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Effects of motor impulsivity and sleep quality on swearing, interpersonally deviant and disadvantageous behaviors on online social networking sites

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ABSTRACT

Reports point to an increase in problematic uses of social networking sites that may include swearing, interpersonally deviant and disadvantageous online behaviors. The etiology of such behaviors, though, is still unknown. Relying on models borrowed from the offline problematic behavior (e.g., gambling, substance abuse) and neurocognitive literatures, we theorize that such behaviors are driven, in part, by elevated motor impulsivity and poor sleep quality, which is also a growing concern in modern society; and that poor sleep quality strengthens the effects of motor impulsivity on the examined range of problematic behaviors, after accounting for stress effects. To test this model we conducted a time-lagged study involving 384 young adults from the US who use social networking sites. Findings based on structural equation modeling analyses reveal that (1) motor impulsivity drives some problematic online behaviors, (2) poor sleep quality (at normative levels) does not directly influence these behaviors, and (3) poor sleep quality augments the effect of motor impulsivity on swearing, interpersonally deviant, and disadvantageous online behaviors, after accounting for stress effects. The results point to possible etiological underpinnings of problematic online behaviors and can serve as a springboard for the development of interventions that target such factors.

1. Introduction

The proliferation of social networking sites (SNS) has been largely advantageous for many people, but has also led to the emergence of a range of modern-day problematic behaviors (i.e., behaviors that are disadvantageous to users in the long run and/or are deemed to be socially unacceptable and less civil). These include deviant online behaviors such as using coarser rhetoric among users or virtually attacking other people (Siegel, 2009); and the use of SNS at inappropriate times such as while driving (Turel & Bechara, 2016a) or when talking face-to-face with other people (Turel & Bechara, 2016b). Consequently, 47% of Facebook walls contain profanity (Davis, 2011) (words that are judged to be profane by many members of a society, e.g., "fuck", "shit", "bitch"), 40% of drivers report some level of SNS use while driving (Turel & Bechara, 2016a), and many report frequent impulsive, unplanned use of such sites, even in situations in which they are not supposed to use such sites (Turel & Bechara, 2016b). Such behaviors can be conceived as problematic since they can be dangerous (e.g., using SNS while driving), infringe social civility and promote online and offline aggression (e.g., swearing online or using a cellphone while talking to other people), or be less advantageous for users (e.g., using SNS instead of studying or working). Hence, understanding the etiology of such behaviors is warranted and can lead to the development of efficacious interventions.

This study suggests that problematic online behaviors on SNS can be rooted, at least in part, in individual differences associated with brain systems that govern impulsive and problematic behaviors and with situational factors that can influence such systems. First, the literature on rewarding yet disadvantageous and often perceived-to-be deviant behaviors such as gambling and drug abuse suggests that trait impulsivity (a stable tendency to act rashly and engage in behaviors without adequate forethought) is a key driver of such behaviors (Verdejo-Garcia, Lawrence, & Clark, 2008). This trait is fairly steady and varies normatively among healthy subjects (Patton, Stanford, & Barratt, 1995). Its effect on problematic behavior stems from its well-established associations with poor inhibitory control, with flawed future discounting and reward sensitivity (Verdejo-Garcia et al., 2008), and with lack of proper forethought in decision-making (Jentsch & Taylor, 1999).

Impulsivity can manifest through many facets, including attentional/cognitive (making quick decisions without considering all facts), motor (acting rashly without thinking), and non-planning (orientation toward present gains) impulsiveness (Patton et al., 1995). It is assumed that the motor facet is most relevant for explaining spontaneous yet often

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deviant or harmful use of SNS because it captures low ability to inhibit pre-potent behavioral responses (Bechara, Damasio, & Damasio, 2000), such as using aggressive, profane, and inappropriate online language, or using websites in inappropriate situations. Hence, our first hypothesis is that motor impulsivity will be positively associated with a range of problematic behaviors on SNS, including swearing (use of words that are largely deemed to be profane by a society), interpersonally deviant uses (behaviors that can offend or harm other people), and disadvantageous uses (behaviors that are largely socially or explicitly prohibited and can be potentially harmful).

Poor sleep quality, which reflects underperformance on various sleep dimensions including falling and staying asleep, sleep duration and after-sleep alertness, is another contributing factor to poor decision-making and consequent impulsive and problematic behaviors (Killgore, Balkin, & Wesensten, 2006). The reason is that poor sleep adversely influences prefrontal cortical functioning (Durmer & Dinges, 2005), which translates into weak behavioral inhibition, and more impulsive and aggressive behaviors (Anderson & Platten, 2011). Indeed, poor sleep quality has been associated with many problematic behaviors, including drug use and relapse, cigarette smoking, and gambling, as well as with aggressive behaviors (Kamphuis, Meerlo, Koolhaas, & Lancel, 2012). Since poor sleep is often linked to stress (Huang et al., 2011), which can have similar and confounding effects on problematic behaviors (Sinha, 2001), one needs to control for stress effects before isolating sleep effects on problematic behaviors. The second hypothesis is therefore that poor sleep quality will be positively associated with problematic behaviors on SNS, including swearing, interpersonally deviant uses, and disadvantageous uses, after controlling for stress effects.

Poor sleep quality has also the potential to disturb normal body physiology by creating a sense of persistent disturbance (tiredness) that people normally want to address, for example, by cognitively suppressing it, consuming stimulants, or going to sleep. Such perturbations in the visceral and internal body state have been proposed to be linked to activity in the insular cortex (Contreras, Ceric, & Torrealba, 2007) and can be induced by a variety of conditions, including poor sleep (Chen et al., 2016). When a sense of perturbation in body physiology is generated (e.g., through tiredness), these interoceptive signals are received by the insula, which in turn mobilizes a series of neural events that lead to behavioral actions concerned with paying attention to immediate events that help correct or turn attention away from these perturbations. The end result of this insular activity is the promotion of impulsive behaviors and the hijacking of decision-making processes concerned with the control of these impulses (Naqvi & Bechara, 2010).

Consistent with this view, it has been shown that sleep deprivation creates perturbations that promote impulsive behaviors and lower inhibitions (Anderson & Platten, 2011). The neural mechanism of such perturbations involves the engagement of the insular system, which increases the brain's reliance on the impulsive brain system (Noel, Brevers, & Bechara, 2013). Using this logic of perturbation effects, we propose here to test the hypothesis that sleep disturbances, as manifested in poor sleep quality, increase the reliance on the impulsive brain system and reduce inhibition abilities (Turel & Bechara, 2016b). Hence, the third hypothesis is that poor sleep quality will moderate (strengthen) the association between motor impulsivity and problematic behaviors on SNS, including swearing, interpersonally deviant uses, and disadvantageous uses, after controlling for direct and moderating stress effects.

Beyond stress controls, we controlled for other factors that may influence problematic online behaviors, including age and sex (Livingston & Room, 2009), number of contacts on the SNS (which can provide motivation and opportunity to engage in problematic behaviors (Turel & Bechara, 2016a)), and grade point average (GPA) because, as an indirect manifestation of self-control, intellect and school misconduct, it can also relate to problematic online behaviors (Qahri-Saremi & Turel, 2016).

2. Methods

2.1. Participants

Participants were recruited from a population of university students who use SNS. This segment of the population was deemed appropriate for this study since it often has some level of sleep disturbances (Lund, Reider, Whiting, & Prichard, 2010) and it tends to use SNS, including problematic use (Turel & Serenko, 2012), more than others. The study was approved by the institutional review board of an American university. Exclusion criteria were: (1) younger than 18 years old, or (2) not actively using SNS. All participants gave written informed consent when they started the study. For the pilot study, 84 people were invited and 65 completed the two surveys (77.3% response rate). For the main study 481 people were invited and 384 completed the two surveys (79.8% response rate). No exclusions were made.

2.2. Procedure

The same procedures were employed for both the pilot and main studies. Participants were invited via the online learning system of a statistics class to voluntarily participate in a study of SNS use behaviors in exchange for bonus points. The study required the completion of two online surveys. Participants who completed the first survey were invited via email to complete a second follow-up survey one week after the first survey. The first survey and consent form gave no information about what would be measured in the second survey, thus minimizing any influence on normal behavior during the intervening week.

2.3. Measures

Since participants can use multiple SNS, they were asked to focus on the one site they use the most. The first survey included descriptive variables and the individual differences on which this study focuses. The second survey captured self-reported sleep quality, stress, and problematic behaviors over the previous week. All measures were valid and reliable adaptations of existing scales and items. Because some were adapted to the SNS context or modified/shortened, they were pilot tested. They presented reasonable psychometric properties both in the pilot test and the main study. Scales and descriptive statistics are given in Appendix A.

2.4. Statistical analysis

Given that the model includes a complex net of relationships with multiple outcome variables and latent factors, the structural equation modeling (SEM) facilities of AMOS 24 were used to estimate it. The analysis followed the two-step approach (Anderson & Gerbing, 1988), starting with a confirmatory factor analysis model. In the second step a sequence of structural models was estimated. Since negative phenomena often do not follow the normal distribution (Turel, Serenko, & Giles, 2011), bias-corrected bootstrapping (500 resamples, 95% confidence interval, two-tailed significance) was used for estimate generation. This approach imposes no distribution assumptions on the variables; it is also useful for assessing moderation effects since the product of two variables typically produces non-normal residuals (Preacher, Rucker, & Hayes, 2007). Two-tailed p-values are reported. Common cutoff criteria were used for assessing model fit (Hu & Bentler, 1999). Moderation plots and path coefficients were generated with the Interaction package (http://www.danielsoper.com/Interaction/).

3. Results

The sample included 384 young adults (average age of 23.30, range = 18–47, SD = 3.84, 83.6% in the 18–25 age range, 14.3% in the 26–35 age range, and 2.1% in the 36–47 age range) who use SNS. Most