



Self-regulation and bedtime procrastination: The role of self-regulation skills and chronotype



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ABSTRACT

The present study focuses on examining the role of chronotype in the relationship between self-regulation skills and bedtime procrastination. Two possible models were tested, hypothesizing that eveningness may moderate or mediate the association between self-regulation abilities and bedtime procrastination. A sample of 304 participants completed measures of self-regulation, morningness–eveningness, bedtime procrastination, and subjective indicators of the amount and quality of sleep. The analyses showed that bedtime procrastination was negatively correlated with hours of sleep and positively correlated with frequencies of perceived insufficient sleep and daily fatigue. Moreover, bedtime procrastination was negatively related to self-regulation skills and to morningness. No significant interaction (moderation) effect was found between self-regulation skills and eveningness. The analysis showed that eveningness partly mediated the relationship between low self-regulation skills and bedtime procrastination. The results confirm that low self-regulation skills may account for higher bedtime procrastination, and suggest that this negative effect reveals itself, in part, through enhancing eveningness.

1. Introduction

Perceived insufficient sleep has recently grown to become a serious social problem. Empirical findings from many countries confirm that the problem affects a large proportion of people, who not only experience discomfort, such as daytime fatigue and sleepiness, but also are exposed to other serious effects of sleep insufficiency (Kroese, De Ridder, Evers, & Adriaanse, 2014; Nowicki et al., 2016; Ogińska, Mojsa-Kaja, Fafrowicz, & Marek, 2014). Just like objective or actual sleep insufficiency, perceived insufficient sleep has a significant effect on physical and mental health, achievement, work safety and efficiency, and social relationships (Hairston & Shpitalni, 2016). Perceived poor quality and insufficient amount of sleep are more common than clinical insomnia and research into this problem may provide important additional information helpful in understanding the causes of sleep problems and the significance of sleep for health in the general population (Benham, 2010; Nowicki et al., 2016).

The prevalence of subjective complaints about poor quality and insufficient amount of sleep, however, calls for looking at sleep problems from a different perspective than just the clinical one. Sleep problems leading to perceived insufficient sleep are often caused by the lifestyle and negative sleep habits. People's behavior is a significant determinant of their health. Apart from the genes, the quality of healthcare, and the environment, it is behavioral factors that account

for 40% of deaths in developed countries (Benham, 2010). This is why a large proportion of studies within health psychology focus on examining the determinants and supporting the positive health effects of such behaviors as physical activity, healthy diet, following doctor's orders, avoiding smoking and drinking, and, recently, also behaviors enabling healthy sleep (Hagger et al., 2014; Kor & Mullan, 2011; Loft & Cameron, 2013).

Preliminary evidence confirms that just like other health related behaviors, the quantity and quality of sleep are related to self-regulation skills. Higher self-regulation skills not only facilitate healthy eating, systematic physical exercise, and changing bad habits; individual differences in self-regulation skills are also related to hours of sleep and daytime fatigue (Hagger, 2010; Kroese et al., 2014; Kroese, Evers, Adriaanse, & de Ridder, 2016). Research findings also suggest that poorer self-regulation skills are related to a failure to follow the principles of sleep hygiene (Kor & Mullan, 2011), whereas improving the ability to control one's behavior using intention implementation imagery may be a good way to develop healthy sleep related habits (Loft & Cameron, 2013).

According to Duckworth and Steinberg (2015), in order to fully understand the findings from numerous studies of self-regulation, we need to make a distinction between the external signs of self-regulation and its underlying psychological processes. There are two basic groups of processes that play a significant role in self-regulation: volitional

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processes that facilitate self-regulation, and impulsogenic processes that undermine self-regulation. When examining the determinants of effective self-regulation, psychologists show a much stronger focus on volitional skills than impulsogenic tendencies. For instance, from the developmental perspective, it is often presumed that impulsogenic tendencies remain constant throughout life and that what changes over time is volitional skills. In fact, understanding the full picture of factors determining the efficiency of self-regulation requires taking into account both processes that facilitate self-regulation and those that make it difficult (Duckworth & Steinberg, 2015). Self-regulation failure may result both from weak volitional processes and from powerful impulsogenic processes.

In the context of sleep related behavior, the evening chronotype (or eveningness) is one of the factors undermining self-regulation. In other words, sleep problems may result not only from the individual's low self-regulation skills (or volitional skills), but also from the fact that their preferred bedtimes and rise times (related to eveningness) differ from normative social schedules such as work or school hours. For example, sleep problems which are common among adolescents are strongly linked their circadian rhythm shift toward eveningness (Randler, Fabi, & Kalb, 2017). The delayed sleep-phase syndrome is significantly more frequent among adolescents (7%–16%) than in the general population (0,13–0,17%) (Bittencourt, Santos-Silva, De Mello, Anderson, & Tufik, 2010). Thus, it may be concluded that, in a sense, it is an internal biological mechanism that makes adolescents go to sleep late.

1.1. Self-regulation, bedtime procrastination, and insufficient sleep

Self-regulation involves the ability to manage one's goal-directed activities. It activates processes through which people manage their thoughts, emotions, and behavior in ways consistent with their goals. Every effort to change one's own internal states and responses may be regarded as a sign of self-regulation (Baumeister, Schmeichel, & Vohs, 2007; Karoly, 1993; Kuhl, 2000).

Self-regulation skills play a crucial role in the transition from an intention to behavior consistent with this intention. Hence, poor self-regulation is considered to be an important factor responsible for the behavioral gap. One manifestation of intention-behavior inconsistency is procrastination or delaying an intended action (Howell, Watson, Powell, & Buro, 2006; Lay, 1986; Stainton, Lay, & Flett, 2000). Procrastination means that the individual has formed an intention, but is unable to proceed from intention to action. Thus, procrastination does not result from low motivation, but rather from poor behavior control mechanisms or low self-regulation (Kuhl, 2000).

It seems that many people have the intention and possibility to sleep well and sleep enough hours, but they cannot implement this intention successfully. The failure to successfully move from the intention to sleep well to taking specific steps that would ensure good sleep may be seen as one of important factors contributing to chronic sleep deprivation in many individuals (Loft & Cameron, 2013).

According to Kroese et al. (2014) delaying bedtime is a relatively common bad habit contributing to perceived insufficient sleep. Researchers refer to this habit as bedtime procrastination. Delaying bedtime may be regarded as an example of procrastination, because just like general procrastination it involves putting off an intended action (in this case, going to bed), a lack of clear reason for the delay (the individual could go to sleep but fails to do so), and the procrastinator's ability to predict some negative consequences of the delay (such as feeling tired when having to get up the next morning) (Nauts, Kamphorst, Poortvliet, Sutu, & Anderson, 2016).

Research shows that this specific type of procrastination, i.e. bedtime procrastination, is linked to low perceived quality and quantity of sleep. Delaying bedtime turns out to be a prevalent habit in the general population, having a significant effect on perceived insufficient sleep and daytime fatigue. Studies have also confirmed that this particular

form of procrastination (delaying bedtime) is associated both with general procrastination and with self-regulation (Kroese et al., 2014, 2016; Nauts et al., 2016).

Kroese et al. (2014, 2016) have found that people with poor self-regulation skills usually go to bed later than they intended and that this behavior has a significant effect on their subjective experience of insufficient sleep. These negative consequences raise a question: Why do people engage in bedtime procrastination? Why do they delay bedtime despite being aware of the negative consequences of this behavior? Just like research into the causes of general procrastination, studies looking for the causes of bedtime procrastination have not yet provided a satisfactory answer (Nauts et al., 2016; Steel, 2007). Low self-control making the individual give in to current temptations without considering the long-term consequences of such behavior, does not seem a satisfactory explanation in this case, because the negative consequences, such as perceived insufficient sleep, will be experienced by the bedtime procrastinator relatively soon. So perhaps our answer to the question about why people engage in bedtime procrastination cannot be limited to low self-regulation skills, but should also include individual differences in chronotype?

1.2. Self-regulation skills, chronotype, and bedtime procrastination

The term “chronotype” refers to individual differences in circadian rhythms or, in other words, in the functioning of the human biological clock. At the psychological level, chronotype is a preference for a specific time of the day, reflected by objective effectiveness of action and by mood oscillations (Jankowski, 2014; Stolarski, Ledzińska, & Matthews, 2013). Chronotype is also linked to individual preferences for early or late bedtimes and rise times (Jankowski, 2017; Vollmer et al., 2017; Wittmann, Dinich, Merrow, & Roenneberg, 2006).

Chronotype is determined by biological factors (specific genes), individual factors (such as gender or age), and environmental factors (e.g., changes of light and dark) (Randler et al., 2017). However, the circadian rhythms are also influenced by social synchronizers, such as social activity, including school schedules or the family life, as well as other social factors. For example, a study of adolescents which examined the links between morningness–eveningness, pubertal development, and family relationships showed that a strong drive toward autonomy (independence) and frequent conflicts in the family were the most significant predictors of eveningness. The effect of family relationships on eveningness turned out to be stronger than the effect of factors, such as age and pubertal development (Díaz-Morales, Escribano, Jankowski, Vollmer, & Randler, 2014). Other studies also confirm that factors related to family functioning contribute to chronotype. Women's chronotype is influenced by pregnancy and by having children (Leonhard & Randler, 2009), and children's chronotype is influenced by the rules of family life, parental attitudes, and sleep problems experienced by the parents, especially the mother (Bajoghli, Alipouri, Holsboer-Trachsler, & Brand, 2013; Brand, Gerber, Hatzinger, Beck, & Holsboer-Trachsler, 2009; Urfer-Maurer et al., 2017). Other data suggest that following the principles of sleep hygiene or shaping healthy patterns of sleep related behavior may be effective in preventing the shift toward eveningness in adolescence (Vollmer et al., 2017). It turns out that regular, though not necessarily very intensive, physical activity, adhering to earlier bedtimes, and following the basic rules of sleep hygiene may improve the quality of sleep even in adolescents suffering from serious sleep disorders, such as the delayed sleep-phase syndrome (Brand et al., 2010; Dewald-Kaufmann, Oort, & Meijer, 2014; Richardson, Gradisar, Short, & Lang, 2017).

Social jetlag or misalignment of the biological and social clocks is considered to be the main cause of both sleep problems and other health issues of evening types. Evening types have to deal with a discrepancy between their preferred times for work and study and morning-oriented schedules imposed by social rules (Jankowski, 2017; Vollmer et al., 2017; Wittman et al., 2006). This misalignment makes

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