



Revenge Bedtime Procrastination – a Compromise for Satisfying Frustrated Needs?

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Abstract

Sleep is an essential aspect of everyday life to stay healthy, mentally and physically. There are numerous aspects of why employees sacrifice their sleep, intentionally and unintentionally. *Revenge Bedtime Procrastination* is a deliberate form of bedtime procrastination. It is the attempt to purposefully eke out some leisure time in a day full of obligations by postponing one's sleep. This thesis studied the phenomenon through the lens of self-determination theory. It was hypothesized, that the urge to eke out some leisure time for oneself is a compromised strategy to counter the frustration of basic psychological needs at work (autonomy, relatedness, competence). Participants completed a questionnaire and results showed a significant positive association between need frustration at work and revenge bedtime procrastination. A job resource that was assumed to provide the possibility to fulfill basic psychological needs directly at the workplace was taking work breaks. Taking more frequent self-initiated work breaks had no significant moderating effect on the relationship between need frustration at work and revenge bedtime procrastination. These results are discussed in relation to work break quality and culture at the workplace. The thesis results underline the importance for organizations and employees to consider aspects in the workplace that frustrate basic psychological needs and find ways to mitigate unnecessary need frustration because it presumably affects employees' sleep behavior.

Keywords: Deliberate Bedtime Procrastination, Revenge Bedtime Procrastination, Self-Determination Theory, Basic Psychological Needs Frustration, Work Breaks

Revenge Bedtime Procrastination, Need Frustration, and Work Breaks

“Human beings are the only species, that deliberately deprive themselves of sleep for no apparent reason.” – (Walker, 2019)

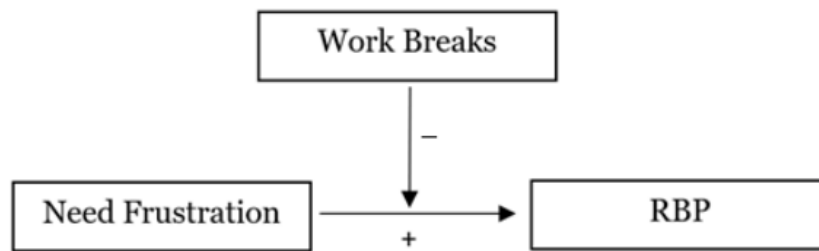
Research has shown that good sleep is an essential factor for short- and long-term health (Medic et al., 2017). But it is also well known that many employed people get less sleep than needed to function well (Swanson et al., 2011), and sleep impairment is negatively associated with employees’ health, well-being, work performance, and job satisfaction (Kuppermann et al., 1995). In recent days, there are countless reasons why working people sacrifice their sleep, intentionally or unintentionally. While research already started to investigate people’s intentional bedtime delay for example as “borrowing” this time for serving other obligations such as work or family (Barnes et al., 2012), qualitative research by Nauts and colleagues (2019) uncovered, bedtime procrastination seemingly has more causes and characteristics. Identified as another type of intentional bedtime delay, *deliberate bedtime procrastination* has the purpose to eke out some leisure time in a day full of obligations. This is similar to a phenomenon mentioned in the non-scientific literature on resources such as web blogs where people describe engaging in *Revenge Bedtime Procrastination (RBP)* for having the only leisure time in a working day full of obligations (Liang, 2020). To this date, an investigation of correlates of why people engage in this deliberate form of bedtime procrastination is lacking (Hill et al., 2022).

Taking the Self-Determination Theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000) into account, its mini-theory (Basic Psychological Needs Theory, BPNT; Deci & Ryan, 2000) proposes people’s well-being, vitality, and motivation is constituted by the fulfillment of their three basic psychological needs (BPN). The frustration of those needs is associated with people’s ill-being (Bartholomew et al., 2011b; Stebbings et al., 2012). These are the needs for autonomy,

relatedness, and competence. For employees, the work environment determines important opportunities for their needs to be fulfilled or frustrated (Gagné & Deci, 2005), as working adults spend on average eight hours on the job while awake (Harter, Schmidt & Keyes, 2003). When people chronically fail to have their three basic needs met (i.e., BPN are frustrated), they cope by developing maladaptive mechanisms to accommodate the experience of need frustration (Vansteenkiste & Ryan, 2013). In this research, engagement in RBP is assumed to be a compromised strategy, and it is presumed to be linked to the frustration of employees' BPN at work. Thus, the first research purpose of this study is to gain a better understanding of RBP, by documenting and examining the link between need frustration at work and this form of deliberate bedtime procrastination.

According to the Job Demand-Resources Model, job resources (e.g., autonomy, social support, skill variety, breaks from work) can buffer the negative impacts of job demands (Bakker & Demerouti, 2017) and job resources are negatively associated with employees' need frustration (Toyama et al., 2022). Work breaks within the workday are shown to alleviate the impact of daily job demands and recover resources (Kim et al., 2017). Therefore, the second aim of this research is to investigate whether engaging in frequent self-initiated work breaks in the workplace, can lessen the relationship between need frustration at work and deliberate bedtime procrastination. Figure 1 shows the investigated research model for this study.

Figure 1
Proposed investigation model



This extension to the work-life literature provided a greater understanding of the relatively young research topic of bedtime procrastination (Kroese et al., 2014; Hill et al., 2022) and especially of one specific type of deliberate bedtime procrastination (Nauts et al., 2019), that is RBP. It thus contributed to Hill and colleagues' (2022) suggestion to further specify and redivide the broad construct of bedtime procrastination. Through the lens of SDT, it is suggested to be the compromised strategy to fulfill BPN that are frustrated at work. Within SDT, the research focus has been mostly on need satisfaction, not need frustration (Bartholomew et al., 2011b; Van den Broeck et al., 2016; Van den Broeck et al., 2021). This investigation's focus therefore accumulated to the so far neglected SDT perspective. Practically, this research aimed to emphasize the importance of work breaks and their potential positive impact on serving as a period during a working day that has the potential to be a pathway for employees to counter need frustration.

RBP - a Form of Deliberate Bedtime Procrastination

Bedtime procrastination is studied as an important factor in health-related behavior affecting people's health and well-being (Kroese et al., 2014). Bedtime procrastination is defined as "going to bed later than intended, without having external reasons for doing so." (Kroese et al.,

2016, p. 853). Employees, although they have to get up early in the morning, postpone their bedtime and thus are getting an insufficient amount of sleep. It was first conceptualized as a form of procrastination, indicated by an intention-behavior gap (Steel, 2007), and assumed to happen because of low self-regulation (Kroese et al., 2014; Kroese et al., 2016). But further studies revealed, that for some people it can also be a question of chronotype whether to go to bed late during the working week, although they have to get up early the next morning (Kühnel et al., 2018). For examining explanations people give for *why* delaying their bedtime, Nauts and colleagues (2019) conducted a qualitative study, using in-depth, semi-structured interviews. Besides *mindless procrastination* like staying up late to watch TV, they found that people *strategically delayed* bedtime for reasons such as insomnia if going to bed too early. Others delayed their bedtime *deliberately* for having time for themselves, *knowingly* and *intentionally* that they would be worse off the next day. This shows, although the outcome of sacrificed sleep and therefore the problematic health-related behavior is the same for all types of bedtime procrastination, they differ in terms of unintentional (mindless bedtime procrastination) and intentional (strategic delay / deliberate bedtime procrastination). I conceptualize the studied phenomenon of RBP as the deliberate form of bedtime procrastination and define RBP as “*purposefully* sacrificing some sleep time to eke out some free time in a working day full of obligations”.

Particularly working people or caretakers describe this time between finishing their obligations and going to sleep as the only time fully dedicated to themselves (Liang, 2020; Nauts et al., 2019). Nauts and colleagues (2019) pointed out that people attempted to justify the delay by construing it as a way to meet a need for autonomy (Deci & Ryan, 2000). Sonnentag (2001) showed that low-effort, social, or physical activities had a positive effect on individuals’

situational well-being before going to sleep, which existed beyond individuals' well-being at the end of the workday. It can be assumed, that in this regard RBP is an employee's intentional attempt to contribute to his or her well-being and RBP can serve as a time necessary to compensate frustrated needs.

The Frustration of Basic Psychological Needs and Deliberate Bedtime Procrastination

Self-Determination Theory (SDT) (Deci & Ryan, 2000; Ryan & Deci, 2000) and its sub-theory (Basic Psychological Need Theory (BPNT); Deci & Ryan, 2000) assume that people actively seek out their three basic psychological needs (BPN) to be fulfilled, to feel vital and well, which are autonomy, relatedness, and competence. In contrast, studies showed that ill-being is associated with the frustration of those needs (Bartholomew et al., 2011a, b; Olafsen et al., 2017). The social context determines the fulfillment or frustration of the BPN (Deci & Ryan, 2000; Ryan & Deci, 2002). For working people, this to a large extent is the workplace (Gagné & Deci, 2005, Vander Elst et al., 2012). The need for *autonomy* involves acting with a sense of volition and having the experience of choice (Gagné & Deci, 2005). An employee who is fully able to choose and thereby stands behind her or his actions should experience more satisfaction of this need, than an employee who chooses a particular task because of others' expectations. In the working context, it was shown that autonomous motivation correlates positively with, for instance, work-related well-being and optimal performance as it is conducive to the satisfaction of the three basic needs (Gagné & Deci, 2005; Shir et al., 2019; Van den Broeck et al., 2008). Autonomy frustration happens if the employee feels coerced and has no choice to perform or not perform a certain behavior. The need for *competence* (White, 1959) refers to the experience of mastering situations effectively and skillfully, while its frustration refers to feeling ineffective and unable to achieve desired outcomes, resulting in helplessness and a lack of motivation (Deci

& Ryan, 2000). The need for *relatedness* (Baumeister & Leary, 1995) refers to the experience of feeling connected and cared for by important others, while frustration is experienced if one feels disconnected, excluded, and/or not respected by people he or she wants to belong to. It is crucial to understand, that not being satisfied in one or several needs (i.e., need dissatisfaction) and need frustration have a clear differentiation: If BPN are dissatisfied, they are not actively supported whereas frustration of BPN describes that someone's BPN are *actively undermined* [by others/the social context] (Bartholomew et al., 2011a,b; Vansteenkiste & Ryan, 2013). In this line, Bartholomew et al. (2011b) showed, that need thwarting predicted exhaustion (i.e., ill-being) while need satisfaction predicted vitality (i.e., well-being). Essentially, the frustration of psychological needs is the basic principle underlying individuals' malfunctioning (Gagné & Deci, 2005; Ryan & Deci, 2000; Stebbings et al., 2012; Verstuyf et al., 2012). Employees who are actively excluded from their coworkers are probably hurt (i.e., active frustration of the need for relatedness). However if the workplace does not provide opportunities to have contact with colleagues regularly, the need for relatedness might be dissatisfied but not frustrated.

Following SDT, not the extent to which an individual expresses a particular need, but the degree to which he or she is experiencing need satisfaction is considered to be predictive for his or her optimal functioning (Deci & Ryan, 2000; Van den Broeck et al., 2010) as well as is the degree of frustration is predictive for his or her ill-being and malfunctioning (Bartholomew et al., 2011b; Jang et al., 2016; Vansteenkiste & Ryan, 2013). Whereas low need fulfillment would fail to foster the growth potential of individuals, the frustration of these needs would elicit defensiveness, ill-being, and even psychopathology (Bartholomew et al. 2011b; Ryan et al. 2015; Vansteenkiste and Ryan 2013).

To deal with the continuing frustration of their needs, people develop strategies to satisfy their frustrated needs in a compromised, maladaptive way (Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013; Verstuyf et al., 2012). Those strategies have significant negative consequences for health and well-being (Niemic, Ryan & Deci, 2009). People use need substitutes or engage in compensatory behavior, and sustain a situation of need frustration which can precipitate a negative cycle of increasing vulnerabilities for nonoptimal functioning (Vansteenkiste & Ryan, 2013; Verstuyf et al., 2012). A motivated employee who perceives work tasks, that do completely mismatch her competencies (i.e., being actively frustrated in her need for competence) might be hindered to work effectively on her task and therefore starts to lower her motivation and standard towards the completion of her tasks, which keeps her trapped in a vicious cycle of being frustrated about her results. Another employee who is told to stay in the office although he has too little work to do (i.e., being actively frustrated by his need for autonomy), might spend this time completing private issues as compensation, which becomes the rule also during periods with high workload, leading to malfunctioning at the workplace.

We know from numerous studies, that effects from work life spill over into non-work life (e.g., Poppleton, Briner & Kiefer, 2008; Westman, 2013), and we can suppose that employees who experience the frustration of one or more of their BPN at the workplace, try to compensate during their work – as well as their non-work life. I assume that engagement in RBP is such a compromise. In this research, I classify RBP as the compensatory activity of *oppositional defiant behavior* (Ryan et al., 2015; Vansteenkiste & Ryan, 2013; see also: Tyagi, 2022 for a first assessment) that working people use to restore frustrated needs in a compromised way. In Nauts et al.'s (2019) research, for example, a 50-year-old female participant described her deliberate bedtime delay as a form of defiance:

[...] Whatever! I am not going to do it. I am just going to, going to play a game. Or just watch another episode. . . I am allowed to do that. It's a way of revolting against all the obligations that you have. Because well, my life, and I think the life of most adults, consists of lots and lots of obligations. (p.756)

Thus, employees' engagement in RBP shows a form of defiance against the overwhelming obligations, daily life through job and home demands puts on them with little time and energy left for actively organizing satisfying leisure time during the day. The eked-out leisure time that RBP provides, can serve to satisfy frustrated needs. People might chat with friends (i.e., satisfy the need for relatedness) or master a hobby (i.e., satisfy the need for competence) and satisfy their need for autonomy by intentionally and deliberately engaging in RBP.

Therefore, it is critical to understand the phenomenon of this form of deliberate bedtime procrastination and its suggested link to work to a better extent and it is hypothesized that

Hypothesis 1: The frustration of the BPN at work is positively related to RBP (H1).

Work Breaks Moderate the Association Between BPN Frustration and RBP

Following SDT, the degree to which employees' BPN are frustrated or satisfied is determined by their work environment. Consequentially, positive aspects of the job (e.g., job resources) can foster employees' satisfaction with BPN, which is also described in the Job Demands-Resources model (Bakker & Demerouti, 2017; Demerouti et al., 2001). These *job resources* can help the employee to achieve a work goal, stimulate personal growth and development, and provide the opportunity to counter *job demands* and their consequences that are the physical, psychological, social, or organizational aspects of the job that require sustained

physical and/or psychological effort and are therefore associated with certain physiological and/or psychological costs (Bakker & Demerouti, 2017; Demerouti et al., 2001). Job resources were found to be negatively associated with employees' need frustration (Toyama et al., 2022) and thought to contribute indirectly to the satisfaction of employees' BPN (Deci & Ryan, 2000, Van den Broeck et al., 2008). For example, social support is a job resource that could also provide satisfaction for the need for relatedness.

In this regard, *work breaks* can serve as a job resource. They are defined as recovery opportunities that may involve recovery activities or experiences (Sonnetag et al., 2017), essential to preserve and replenish resources (Troughakos & Hideg, 2009). At work, these recovery activities/experiences could counter the frustration of BPN. For example, an employee, who dislikes her team in a project, could spend her breaks with colleagues she likes better. Work breaks should represent autonomous moments during the workday (Troughakos et al., 2014) because work breaks represent a time during which work-relevant tasks are not required or expected (Troughakos et al., 2008). Ideally, employees can use work breaks to actively shape this time as they like, to satisfy their needs for autonomy, relatedness, and competence, as far as the workplace provides opportunities.

Work breaks are intentional, self-initiated moments, contrary to unexpected work interruptions (Puranik et al., 2020). Yan (2023) proposed that some people can intentionally arrange more work breaks during the daytime to satisfy their leisure needs in a more balanced way, as breaks can foster the proactiveness of employees to change their circumstances (Frese & Fay, 2001; Griffin, Neal & Parker, 2007). Employees who can frequently self-initiate breaks apart from the obligatory lunch break can plan and engage in different activities when needed. If someone can choose self-determined to take a short break, she or he is also likely to show

behavior or to do an activity that provides the “nutriments” needed to satisfy BPN (Deci & Ryan, 2000). I argue that self-initiated breaks from work can counter BPN frustration, and employees who experience BPN frustration at work can mitigate the effect on RBP by taking frequent work breaks. Employees who can choose to take a self-initiated break (actively satisfy the need for autonomy), might be able to do this with their preferred co-worker (actively satisfy the need for relatedness) or if they feel that they need to recharge (actively satisfy the need for autonomy and competence) and thus counter potential need frustration.

In this regard, it is hypothesized that

Hypothesis 2: The association between BPN frustration at work and RBP is moderated by frequent self-initiated work breaks, in that way that by more self-initiated work breaks, the association between BPN frustration at work and RBP is lower (H2).

Method

Sample

The initial sample consisted of $N = 127$ participants. $N = 97$ participants finished the study. Because of a wrong response to a proof question, nine participants were excluded from the quantitative analyses. All valid participants gave their informed consent. $N = 88$ participants remained for quantitative hypotheses testing. 48 (54.5 %) participants were female. 36 % ($n = 32$) belonged to the age group ranging from 20-29 years, and 47 % ($n = 41$) of the participants were in the age group ranging from 30-39. The other 17 % ($n = 15$) participants were in age groups ranging from 40-49, 50-59, or 60-69 years. 20 (23 %) participants lived by themselves, 37 (42 %) lived with a partner, 16 (18 %) lived with a partner and children, two (3 %) lived with their children and 13 (14 %) lived in other circumstances. 80 % ($n = 70$) of the participants hold at least an educational level equivalent to a bachelor’s degree. 57 (65 %) participants worked as

upper-level white-collar worker, 17 (19 %) worked as lower-level white-collar worker, 4 (5 %) worked as blue-collar worker and 10 (11 %) participants worked in the high management. Participants worked on average 37.89 ($SD = 10.97$) hours a week, up to 66 hours, on average they worked 33 % of their time remotely.

Research Design and Procedure

This research, which was approved by the ethics committee of Behavioural and Social Sciences of the University of Groningen, used an online questionnaire design. Participants were asked to read the description of the study (Appendix A1) and provide their active informed consent (Appendix A2). The survey used two established scales which were the Bedtime Procrastination Scale (Kroese et al., 2014) and the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS; Chen et al., 2015). The Bedtime Procrastination Scale and questions about participants' general bedtime behavior and whether and why they were engaging in RBP were presented first, followed by the BPNSFS. Participants were asked, how many self-initiated work breaks they take on average, for how long, how they spend them, and whether the breaks were of good quality. Subsequently, some questions about sleep duration and quality were asked, followed by demographic questions such as gender, age, current country of residence, living conditions, and different questions regarding educational and working status. Afterward, participants were informed that responses were recorded and thanked for their participation. The participants received no rewards or other incentives for their participation and the completion of the survey took approximately 10 minutes.

Measures

Basic Psychological Need Frustration

Basic Psychological Need Frustration was measured using the Basic Psychological Need Satisfaction and Need Frustration Scale (BPNSFS; Chen et al., 2015). The items for relatedness frustration were adapted to emphasize the working context (i.e., “colleagues” instead of “people”). The English version of the scale appears in Appendix A3. The instrument consisted of subscales for autonomy frustration (four items; e.g., “I feel pressured to do many of the things I do”), competence frustration (four items; e.g., “I seriously doubt whether I can do things well”) and relatedness frustration (four items; e.g., “I feel excluded from the work group that I want to be a part of”). The items were reported on a five-point Likert-scale ranging from 1 (completely untrue) to 5 (completely true). Cronbach’s alpha was 0.65 for the need frustration scale, indicating acceptable reliability (Streiner, 2003).

Bedtime Procrastination and Revenge Bedtime Procrastination

Bedtime Procrastination was measured using the Bedtime Procrastination Scale (Kroese et al., 2014). The English version of the scale appears in Appendix A3. The scale consists of nine items (e.g., “I go to bed later than I had intended”), and items were answered on a five-point Likert-scale from 1 (never) to 5 (always). To figure out whether those people tend to engage in the deliberate form of bedtime procrastination (i.e., RBP), a definition of RBP was given and participants were asked how many days during a working week they engage in this kind of behavior. Additionally, for qualitative research participants were asked for what reason they engaged in RBP. Negatively phrased items were recoded for data analysis. Cronbach’s alpha was 0.91, indicating good reliability (Streiner, 2003).

Self-initiated Breaks at Work

Self-designed questions toward self-initiated work breaks were asked as follows: (1) “How many self-initiated breaks do you take during a typical working day?”; (2) “How long are your breaks in general?”; (3) “Rate the quality of your work breaks”. Additionally, it was asked, how people spent their breaks. Question (1) was used as a moderator.

Contextual and Demographic Variables

To get a better understanding and gather information on the environment and circumstances, participants live in, contextual variables concerning sleep descriptives and demographics (age, living situation, leadership position, remote work, overtime) were asked.

Data Analyses

For the questionnaire, the program Qualtrix was used, and data analysis was performed with RStudio Version 4.3.0. To ensure that the different BPN could be reproduced in the scales, an explorative maximum likelihood factor analysis was conducted, revealing the items for both need satisfaction and frustration of the basic needs loaded on the different factors as expected. To identify the effects of the frustration of employees’ BPN on their engagement in RBP, a hierarchical regression analysis was performed. For the correlational analysis, the effect size will be expressed by r , where .1 = small, .3 = moderate, and .5 = large (Cohen, 1992). Age and gender were taken into account as control variables.

Results

Descriptive Statistics

36 (41 %) participants stated they engaged in RBP less than three times a working week, and 52 (59 %) stated they engaged in RBP equal to or more than three times during a working week. On average participants went 54 minutes later to bed than intended. They took on average

3.91 ($SD = 2.51$) self-initiated breaks, mostly spending them being social or having a snack/drink. The breaks ranged from two to 30 minutes, with an average of 10.70 minutes ($SD = 7.03$). Participants reported having on average satisfactory ($M = 3.08$, $SD = 0.89$) breaks from work. Employees got on average 6.84 hours of sleep ($SD = 0.89$) during a work week. Participants rated their quality of sleep on average as good ($M = 3.88$, $SD = 1.11$). Means, standard deviations, and Pearson's correlation between study variables are calculated, and presented in Table 1. There was a significant, moderate correlation between the control variable age and the outcome variable RBP, $r(88) = -.37$, $p < .01$. Thus, age was included in further analyses. There was no significant correlation between gender and outcome variable, thus gender was not included in further analyses. As expected, deliberate bedtime procrastination RBP and frustration of BPN showed a significant, moderate correlation ($r(88) = .38$, $p < .01$), as well as deliberate bedtime procrastination and age ($r(88) = -.37$, $p < .01$), and frustration of BPN and age ($r(88) = -.42$, $p < .01$). A non-relevant significant correlation showed age and gender ($r(88) = -.24$, $p < .05$).

Table 1

Means, Standard Deviations, and Pearson's Correlation Between Study Variables

Variables	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Deliberate Bedtime Procrastination RBP	3.09	0.78	-				
2. BPN Frustration	2.39	0.67	.38**	-			
3. Frequency Work Breaks	3.91	2.51	-.01	-.04	-		
4. Age	1.93	0.97	-.37**	-.42**	.05	-	
5. Gender	-	-	.10	.13	-.18	-.24*	-

Note. N=88. * $p < .05$; ** $p < .01$

Quantitative Analyses

Data Inspection and Preliminary Analysis

The assumptions of normality, linearity, multicollinearity, and homoscedasticity have been checked for data analysis. The dataset has a skewness and kurtosis that matches normal distribution. Check for outliers showed one outlier detected by statistical calculation, but after checking manually and deciding that values are plausible for all scales, it remained in the dataset. There was no multicollinearity, this is additionally confirmed by the collinearity statistics (*Need frustration of BPN*, Tolerance = .83, VIF = 1.21; *Age*, Tolerance = .82, VIF = 1.21; *Frequency of Work Breaks*, Tolerance = .99, VIF = 1.00). There was no missing value for the study variables.

Hypotheses testing

Hypothesis 1 stated, that higher frustration of BPN at work increases a deliberate form of bedtime procrastination, RBP. To investigate the hypothesis, hierarchical regression analysis was conducted. The variable revealed a positive relationship, $b = .32$, $t(84) = 2.60$, $p < .05$, and accounted for a significant amount of variance in the intention to engage in RBP $R^2 = .20$, $F(3, 84) = 6.99$, $p < .05$, with an increase of explained variance of $\Delta R^2 = 0.07$, $\Delta F = 6.83$, $p < .05$. Thus, employees who experience more frustration of their BPN show more RBP. Hypothesis 1 was supported by the data.

Hypothesis 2 stated that the frequency of self-initiated work breaks moderates the relationship between BPN frustration at work and RBP. For the moderation analysis, the interaction term of the variables BPN frustration and frequency of work breaks was added to Model 3 (Table 2). The model including the interaction term accounted for a non-significant proportion of the variance in RBP, $b = -.09$, $t(83) = -1.90$, $p = .06$, and accounted for the

Table 2
Hierarchical Regression Analysis Predicting Engagement in RBP

Variable	B	95% CI for B		SE _B	t	R ²	ΔR ²
		LL	UL				
Model 1						0.13	0.13***
(Constant)	3.67	3.32	4.02	0.18	20.92***		
Age	-0.29	-0.46	-0.13	0.08	-3.67***		
Model 2						0.20	0.07*
(Constant)	2.71	1.91	3.52	0.40	6.71***		
Age	-0.20	-0.38	-0.03	0.09	-2.35*		
BPN F	0.33	0.08	0.57	0.12	2.61*		
Model 3						0.23	0.03
(Constant)	1.87	0.67	3.07	0.60	3.10**		
Age	-0.20	-0.38	-0.03	0.09	-2.38*		
BPN F	0.67	0.23	1.11	0.22	3.06**		
Frequency Workbreaks	0.22	-0.01	0.46	0.12	1.87		
Interaction (BPN F x Frequency Workbreaks)	-0.09	-0.19	0.00	0.05	-1.90		

Note. N = 88. CI = confidence interval; LL = lower limit; UL = upper limit; BPN F = BPN Frustration at work; * $p < .05$; ** $p < .01$; *** $p < .001$

non-significant amount of increased explained variance in RBP, $\Delta R^2 = .03$, $\Delta F = 1.80$, $p = .17$. Thus, Hypothesis 2 was not supported by the data.

Explorative Analysis

I conducted an explorative analysis to further examine assumptions from the SDT literature. One assumption is that the psychological need for autonomy is assumed to have a particularly important impact on people's well- or ill-being through satisfaction or frustration (Ryan 1993; Vander Elst et al., 2012). People who can autonomously choose with whom they spend their time (i.e., need for relatedness) and what task they want to do to feel skillfull (i.e., need for competence) are assumed to contribute optimally to their need satisfaction and counter need frustration. It was expected, that the BPN frustration of autonomy contributes most to people's deliberate bedtime procrastination. Explorative analysis of this assumption revealed a

non-significant partial correlation for need frustration of autonomy, controlling for age, need frustration of competence, and relatedness ($r(88) = 0.16, p = .14$).

Furthermore, deliberate bedtime procrastination is assumed to happen as a compensation mechanism because of experienced need frustration. Therefore, Hypothesis 1 stated, it is positively associated with BPN frustration. Studies consistently show that frustration of basic needs is stronger or solely linked with ill-being, and ill-being has no direct or only a weak link with BPN satisfaction (Chen et al., 2015, Nunes et al., 2023), as frustration and satisfaction are not both ends of a continuum but distinct mechanisms. Linear regression showed that BPN satisfaction has a non-significant negative link with deliberate bedtime procrastination ($b = -.26, t(86) = -1.90, p = .07$).

Discussion

Many people do not get enough sleep (Swanson et al., 2011) and one reason is bedtime procrastination (Kroese et al., 2014). This study investigated an intentional and purposeful, deliberate type of bedtime procrastination, RBP. To my knowledge, this was the first study examining this particular form of bedtime procrastination (Hill et al., 2022). It is the phenomenon that people purposefully sacrifice their sleep to eke out some free time in a working day full of obligations. According to Ryan and Deci's SDT (2000), satisfying the BPN is mandatory for feeling vital and well. Individuals who experience continuous frustration of those needs cope by showing maladaptive, compromising behavior (Deci & Ryan, 2000; Vansteenkiste & Ryan, 2013). I assumed employees engage in RBP to compromise for need frustration they experienced during the working day. This was supported by the data, showing a positive association between BPN frustration at work and RBP. Employees whose frustration of the BPN is higher showed more RBP. The second notion was examining whether taking frequent self-

initiated work breaks moderates the relationship between BPN frustration at work and RBP, by mitigating the effect. This hypothesis was not supported by the data.

Theoretical Contributions

Frustration of BPN and RBP

The link between the frustration of BPN at work and RBP is an important finding, indicating employees' use of maladaptive behavior during their leisure time (i.e., sacrificing sleep) is related to overcoming the frustration of the BPN they experience during the workday. This finding suggests that the usage of compromised strategies - although the frustration happens in one context (i.e., work) can spill over to another context (i.e., leisure time). RBP represents an intentional, deliberate form of bedtime procrastination. Thus, people do not sacrifice their sleep because of other obligations such as childcare or necessary appointments, but to promote their psychological well-being and counter frustrated needs. This behavior is in line with the central assumption of SDT, that people actively seek to feel vital and well by satisfying their needs for autonomy, relatedness, and competence (Deci & Ryan, 2000). Nonetheless, I refer RBP to be a compromised strategy (Vansteenkiste & Ryan, 2013; Verstuyf et al., 2012), as it comes at the expense of getting sufficient sleep. Furthermore, this study adds to recent approaches, that forms of bedtime procrastination are not only related to self-control (Kroese et al., 2014; Kroese et al., 2016). Other studies and overviews showed there are different forms, of which some are executed deliberately and intentionally (Hill et al., 2022; Kühnel et al., 2018; Nauts et al., 2019).

Explorative analysis revealed no significant association between need (dis-)satisfaction and deliberate bedtime procrastination, which is in line with previous research (for example Bartholomew et al., 2011b). A significant link was only found between the frustration of BPN

and RBP. This underlines recent assumptions, that frustration and satisfaction of BPN are not inverse, but separate and distinct constructs with different consequences (Bartholomew et al., 2011a, b; Deci & Ryan, 2000). Although the explorative analysis did not show that frustration of autonomy had a stronger link to RBP when controlling for the other two needs, it is possible, that autonomy might play an important role. Intentionally postpone bedtime is an autonomous behavior by itself and in their early works, Deci and Ryan (1985) categorized these behaviors as sufficient for overcoming need frustration. The role of autonomy and RBP could be a topic for future studies.

Self-initiated Work Breaks and Their Role as a Moderator

The hypothesis that frequent self-initiated work breaks could serve as a potential moderator, lowering the relationship between BPN frustration at work and RBP was not supported by the data. This could have several reasons. Fritz and colleagues (2013) proposed that especially the absence of work-related demands is important for recovery processes to occur. Presumably, although employees can take self-initiated work breaks, they cannot spend them with activities that would satisfy frustrated needs because of implicit social norms such as discussing work-related themes during a coffee break which undermines the possibility to detach from job demands and thus, foster the recovery process. Qualitative statements revealed, many self-initiated breaks employees took served for satisfying other basic needs, such as having a snack/drink, but have no impact on the active satisfaction of the psychological needs. In general, while in the office, taking a break can contribute to satisfying some needs, but not all. Meeting friends and having a meaningful conversation or spending quality time with a partner and children (satisfying the need for relatedness) or mastering a hobby (satisfying the need for competence) are all examples of activities that cannot be squeezed into a short self-initiated work

break. Bosch, Sonnentag, and Pinck (2018) found, that employees did not take breaks when they needed them. Instead, they took them when they wanted to reward themselves.

Nonetheless, the data showed that having more breaks impacted employees who had moderate or high frustration in the hypothesized direction, which means, that these employees engaged less in deliberate bedtime procrastination, if they took more work breaks. But the effect reversed when employees reported a low level of need frustration. This phenomenon is rather interesting and needs further exploration. One explanation could be, that workers who are satisfied in the workplace perceive more breaks as an unnecessary interruption during their work, and frustration with their needs increases by having more instead of fewer breaks. Another aspect that can alter the perception of breaks is their quality. If employees take breaks but experience break quality as insufficient, it can be an additional factor, contributing to BPN frustration at work rather than decreasing it. Work breaks are mostly investigated in terms of recovery periods from stress or strain in the workplace (Troughakos & Hideg, 2009). Thus, it is likely that the recovery of resources and the necessary satisfaction of frustrated BPN are two distinct but important mechanisms, that are essential for employees to feel vital. Work breaks might serve primarily the first, but the second only if circumstances allow so.

Limitations and Future Research

This study has several limitations that need to be considered. First, the optimal sample size for this study was not reached and thus the study was underpowered. A smaller sample size than necessary can increase the risk of a type-II error, which can result in the impossibility to detect differences although there are some (Akobeng, 2016). This might be true for Hypothesis 2 of this study in that way, that it may remain non-significant falsely although true.

Another limitation is the cross-sectional design which can just find correlation, not causality. Therefore, the data shows a link between RBP and BPN frustration at work but no causal relation. For future research, it might be critical to conduct a longitudinal study with at least two measurement points or a diary study where people are asked to rate their daily psychological need frustration and their daily deliberate bedtime procrastination a full week. This longitudinal research would be way better able to detect whether there is a causal relationship between the two variables.

The sample that participated in the study consisted mostly of the age group 20-40 years (> 80 %). Age had a moderate negative correlation with BPN frustration and showed that younger employees had a higher frustration of their needs. The low number of older participants could deform the results. That makes the present study more representative of a younger age group and cannot be generalized. Additionally, the sample consisted of well-educated participants, with most of them holding a bachelor's degree, which is also non-representative of the general population. In terms of daily life at work, jobs that need an academic degree can be very different compared to jobs that do not need this degree, as a certain education often comes along with more responsibility but also more opportunities in the job.

The scale that was used for capturing RBP (Bedtime Procrastination Scale, Kroese et al., 2014) was not exclusively for this deliberate type but for bedtime procrastination in general. Although it was asked whether participants engage in the form of intentional, deliberate bedtime procrastination RBP, some qualitative statements revealed, that participants are rarely able to differentiate between different forms of bedtime procrastination. This might confound the results in this study.

Practical Implications

Although not all hypotheses were supported by the data, there remain some practical implications that can be made. There was a clear link between the need frustration at the workplace and RBP which in the long term can be harmful because sleep is an essential factor contributing to employees' health (Medic et al., 2017) and optimal performance (Kuppermann et al., 1995). Both, organizations, and employees can be sensitized to circumstances in the work context that cannot only (dis-)satisfy but actively frustrate the need for autonomy, competence, or relatedness of employees. To identify circumstances that frustrate employees' needs, supervisors could ask in a 1:1 discussion or organizations could use surveys, to identify influencing factors and respect employees' rights to stay anonymous. Oftentimes, there are obvious changes that can be made. Some are already status quo in modern institutions such as flexible working schedules (i.e., relating to the need for autonomy) or the opportunity to dedicate a certain amount of the weekly working time towards self-education or projects, that employees can apply for by choice (i.e., relating to the need for competence and autonomy). What should be considered is the fact, that there are occupations, where it is much easier to implement changes than in others, and that working in the upper management brings different challenges than working at the production line. This research gives an insight, that RBP presumably cannot be solved on the individual level only, but that a systemic view is appropriate. Interventions such as educating people in time management or sleep hygiene cannot be sufficient and - supposed that this form of procrastination is practiced because of too many obligations, would only burden employees with more obligations. Moreover, it can be beneficial to educate employees about BPN on a general level and how they can alter work- and non-work life to ensure low need frustration and better need satisfaction.

Conclusion

This study contributes to the neglected aspect of SDT (Ryan & Deci, 2000) which is taking the frustration of BPN at work into account and exploring its linkages to maladaptive behavior (i.e., RBP) in employees' everyday life. It added to the perspective, that work- and non-work-life are two sides of the same coin, and frustration of BPN in one domain can be related to modifications in the other domain. It also emphasizes that RBP is a relevant aspect in employees' health behavior and that different forms of procrastination (i.e., deliberate bedtime procrastination) not only have their origin in the person but potentially in a system.

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Appendix A1: Information About the Study

“An Exploratory Study on Revenge Bedtime Procrastination”

PSY-2122-S-0216

➤ **Why do I receive this information?**

In this study, we seek to investigate how and why individuals engage in revenge bedtime procrastination or retaliatory staying up late at night. The principal investigator is Dr. Nanxi Yan (RUG). The study adheres to the guidelines of the ethical review process of the University of Groningen.

➤ **Do I have to participate in this research?**

Participation in the research is voluntary. However, your consent is needed. Therefore, please read this information carefully. Ask all the questions you might have, for example because you do not understand something. Only afterwards you decide if you want to participate. If you decide not to participate, you do not need to explain why, and there will be no negative consequences for you. You have this right at all times, including after you have consented to participate in the research.

➤ **Why this research?**

Revenge bedtime procrastination describes a phenomenon that people sacrifice some sleep time to eke out some free time. This behavior has influenced a wide range of people's work and life, but it is a phenomenon still under studied. Your participation of this research could contribute to the understanding of this phenomenon.

➤ **What do we ask of you during the research?**

If you are invited to participate in the qualitative interview, you will be asked to participate in a chat using google meet or in-person depending on your preferences. The interview lasts about 30 and 45 minutes, and you will be asked to reflect on your experiences with revenge bedtime procrastination, particularly the process: what triggers this behavior, how do you feel about this behaviour, and the outcome. We will make audio recordings of the interview only with your consent. However, after transcribing the interviews, we delete the recordings. The recordings are important to understand experiences in greater detail.

If participated in the online survey, you will be asked fill in questionnaire about your experiences on revenge bedtime procrastination, experiences about your work environment and questions about your demographic characteristics. After data collection period is done, each participant will be assigned a number code and your personal information (e.g., email address, names) will be removed. However, if you want us to provide you a copy of report on the study results, we keep your personal information until the time we send you the results.

➤ **What are the consequences of participation?**

No risks involved.

No compensation will be provided. However, you can ask us to provide you a copy of report on the study results to better understand your experiences and behaviors.

➤ **How will we treat your data?**

We process your data to better understand the factors contribute to revenge bedtime procrastination and the outcomes of revenge bedtime procrastination. The final aim is to eventually publish the insights in peer-reviewed scientific journal.

All your responses are securely stored on servers of the University of Groningen for 10 years and not passed on to any third parties.

No matter whether you participated in the online survey or the qualitative interview, your responses (in combination with your name, email address) are considered personal data. You have the right to access, rectify, and request the deletion of your (sensitive) personal data. You can do so and also obtain a copy of personal data by sending an email to Dr. Nanxi Yan. No sensitive (personal data) will be processed as they will be removed and replaced by personal identifying number or pseudo names. The lists that can match participants' personal information and identifying number/pseudo names will be saved in Dr. Nanxi Yan's password protected computers and will be deleted once the data collection is done or study reports have been sent out to those who needed.

➤ **What else do you need to know?**

You may always ask questions about the research: now, during the research, and after the end of the research. You can do so by speaking with one of the researchers present right now or by emailing Dr. Nanxi Yan at n.yan@rug.nl.

Do you have questions/concerns about your rights as a research participant or about the conduct of the research? You may also contact the Ethics Committee of the Faculty of Behavioural and Social Sciences of the University of Groningen: ec-bss@rug.nl.

Do you have questions or concerns regarding the handling of your personal data? You may also contact the University of Groningen Data Protection Officer: privacy@rug.nl.

As a research participant, you have the right to a copy of this research information.

Appendix A2: Consent form

This survey investigates the phenomenon **Revenge Bedtime Procrastination**.

Revenge Bedtime Procrastination or purposeful bedtime delay describes the tendency of people who actively choose to postpone their sleeping time in favour of having more leisure time, although they know to be worse off the next day (i.e., tired, exhausted). They do so because of the feeling of having many obligations during the day and a lack of leisure time.

The survey will take approximately 10 minutes.

We thank you for your willingness to participate in our survey.

This investigation can help us to better understand how employees' structure of their workday can influence their sleeping behavior. We kindly ask you to give your informed consent. For reading more about how we handle your data, and whom to contact in case of questions you can click [here](#).

By clicking "yes" you agree the following points:

- I have read the information about the research. I have had enough opportunity to ask questions about it.
- I understand what the research is about, what is being asked of me, which consequences participation can have, how my data will be handled, and what my rights as a participant are.
- I understand that participation in the research is voluntary. I myself choose to participate. I can stop participating at any moment. If I stop, I do not need to explain why. Stopping will have no negative consequences for me. You have the right to a copy of this consent form. You may download the linked document. Below I indicate my consent

- Yes
- No

Appendix A3: Questionnaire

Deliberate Bedtime Procrastination

In this part, we will ask you about your sleeping behavior during working weeks. Please answer the following questions in relation to your general sleeping behavior during working weeks.

At what average time do you go to bed during work weeks? (Please use format 0-23, where 0 is midnight; for decimal use ".")

Considering the previous question: at what average time would you like to go to bed for having a sufficient amount of sleep? (Please use format 0-23, where 0 is midnight; for decimal use ".")

Revenge Bedtime Procrastination or purposeful bedtime delay describes the tendency of people who actively choose to postpone their sleeping time in favor of having more leisure time, although they know to be worse off the next day (i.e., tired, exhausted). They do so because of the feeling of having many obligations during the day and a lack of leisure time.

How many nights do you engage in that kind of behavior during the working week?

Why do you engage in Revenge Bedtime Procrastination? (separate different reasons with ";")

How many days a week (from Monday to Sunday) do you work?

Bedtime Procrastination Scale

For each of the following statements, please decide whether it applies to you using a scale from 1 (almost) never to 5 (almost) always.

1. I go to bed later than I had intended.
2. I go to bed early if I have to get up early in the morning (R).

3. If it is time to turn off the lights at night I do it immediately (R).
4. Often I am still doing other things when it is time to go to bed.
5. I easily get distracted by things when I actually would like to go to bed.
6. I do not go to bed on time.
7. I have a regular bedtime which I keep to (R).
8. I want to go to bed on time but I just don't.
9. I can easily stop with my activities when it is time to go to bed (R).

Basic Psychological Need Satisfaction and Need Frustration Scale

1. I feel a sense of choice and freedom in the things I undertake
2. I feel that my decisions reflect what I really want
3. I feel my choices express who I really am
4. I feel I have been doing what really interests me
5. Most of the things I do feel like "I have to"
6. I feel forced to do many things I wouldn't choose to do
7. I feel pressured to do too many things
8. My daily activities feel like a chain of obligations
9. I feel that the people I care about also care about me
10. I feel connected with people who care for me, and for whom I care
11. I feel close and connected with other people who are important to me
12. I experience a warm feeling with the people I spend time with
13. I feel excluded from the group I want to belong to
14. I feel that people who are important to me are cold and distant towards me
15. I have the impression that people I spend time with dislike me

16. I feel the relationships I have are just superficial
17. I feel confident that I can do things well
18. I feel capable at what I do
19. I feel competent to achieve my goals
20. I feel I can successfully complete difficult tasks
21. I have serious doubts about whether I can do things well
22. I feel disappointed with many of my performance
23. I feel insecure about my abilities
24. I feel like a failure because of the mistakes I make

Work Breaks

In this part, we will ask about self-initiated work breaks. You decided on your own to take these breaks during your work day (i.e. the obligatory lunch break is no self-initiated break). Please answer the following questions about your general break-taking behaviour during work days.

How many self-initiated breaks do you take during a typical working day?

How long are your breaks in general? (in minutes)

Rate the quality of your work breaks. (very poor, poor, satisfactory, good, very good)

What do you do during your breaks? (multiple answers possible) (being social; having a snack/drink; doing some stretching/walk; surfing in the internet/social media; others)

Sleep Behavior

How many hours on average do you sleep during week nights?

How would you rate the quality of your previous night's sleep? (very poor, poor, satisfactory, good, very good)

To what extent do you feel the number of hours of sleep you get is sufficient? (not at all, not really, undecided, somewhat, very much)

Demographics

What is your age? (20-29, 30-39, 40-49, 50-59, 60-69)

What is your gender? (male, female, non-binary, prefer not to say)

In which country do you currently live?

Do you live by yourself or with someone else? (I live by myself, I live with my spouse or partner, I live with my spouse/partner and child/children, I live with a child/children, others)

What is your highest completed level of education? (primary education, high school or equivalent level, bachelor's or equivalent, master's or equivalent, doctoral or equivalent)

How many hours per week do you work on average?

What kind of contract do you have? (permanent, temporary, self-employed, others)

Do you have a leadership position?

How would you classify your current job? (manual worker, lower level white collar worker, upper level white collar worker, high management)

In which field are you working?

How long have you been working for your current employer?

How long have you been working in your current job?

To what extent are you currently working remotely?

To what extent do you work overtime compared to your contract hours?