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Running Head. Daily Dynamics: Need Satisfaction at Work

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Author Note

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Abstract

Drawing on self-determination theory, this study focuses on the person- and occasion- specific components of the daily dynamics of employees' global psychological need satisfaction at work. Predictors (job demands related to information and communication technologies, segmentation norms, and workload) and outcomes (perceived productivity, psychological detachment, work-family conflict, job satisfaction, and personal satisfaction) were also examined across both levels to better grasp the mechanisms underlying these short-term dynamics. A total of 129 French employees filled out questionnaire surveys at the end of each workday for five days (521 observations). Results from Dynamic Structural Equation Modeling (DSEM) showed clear associations between need satisfaction, the predictors, and the outcomes at the person-specific level. However, and although need satisfaction levels were found to fluctuate on a daily basis, they seemed immune to the effects of daily fluctuations in predictors levels, and unlikely to generate matching fluctuations in outcome levels. These results suggest strong homeostatic processes protecting employees' functioning against daily fluctuations, but that the accumulation of such fluctuations over the work week may jeopardize these processes.
Keywords: Basic psychological need satisfaction; information and communication technologies; job demands; well-being; self-determination theory; dynamic structural equation modeling.

Most work-related experiences are dynamic (Hofmans et al., 2021), thus fluctuating on a daily, weekly, monthly, or annual basis, and sharing time-structured associations with other variables. Dynamic constructs present both person-specific (stable inter-individual differences, also referred to as between-person or trait-like effects) and occasion-specific (time-structured intra-individual deviations, also referred to as within-person or state-like effects) components (Navarro et al., 2020). Regrettably, organizational research relies heavily on cross-sectional designs, weak (two time points) longitudinal designs, and analyses that are unable to disaggregate these sources of variability (Hofmans et al., 2021). The study of employees' basic psychological need satisfaction (BPNS), referring to the positive experiential state of feeling that one's psychological needs for autonomy (the experience of volition), competence (the experience of effectiveness and mastery), and relatedness (the experience of social connectedness) are fulfilled at work (Ryan & Deci, 2017), is no exception (e.g., Trépanier et al., 2015b; Vansteenkiste et al., 2007). Indeed, although the person- and occasion specific components of BPNS have been more extensively examined outside of the work context (e.g., Hancox et al., 2017; Jiang et al., 2020), there have been relatively few attempts to differentiate these sources of variability in employees' BPNS (Coxen et al., 2021). This limitation is important when we consider emerging research suggesting that BPNS at work fluctuates over time (Huyghebaert et al., 2018b; Trépanier et al., 2015a), even daily (Coxen et al., 2021), and that these fluctuations play a role in employees' adjustment and behaviors. More generally, intensive studies focusing on the daily dynamics of psychological constructs have the advantage of capturing psychological experiences as they unfold in everyday life, minimizing retrospective bias (Zirkel et al., 2015), and thus of providing a more accurate and naturalistic perspective of how life really unfolds at work for employees.

The present study focuses on the daily dynamics of BPNS over the course of one work week (five days). This timespan was selected based on research suggesting that five days are sufficient to obtain a precise overview of the daily dynamics of BPNS (e.g., Hetland et al., 2015; van Hoof & Geurts, 2015; van Hoof & van Hooft, 2017). To better grasp the mechanisms underlying these short-term dynamics, we also consider theoretically and practically relevant predictors and outcomes. Indeed, prior research on what drives daily BPNS fluctuations has typically focused on generic job characteristics (e.g., job demands; see Coxen et al., 2021), thus failing to address how job characteristics related to information and communication technologies [ICT] could relate to daily variations in employees' need satisfaction. ICT use at work is now ubiquitous, and research has demonstrated that job demands specific to ICT are able to help explain employee stress and strain beyond more generic types of job demands (Day et al., 2012). Moreover, ICT-related job demands appear to play an even more critical role for remote workers, uniquely predicting outcomes which are not predicted by generic types of job demands among this population (Ulfert et al., 2022). Therefore, the widespread nature of ICT-related job demands, coupled with their key unique role for employees (Cho et al., 2020; Park et al., 2018), makes it crucial to reach a better understanding of their contribution to daily BPNS.

Moreover, prior research considering the consequences of daily BPNS fluctuations has mostly focused on components of employees' workplace well-being (e.g., Bakker & Oerlemans, 2016; Foulk et al., 2019; Hetland et al., 2015; van Hooff & Geurts, 2015; van Hoof & van Hooft, 2017), thus failing to document the implications of these fluctuations in terms of productivity and for employees' personal life. Yet, results from cross-sectional or longer-term longitudinal research highlight the key benefits of BPNS for employees' productivity, work recovery, and for the quality of their work-home experiences (Huyghebaert et al., 2018b, 2018c; Trépanier et al., 2015b). Achieving a better understanding of whether these associations translate to a shorter time span will contribute to our understanding of the role played by BPNS at work, as well as to an enrichment of Self-Determination Theory (SDT; Ryan & Deci, 2017), the key theoretical framework underlying the study of BPNS.

The present study will therefore focus on how these possibly critical predictors (ICT-related demands) and outcomes (i.e., perceived productivity, psychological detachment, and work-family conflict) relate to daily fluctuations in BPNS. In addition to their theoretical and practical relevance, these variables were selected based on their documented person- (Day et al., 2012; Sonnentag et al., 2010; Vansteenkiste et al., 2007) and occasion- (Cho et al., 2020; Kushlev & Dunn, 2015; Van Laethem et al., 2018) specific variation. This is important, given that previous research on the daily dynamics of BPNS has typically focused solely on their associations with predictors and outcomes unfolding at only one of these two levels (Aldrup et al., 2017; Bakker & Oerlemans, 2016; De Gieter et al., 2018). Yet, it has long been acknowledged that results obtained at any level of analysis cannot be expected to

generalize at another level (Neubauer & Voss, 2018). To address this consideration, we examine the daily dynamics of BPNS and their associations with these predictors and outcomes as they jointly unfold across these two levels of analysis by relying on the newly developed Dynamic Structural Equation Modeling (DSEM) framework (Asparouhov & Muthén, 2018, 2020), providing one of the first illustrations of this method in organizational research.

Short Term Dynamics of BPNS at Work

Research anchored in SDT (Ryan & Deci, 2017) has documented the importance of BPNS in enhancing well-being in many life contexts (Ryan & Deci, 2017), including work (Deci et al., 2017). Prior intensive investigations of the daily dynamics of BPNS at work have shown that a significant amount of variability in BPNS ratings occur at the occasion-specific level (i.e., daily). In a recent meta-analysis of studies designed to capture the daily dynamics of work-related BPNS, Coxen et al. (2021) found that more variability occurred at the occasion level than at the person level. More precisely, occasion-specific variations explained 41.00% to 68.90% (M = 56.10%) of the variance in ratings of autonomy satisfaction, 42.00% to 72.70% (M = 57.57%) of the variance in ratings of competence satisfaction, and 43.40% to 72.40% (M = 57.14%) of the variance in ratings of relatedness satisfaction. In a subsequent study, Scharp et al. (2022) reported similarly high levels of daily variation of the satisfaction of employees' needs for autonomy (58.7%), competence (61.8%), and relatedness (52.6%). Unfortunately, these previous studies all involve important limitations.

Indeed, many prior studies have failed to consider one or more of the three basic psychological needs for autonomy, competence, and relatedness (Aldrup et al., 2017; Cangiano et al., 2019; De Gieter et al., 2018). However, all three needs have been demonstrated to be important "psychological nutrients that are essential for ongoing psychological growth, integrity, and well-being" (Deci & Ryan, 2000, p. 229), so that one or more need(s) cannot simply be set aside when one seeks to achieve a complete understanding of the psychological experience of need satisfaction. Other daily diary studies did consider all three needs but modelled these needs separately in their analyses (Aldrup et al., 2017; Bakker & Oerlemans, 2019; De Gieter et al., 2018; Haar et al., 2018; Hewett et al., 2017; Scharp et al., 2022; van Hoof & De Pater, 2019; van Hoof & Geurts, 2014; Vandercammen et al., 2014; Wang et al., 2020). Yet, need satisfaction is a global experience anchored in all three needs, which have to be jointly considered in analyses. Indeed, a key premise of SDT is that all three psychological needs must be fulfilled together (Ryan & Deci, 2017), in a balanced manner, for psychological well-being to occur. This equal additive importance of the three psychological needs has been demonstrated throughout decades of SDT research (see Vansteenkiste et al., 2020). As a result, the consideration of the global satisfaction of all three needs[1] is required to achieve a complete understanding of the workplace dynamics of BPNS. This perspective is in line with most organizational research on need satisfaction at work, which often considers the satisfaction of these needs as a whole (e.g., Huyghebaert et al., 2018a; Trépanier et al., 2015a, 2015b). To this day, only five studies have considered the daily dynamics of employees' global experience of BPNS at work. Regrettably, three of these studies (Hetland et al., 2015: five days; van Hooff & Geurts, 2015: five days; van Hoof & van Hooft, 2017: five days) did not report the amount of variation in BPNS ratings occurring at the person versus occasion level (van Hooff & Geurts, 2015 only deplored the small variance of their BPNS measure). The other two studies (Bakker & Oerlemans, 2016: three days; Foulk et al., 2019: 10 days) reported low to moderate daily fluctuations in BPNS (5% to 41%; M = 23%). Moreover, two of these studies relied on specific samples of questionable generalizability (knowledge workers, Hetland et al., 2015; managerial employees enrolled in an executive business program at an Indian university, Foulk et al., 2019). Finally, Bakker and Oerlemans (2016) focused on employees' BPNS related to specific tasks, thus failing to address how employees' global experience of BPNS at work relates to predictors and outcomes. Importantly, they reported low correlations between their task-specific measure of BPNS and a validated measure of global BPNS at work.

To address these limitations, we rely on a measure of BPNS at work accounting for the needs for autonomy, competence, and relatedness, and allowing us to obtain a global indicator of employees'

[1] We hereafter use the term "global BPNS" to reflect the global experience of need satisfaction anchored in all three needs (i.e., capturing the satisfaction of all three needs in a single factor). In research anchored in basic psychological needs theory (Vansteenkiste et al., 2020), this terminology (i.e., global) does not reflect a trait-like level of analysis such as that proposed in Vallerand's (1997) hierarchical model of motivation.

BPNS experience at work (e.g., Huyghebaert et al., 2018a), consistent with SDT's theoretical assumptions (Ryan & Deci, 2017). We also rely on a diversified sample of employees recruited from various occupational groups to better grasp the generalizability of employees' daily BPNS. Based on prior research focusing on the daily dynamics of BPNS (Coxen et al., 2021), we expect that:

Hypothesis 1. *BPNS will display moderate levels of occasion-specific variability.*

However, simply knowing that BPNS fluctuates on a daily basis is of doubtful utility from a theoretical and practical perspective. To illustrate the practical or theoretical meaning of these fluctuations, one must demonstrate that they respond to actionable levers of intervention (i.e., predictors) able to influence BPNS ratings across both levels of analysis.

Dynamic Predictors of Need Satisfaction

Many studies have failed to consider antecedents of daily fluctuations in BPNS (Hewett et al., 2017; van Hoof & Geurts, 2015; van Hoof & van Hooft, 2017), and those who did considered a limited range of predictors (Coxen et al., 2021). Some studies also examined how predictors were related to BPNS fluctuations at the same time (Aldrup et al., 2017; Hetland et al., 2015). As such, these studies essentially estimated cross-sectional associations, rather than properly specified lagged predictions[2], which are necessary to establish directionality. Other studies demonstrated lagged associations between daily fluctuations in BPNS and time spent on specific work tasks (Bakker & Oerlemans, 2016) as well as ratings of generic job demands and resources (De Gieter et al., 2018).

Going beyond these studies, we focus on job demands specifically related to the intensive use of ICT (Cho et al., 2020). Indeed, despite their utility, ICT have increased the number and variety of demands placed on employees (Day et al., 2012), leading to drastic changes in how employees access information and interact with others. Despite the omnipresence of this contemporary type of job demands, some have previously lamented the dearth of research seeking to specifically investigate the added value of ICT-related job demands beyond that of more generic forms of job demands (Day et al., 2012). To address this limitation, Day et al. (2012) developed a measure specifically designed to assess ICT-related job demands and found support for their distinctiveness and added-value in prediction, relative to that of more generic types of job demands. Among the various ICT-related job demands considered in their study, feelings of immediacy, communication problems, and lack of control appeared to be the most discriminant. Feelings of immediacy refer to employees' experience of being expected to immediately address work-related issues through ICT, even outside of their work hours (Day et al., 2012). Communication problems refer to employees' perceptions that the use of ICT, such as emails or text messages, create miscommunications and misinterpretations by forcing them to forego critical verbal and nonverbal cues essential to the correct interpretation of interpersonal interactions (Day et al., 2012). Finally, lack of ICT control refers to the fact that, despite the widespread use of ICT, some employees still feel coerced to use ever-evolving communication tools to complete their job efficiently and unable to volitionally decide how and when to complete their work assignments as a result of this electronic "leash" (Day et al., 2012). Interestingly, Day et al. (2012) found that ICT-related communication problems and lack of ICT control both represented unique predictors of stress beyond the role of generic job demands, including a more general measure of job control which proved to be only moderately related to their direct measure of lack of ICT control.

Despite the relatively clear connections between these three types of ICT-related demands and BPNS (i.e., when forced to handle high ICT-related demands, employees may come to feel less in control, less cared for, and experience less mastery), these associations have never been examined in prior research. This study was thus designed to investigate the associations between ICT-related demands and BPNS at the person and occasion level. At the occasion level, research has demonstrated that ICT-related demands, just like BPNS, fluctuate on a daily basis (Cho et al., 2020). Thus, based on previous evidence of the negative role played by job demands in daily BPNS fluctuations (Bakker & Oerlemans, 2016), exposure to momentary increases or decreases in ICT-related demands are expected to predict opposite fluctuations in BPNS. Indeed, when employees feel that they should be always reachable, experience ineffective communication, and lack control over ICT, they may feel less volitional, less efficient, and less connected to others. On this basis, we expect that:

[2] By lagged predictions, we mean using predictors measured at Time t to predict outcomes (e.g., BPNS) measured at Time t+1, while controlling for the autoregressive stability of the occasion-specific outcome levels (i.e., controlling for the effects of outcome levels measured at Time t-1 on outcome levels measured at Time t).

Hypothesis 2*: At the occasion-specific level, higher levels of ICT-related demands (immediacy, communication problems, and lack of control) should be negatively related to later BPNS fluctuations.*

Things become slightly more complex when we consider the person-specific components of these associations. Indeed, when considering the short-term dynamics of BPNS at work, modern research methods make it possible to consider two components of employees' person-specific BPNS: (a) Their average (or weekly in this study) level of BPNS over time, and (b) the extent to which these person-specific levels are (un)stable over time (i.e., person-specific average levels of variability in BPNS levels over time). The first component reflects the fact that, despite their tendency to fluctuate daily, both BPNS (Huyghebaert et al., 2018b; De Gieter et al., 2018) and ICT-related demands (Cho et al., 2020; Stadin et al., 2019) also present a more stable component. To fully understand how this second component differs from the occasion-specific component, one must consider that some employees experience more pronounced variations in their BPNS levels over time. This between-person difference could result either from exposure to a distinct (more unstable) work environment or from their own personal tendencies, and is distinct from the consideration of how much each employee's BPNS differs from their average level on any given day. Unfortunately, although all aforementioned studies relied on a proper disaggregation of person- and occasion- specific variability, most of them failed to consider matching associations occurring at the person-specific level (Aldrup et al., 2017; Bakker & Oerlemans, 2016; De Gieter et al., 2018), and none of them considered person-specific levels of BPNS variability. Yet, person-specific results do not necessarily transpose to occasion-specific associations, and vice versa (e.g., Neubauer & Voss, 2018), so that a complete picture of the reality requires the consideration of all three variance components (i.e., occasion-specific day-to-day fluctuations in BPNS, person-specific average levels of BPNS, and person-specific BPNS variability). In this study, we rely on the novel DSEM framework (Asparouhov & Muthén, 2018, 2020), which was specifically developed to separate these three components of dynamic constructs.

Based on prior research supporting the presence of negative associations between generic types of job demands and BPNS levels (e.g., Gillet et al., 2015; Trépanier et al., 2015b) and between demanding work contexts and BPNS stability (Huyghebaert et al., 2018b), we expect person-specific levels of ICT-related demands to be negatively associated with employees' person-specific levels of BPNS and BPNS stability. However, beyond the role played by these three types of ICT-related demands, it is also critical to consider that these demands exist in a generally stable (at least weekly) organizational context that needs to be accounted for. Indeed, ICT tends to blur the boundaries between the work and personal domains (Ashforth et al., 2000). As a result, organizations may encourage workers to maintain clear cognitive, physical, and behavioral boundaries between these two life domains (i.e., segmentation norms; Kreiner et al., 2006). Employees' perceptions of these segmentation norms present in their organization may in turn contribute to improve their BPNS at work. Prior research has shown that similar types of resources tend to predict BPNS (Gillet et al., 2015; Huyghebaert et al., 2018c). In contrast, employees' perceptions of their general workload, which are known to be rather stable over time (Huyghebaert et al., 2018a), have also been shown to be negatively related to BPNS at work (Van den Broeck et al., 2008). As a result, both contextual factors were controlled for at the person-specific level in our analyses, allowing us to achieve a clearer view of the unique role played by ICT-related demands. Based on this rationale, we expect that:

Hypothesis 3: *At the person-specific level, ICT-related demands (immediacy, communication problems, and lack of control) and workload perceptions will be negatively related to person-specific levels of BPNS and to the stability of these levels, whereas opposite relations will be observed for organizational segmentation norms.*

Dynamic Outcomes of Need Satisfaction

To support the idea that occasion-specific BPNS fluctuations are worth considering, it is also critical to understand their associations with meaningful outcomes. Although most previous studies have considered some occasion-specific outcomes of BPNS, most of these studies have failed to consider lagged occasion-specific predictions, or matching predictions occurring at the person-specific level. To further our understanding of the dynamic implications of BPNS for employees' personal and work functioning, we expand upon prior studies by considering the occasion-specific and person-specific associations between BPNS and employees' levels of perceived productivity, psychological detachment (i.e., "a state of mind during non-work time characterized by the absence of job-related activities and

thoughts", Sonnentag et al., 2010, p. 356), and work-family conflict.

De Gieter et al. (2018) reported that, on days when workers experienced more autonomy and competence need satisfaction, they also tended to report higher levels of task productivity. Likewise, some studies found that daily BPNS fluctuations positively predicted same-day levels of work engagement (Haar et al., 2018; Hetland et al., 2015; Scharp et al., 2022), enthusiasm (Aldrup et al., 2017), and vigor (van Hooff & Geurts, 2015), three predictors of productivity (e.g., Xanthopoulou et al., 2009). Considering personal outcomes, prior research suggests that BPNS levels facilitate work recovery processes. Hewett et al. (2017) showed that BPNS levels at work predicted higher levels of positive affect and lower levels of negative affect at bedtime. Likewise, others reported negative associations between employees' momentary levels of BPNS and their levels of strain (De Gieter et al. (2018), burnout (Haar et al., 2018) or emotional exhaustion (Aldrup et al., 2017) on the same day. To better understand these associations, we need to consider that BPNS has been previously reported to play a role in energy maintenance and enhancement (Reis et al., 2000) and may thus trigger more positive work recovery experiences, such as higher levels of psychological detachment. In contrast, by maintaining energy, BPNS is also likely to limit the interference of work-related issues in employees' personal life, thus preventing work-family conflict. In fact, research has shown that momentary levels of BPNS were negatively related to employees' levels of fatigue at the end of the workday (van Hoof & Geurts, 2015), which may in turn help them to effectively meet the demands of their personal roles. Likewise, positive associations were reported between employees' levels of BPNS at work and at home (Hewett et al., 2017). In sum, and matching SDT (Ryan & Deci, 2017) conceptualization of BPNS as a positive driver of functioning across domains, these results lead us to expect that:

Hypothesis 4: *At the occasion-specific level, higher levels of BPNS should be positively related to later levels of perceived productivity and psychological detachment, but negatively related to later levels work-family conflict, occurring.*

However, as noted by Neubauer and Voss (2018), "*what makes for a happy day is not entirely congruent with what makes for a happy person*" (p. 226). Although perceived productivity (e.g., Kushlev & Dunn, 2015), psychological detachment (e.g., Van Laethem et al., 2018), and work-family conflict (e.g., Cho et al., 2020) are prone to daily fluctuations, they still present stable, person-specific features. Indeed, a substantial part of the variance in productivity (57%; Xanthopoulou et al., 2009), psychological detachment (47%; Van Laethem et al., 2018) and work-family conflict (%; Cho et al., 2020) has been found to occur at the person-specific level. Theoretically, the universality assumption of SDT (Ryan & Deci, 2017) posits that BPNS levels should generally match levels of well-being for all individuals. This assumption suggests that BPNS should share strong person-specific associations with a variety of outcomes reflecting positive functioning across life domains, an idea that has been previously supported (Huyghebaert et al., 2018c; Huyghebaert-Zouaghi et al., 2022; Leroy et al., 2015; Trépanier et al., 2015b). Indeed, when they feel autonomous, efficient, and appreciated, employees are more likely to maintain productivity, while also being less likely to carry their work-related difficulties into their personal life (e.g., Deci et al., 2017; Ryan & Deci, 2017). From the same perspective, we can also assume that person-specific BPNS stability should be related to more desirable person-specific outcome levels over time, given that stable BPNS should make it easier to maintain performance (Leroy et al., 2015; Trépanier et al., 2015b), work recovery (Huyghebaert-Zouaghi et al., 2022), and lower levels of work-family conflict (Huyghebaert et al., 2018c).

However, beyond the work (productivity) and personal (psychological detachment from work and work-family conflict) implications of work-related BPNS, it is also critical to consider that BPNS could have consequences on employees' more stable levels of subjective well-being (i.e., job and personal life satisfaction). Indeed, research has shown that individuals tend to display rather stable levels of satisfaction, regardless of the nature of their work/personal environment (Bowling et al., 2005; Lucas & Donnellan, 2007). This stability has been attributed to individuals' tendency to experience a state of hedonic neutrality (i.e., a person-specific typical level of satisfaction), due to stable dispositional characteristics (Bowling et al., 2005). Yet, research has indicated that, even though job and personal life satisfaction are rather stable over time (Huyghebaert et al., 2018b; Kinnunen et al., 2004), they still vary as a function of employees' BPNS (Van den Broeck et al., 2016). Indeed, when they feel volitional, experience mastery, and feel connected at work, employees are likely to evaluate their job and their personal life in a more positive light. Therefore, both of these rather stable indicators of employees' subjective well-being were included at the person-specific level, as part of our main analyses, allowing

us to achieve a clearer understanding of the implications of work-related BPNS. As such, we formulated the following hypothesis:

Hypothesis 5: *At the person-specific level, BPNS levels and stability will be positively related to person-specific levels of perceived productivity, psychological detachment, job and personal life satisfaction, and negatively to person-specific levels of work-family conflict.*

Method

Participants and Procedure

This research was conducted in compliance with the American Psychological Association ethical standards and with the Helsinki Declaration and its amendments, and adhered to the legal requirements applicable in France. Participants had to be employed in France, to work from Monday to Friday, and to use ICT at work on a daily basis. They were recruited through network and snowball sampling procedures and were not compensated for their participation. Prior to data collection, potential participants received an email summarizing the objectives of the research, and the fact that it entailed daily measurement for a period of five days. They were also assured of the voluntary and anonymous (through an identification code) nature of their participation. They were then invited to actively provide their informed consent to take part in the study. On the week of data collection, participants received an email including the survey link at the end of each workday (at 6 PM), and had until midnight to complete the daily survey. End-of-day measures were selected based on previous evidence suggesting that measures taken at this time of day tend to be most sensitive to daily fluctuations in BPNS (e.g., Aldrup et al., 2017; De Gieter et al., 2018; Hetland et al., 2015). A total of 129 participants (39.8% males; aged 20 to 61; M_{age} = 39.06; SD_{age} = 12.95) completed a total of 521 occasion-specific ratings, with an average of 4.04 ratings per participant. Most participants occupied a permanent (83.2%) full-time (96.5%) position in industry (9.5%), construction (5.2%), market services (39.7%) and non-market services (45.7%). Most worked in the private sector (71.6%). Participants had an average tenure of 8.77 years in their position (six months to 29 years; *SD* = 9.92 years) and worked an average of 40.76 hours/week (28 to 70 hours; *SD* = 6.34).

Material

Participants completed the same questionnaires each day (i.e., *daily questionnaire*), but also completed additional questions on the first (i.e., *baseline questionnaire*: demographics and controls) and last (i.e., *final questionnaire*: controls) days.

Segmentation norms (baseline) were measured with four items (α = .84; e.g., "Overall, my workplace lets people forget about work when they're at home"; Kreiner, 2006) rated on a scale ranging from 1 (*totally disagree*) to 7 (*totally agree*).

Workload (baseline) was assessed with four items (α = .85; e.g., "Usually, do you have too much work to do?"; Lequeurre et al., 2013) rated on a scale ranging from 1 (*never*) to 7 (*always*).

ICT demands (daily) were measured with subscales from a questionnaire developed by Day et al. (2012). Feelings of immediacy were assessed using two items (α = .82; e.g., "I was expected to respond to e-mail messages immediately"), lack of control using three items (α = .78; e.g., "I had control over how I used technology at work", reversed item), and communication problems using three items (α = .70; e.g., "I received rude e-mails from my colleagues and/or clients"). These items followed the stem "Today, at work...", and were rated on a scale ranging from 1 (*never*) to 5 (*almost always*).

Need satisfaction (daily) was assessed with nine items (α = .89) developed by Gillet et al. (2008). Three items each were used to measure the needs for competence (α = .88; e.g., "I felt like I was able to meet the demands of the tasks that I had to perform"), autonomy (α = .83; e.g., "I had the opportunity to make decisions about the tasks that I had to perform"), and relatedness (α = .84; e.g., "I got along well with the people whom I interacted with"). These items followed the stem "Today, at work..." and were rated on scale ranging from 1 (*totally disagree*) to 7 (*totally agree*).

Work-family conflict (daily) was assessed with three items (α = .85; e.g., "Today, your work schedule made it difficult for you to fulfil your domestic obligations"; Huyghebaert et al., 2018c) rated on a 1 (*totally disagree*) to 7 (*totally agree*) scale.

Psychological detachment (daily) was measured with four items (α = .94; e.g., "This evening, I have a hard time distancing myself from work"; Sonnentag and Fritz, 2007) rated on a scale ranging from 1 (*totally disagree*) to 5 (*totally agree*).

Perceived productivity (daily) was assessed with three items (α = .92; e.g., "Overall today, did you feel you got done the things at work that were most important to you?"; Kushlev and Dunn, 2015) rated

on a 1 (*not at all*) to 7 (*very much*) scale.

Job and personal life satisfaction (final) were each assessed with a single-item (Fisher et al., 2016; Shimazu et al., 2015) asking participants the extent to which they were, overall, satisfied with their current job/personal life rated on a 1 (*dissatisfied*) to 4 (*satisfied*) scale.

Analyses

Preliminary Analyses

Preliminary analyses were conducted in Mplus 8.5 (Muthén & Muthén, 2020), using the maximum likelihood robust (MLR) estimator, and full information maximum likelihood (FIML) to handle the limited number of missing data observed at the occasion-specific level for the repeated measures (less than 0.50%) or at the person-specific level (12.4% to 23.26%; *M* = 13.95%) for measures only administered once (Enders, 2010). First, preliminary (single level and multilevel) measurement models were estimated to verify the psychometric properties of all multi-item measures used in this study, as well as their equivalence across levels (i.e., occasion- versus person- specific). For all multi-item constructs measured repeatedly on each measurement occasion, occasion-specific factor scores were saved from these preliminary measurement models using the natural scale of these measures for the main analyses (fixing the loading and intercept of a referent indicator to respectively 1 and 0 to maximize the similarity between the original scaling of the measure and that of the latent factors). We did not save multilevel factor scores separately at the occasion- (Level 1, or L1) and person- (Level 2, or L2) specific level to allow the multilevel disaggregation process to be done directly in our main predictive models via latent person-mean centering procedures (also known as latent aggregation procedures), which results in L2 estimates that are corrected for inter-occasion unreliability (Asparouhov & Muthén, 2020; McNeish & Hamaker, 2020). For all multi-item constructs measured only once, person-specific factor scores were saved from these preliminary models using the natural scale of these measures for the main analyses. When compared to scale scores (formed by averaging the items forming a scale), factor scores have the advantage of retaining the properties of the measurement model from which they are taken and afford a partial correction for random measurement error (Morin et al., 2017a; Skrondal & Laake, 2001). Additional details on these preliminary models are provided in the online supplements (section 1, Tables S1, S2, and S3).

Multilevel latent correlations, reliability information, and descriptive statistics (mean, *SD*, and range) for all variables (including factor scores) are reported in Table S4 of the online supplements. These results indicate that all multi-item constructs present satisfactory estimates of composite (inter-item) reliability (McDonald, 1970) in the single-level model used to generate the factor scores (ω = .736 to .938), although the occasion-specific (L1) reliability (ω_{L1} = .511 to .887) is slightly lower than person-level (L2) reliability (ω_{L2} = .849 to .981) for some constructs, highlighting the need to rely on factor scores to partially control for this form of unreliability. This is, however, to be expected given that true score (i.e., reliable variance) is separated across two levels of analysis. For constructs assessed repeatedly across occasions, intraclass correlations (ICC1 = .523 to .769) indicate that 52.3% to 76.9% of the variability occurred at the person-specific level (L2), whereas 23.1% to 47.7% occurred at the occasion-specific (L1) level. Finally, estimates of inter-occasion reliability (ICC2; e.g., Morin et al., 2014) reveal that the person-specific aggregates obtained from the combination of occasion-specific measures present a satisfactory level of reliability (i.e., ICC2 = .815 to .931).

Second, relying on factor scores for the occasion-specific measures of BPNS, we verified the absence of longitudinal trend (i.e., that the day of measurement did not influence the ratings) with multilevel growth models (Grimm et al., 2016). In these models, time (day of measurement, coded from 0 to 4) was specified as an occasion-specific predictor of BPNS. Four models were contrasted: (a) A null effects models (the effect of time was constrained to be 0); (b) a linear model, allowing time to linearly influence BPNS; (c) a quadratic (or curvilinear) model, allowing time and time^2 to influence BPNS; and (d) a cubic model allowing time, time^2, and time^3 to influence BPNS. The results from these analyses are reported in the bottom section of Table S1 in the online supplements and indicate that BPNS ratings match the stationarity assumption (Asparouhov & Muthén, 2020; McNeish & Hamaker, 2020) of dynamic structural equation modeling (DSEM; Asparouhov et al., 2018), allowing us to proceed with our main analyses.

Dynamic Structural Equation Modeling (DSEM)

Our main analyses relied on DSEM (Asparouhov & Muthén, 2018, 2020; McNeish & Hamaker, 2020) analyses. These analyses were conducted in Mplus 8.5. (Muthén & Muthén, 2020) using Bayesian

Markov Chain Monte Carlo (MCMC) estimation procedures implemented via a Gibbs sampler algorithm (Asparouhov & Muthén, 2010) and uninformative priors (Mplus default procedure for DSEM; McNeish & Hamaker, 2020). All models were estimated using 2 MCMC chains, a minimum of 5,000 iterations, and a maximum of 50,000 iterations. All solutions were successfully replicated using 3 MCMC chains, a minimum of 10,000 iterations, and weakly informative priors (Depaoli, 2021; Depaoli & Van de Schoot, 2017; McNeish, 2019). Trace plots, posterior distributions, and autocorrelation plots supported the proper convergence of our models (e.g., Depaoli, 2021; Depaoli & Van de Schoot, 2017). In all analyses, person-specific (i.e., time-invariant, modelled only at L2) variables were grand-mean centered prior to the analyses (McNeish & Hamaker, 2020). Other variables were modelled at both levels. In this situation, Mplus relies on a latent person-mean centering process, resulting in L1 results directly expressed as within-person deviations (Asparouhov & Muthén, 2020; McNeish & Hamaker, 2020). Rather than providing a single point estimate for each parameter, Bayesian estimation results in a distribution of plausible values (the posterior distribution) for each parameter. This posterior distribution is usually summarized by a measure of central tendency (i.e., median) and a measure of variability, together with a 95% credibility interval. This credibility interval indicates whether the parameter of interest can be considered to differ from zero.

Our theoretical model is illustrated in Figure 1. To minimize model complexity, two models had to be estimated, one to account for the associations between BPNS and its predictors, and one to account for the associations between BPNS and its outcomes. In both models, BPNS was modelled at L1 using a lag 1 autoregressive process, allowing occasion-specific fluctuations in levels of BPNS to be predicted by BPNS levels on the previous day.[3] Average person-specific levels of BPNS over the course of the study were modelled at L2 as a random variable, with a mean (the average level of BPNS observed over the course of the study for all participants) and a variance (inter-individual variations in person-specific average levels of BPNS). Person-specific average levels of variations around these person-specific levels were also modelled as an additional random variable at L2 (i.e., random residuals) to reflect individual-specific levels of variability in BPNS levels over the course of the study (i.e., a multilevel location-scale model; McNeish & Hamaker, 2020). In DSEM, these random residuals are expressed in log units, and predictions involving them are modelled using log-linear functions. These associations must be converted back to meaningful units for interpretation.

For predictors, a lag 1 specification was used at L1 to model the effects of the three occasion-specific predictors (i.e., time-varying: feelings of immediacy, lack of control, and communication problems related to ICT) on occasion-specific fluctuations in BPNS levels (i.e., BPNS fluctuations on any specific day were influenced by predictor levels on the previous day). At L2, average levels of these predictors were allowed to predict person-specific levels and variability in BPNS. Person-specific predictors (i.e., time-invariant: perception of segmentation norms related to the work-life interface and workload perceptions) measured on Day 1 were also allowed to predict person-specific levels and variability in BPNS. For outcomes, a lag 1 specification was used at L1 to model the effects of BPNS levels on the three occasion-specific outcomes (i.e., time-varying: perceived productivity, psychological detachment, and work-family conflict), so that fluctuations in outcome levels on any given day were predicted by BPNS levels on the previous day. At L2, person-specific levels and variability in BPNS were allowed to predict person-specific average levels on these three outcomes, as well as the two person-specific outcomes measured on Day 5 (i.e., time-invariant: job and personal life satisfaction). The syntax for these models is provided in the online supplements.

For both models, two additional verifications were conducted to test the robustness of our findings. First, person-specific controls [sex (coded 0 for females and 1 for males), tenure in the position (in years, but standardized prior to the analyses), work schedule (coded 0 for full-time and 1 for part time), and employment type (coded 0 for permanent and 1 for temporary)] were added as additional predictors to verify whether the main results would remain unchanged following their inclusion. Second, random slopes describing the L1 associations were modelled at L2 and allowed to be predicted by person-specific predictors (i.e., time-invariant: segmentation norms and workload) and demographic controls to test for possible cross-level interactions.

Results

Unconditional Model

[3] Preliminary analyses showed that lag 2 or 3 autoregressions or predictions did not add to the model.

A first model including no predictor and no outcome was estimated to examine L1 and L2 BPNS person-specific levels, person-specific variability, occasion-specific fluctuations, and autoregressions. The results from this model indicate that participants' average levels of BPNS were quite high (7.033, on a four to eight scale[4], see Table S4 of the online supplements) and characterized by a moderate level of inter-individual variability (*SD* = .496). As can be expected, the average level of day-to-day fluctuations observed in the sample remained quite small (*M* = .095 in natural units) but characterized by a substantial level of inter-individual variation (*SD* = 2.540). This observation is consistent with the ICC1 value of .673 associated with BPNS, suggesting that whereas 67.3% of the variance in BPNS ratings occurs at the person-specific level, 32.7% of this variability occurs on a day-to-day basis. Our results also revealed moderate (*b* = .396 [.227 to .562]; β = .357; R^2 = .244) autoregressions between BPNS levels on any given day and BPNS levels on the next day. Finally, our results showed that person-specific average levels of BPNS were strongly, and negatively, correlated with person-specific levels of day-to-day variability (*r* = -.796), indicating that higher levels of BPNS were more stable[5].

Predictors

The results from the model including the predictors are reported in Table 1. These results indicate that none of the predictors explained daily fluctuations in BPNS levels at L1. However, person-specific levels of perceived lack of control and communication problems (but not feelings of immediacy, perceptions of workload, or segmentation norms) predicted lower average levels of BPNS at L2 (R^2 = .522). Furthermore, person-specific levels of perceived communication problems also predicted higher person-specific levels of variability in BPNS over the course of the study (R^2 = .263). These results were unchanged when including demographic controls (see Table S5 of the online supplements), which did not predict BPNS levels, or variations in these levels, at L2. Finally, additional analyses revealed no evidence of cross-level interactions between the person-specific predictors and the within-person associations between the predictors and BPNS levels.

Outcomes

The results from the model including the outcomes are reported in Table 2. These results indicate that daily fluctuations in BPNS levels did not predict daily fluctuations in the outcomes at L1. However, average person-specific levels of BPNS predicted higher levels of perceived productivity, job satisfaction, and personal life satisfaction, as well as lower levels of work family conflict, but were not associated with psychological detachment. However, higher person-specific levels of variability in BPNS predicted lower levels of psychological detachment, as well as higher levels of work family conflict, but were not associated with feelings of perceived productivity or levels of job and personal life satisfaction. This model explained 92.6% of the between-person variance in perceived productivity, 13.3% in psychological detachment, 16.2% in work family conflicts, 29.9% in job satisfaction, and 19.7% in personal life satisfaction. These results remained unchanged when including demographic controls (see Table S6 of the online supplements), which did not predict any of the outcomes. Finally, additional analyses revealed no cross-level interaction between any of the person-specific predictors and within-person associations between fluctuations in BPNS and outcome levels.

Discussion

Despite the recognition that employees' BPNS at work fluctuate over time, even daily (Coxen et al., 2021), only limited research has tried to capture the short-term dynamics of BPNS at work, especially when considering global levels of BPNS across all three needs proposed to be critical by SDT (i.e., autonomy, competence, and relatedness; Ryan & Deci, 2017). This study was designed to address this limitation by focusing on person and occasion components of the daily dynamics of employees' BPNS at work over the course of one work week, while considering their predictors and outcomes across both levels of analyses. Importantly, we did so by considering a set of theoretically relevant predictors (i.e.,

[4] These are factor scores saved from preliminary measurement models defined using the referent indicator approach (i.e., fixing the loading and intercept of a referent indicator to respectively 1 and 0). Although this approach maximizes the similarity between the original scaling of the measure and that of the latent factors, it never perfectly replicates it. The 4 to 8 range simply reflects the fact that no participant had very low levels of BPNS and indicates that the scaling of the factor scores was slightly higher than that of the original measure (1 to 7). The 4 to 8 scale is the one relevant for interpretations.

[5] No evidence of a correlation was found between person-specific levels of BPNS and the random slope reflecting inter-individual differences in the size of the autoregressions (*b* = .016 [-.080 to .198]; β = .090).

ICT-related demands, segmentation norms, and workload) and outcomes (i.e., perceived productivity, work-family conflict, and psychological detachment) that have been generally ignored in previous research on BPNS and yet have a high level of practical relevance in modern society. Our results supported the theoretical relevance of these predictors and outcomes by demonstrating clear associations occurring at the person-specific level, consistent with the presence of interrelations between these variables occurring over the course of a work week. In contrast, and although BPNS levels were found to fluctuate daily, they seemed immune to the effects of daily fluctuations in predictors levels, and unlikely to generate matching fluctuations in outcome levels, consistent with the presence of strong homeostatic processes. In sum, our results are consistent with the idea that "what makes for a happy day is not entirely congruent with what makes for a happy person" (Neubauer & Voss, 2018, p. 226).

A Dynamic Perspective on BPNS

Supporting Hypothesis 1, our results revealed that, at the occasion level, BPNS displayed moderate (32.7%) daily fluctuations. These fluctuations moderately predicted employees' BPNS fluctuations. These results are aligned with previous reports of moderate estimates of autoregressive stability in BPNS levels over longer periods of time (three months: Huyghebaert et al., 2018b; 12 months: Trépanier et al., 2015a). The generalizability of these results across highly diversified time intervals (days, trimester, year) suggests that whatever the source of these deviations from individuals' person-specific levels of BPNS, these fluctuations are not trivial but are likely to have a lasting impact on BPNS levels. These results are consistent with research highlighting the role of BPNS (in)stability for employees' functioning (Huyghebaert-Zouaghi et al., 2022), and indirectly support SDT's assertion that BPNS fluctuations should be reactive to socio-environmental changes in the life of individuals (e.g., Vansteenkiste et al., 2020).

However, our results also suggested the presence of important inter-individual differences in BPNS' reactivity to such contextual influences. Indeed, although daily fluctuations in BPNS remained, on the average, relatively small (one unit on the BPNS measure), they also displayed substantial inter-individual variability, consistent with the idea that some employees presented more stable BPNS levels than others. This study is the first to consider person-specific levels of work-related BPNS variability and revealed that employees with higher average levels of BPNS displayed more stable BPNS levels over time. This observation suggests that high levels of BPNS are not only beneficial in and of themselves, but also serve a homeostatic function by helping to protect employees against momentary fluctuations in BPNS resulting from external events.

These results are also consistent with the self-equilibrium hypothesis, proposed in the self-concept area (Morin et al., 2013, 2017a; Mund & Neyer, 2016). This hypothesis highlights the importance for individuals to achieve a sense of equilibrium within their environment in order to experience life positively (Ryan & Deci, 2017). From this perspective, the presence of a strong core sense of identity that remains stable over time is assumed to represent a key indicator of whether individuals have achieved this balance (Morin et al., 2013, 2017a). The self-equilibrium hypothesis thus proposes that more desirable person-specific levels on various components of individuals' identity should also be more stable over time. In contrast, less desirable person-specific levels on these same characteristics should be less stable over time, consistent with a work role that has not yet been fully internalized into a strong sense of professional identity. Beyond the self-concept area, research has also supported this hypothesis in relation to job burnout (i.e., lower levels are more stable), another construct known to be closely related to employees' work identity (Gillet et al., 2022b), but revealed opposite equilibration processes for work motivation (more extreme levels are less stable; Gillet et al., 2018). This study is the first to support this hypothesis in relation to BPNS at work, indirectly confirming SDT's assertion of the key role played by BPNS in employees' sense of identity and integrity of the self (Ryan & Deci, 2017). Organizations and practitioners interested in promoting this homeostatic function of high BPNS among employees could be informed of meta-analytical results showing that high levels of need satisfaction are, overall, most strongly predicted by positive leadership styles and, though to a slightly lesser extent, by organizational and job characteristics, rather than by individual or demographic characteristics (Van den Broeck et al., 2016). Interestingly, recent SDT-based research provided a framework to better grasp leaders' positive (need-supportive behaviors), negative (need-thwarting behaviors), and passive (need-indifferent behaviors) behaviors (Huyghebaert-Zouaghi et al., 2023), thus providing important keys to promote high levels of BPNS and their homeostatic function.

It was thus encouraging to note that, at the person level, our results revealed rather high average

levels of BPNS across the whole sample. This suggests that most participants tended to report that their basic psychological needs were met at work. This result is aligned with findings from another five-day diary study (van Hoof & Geurts, 2015) and with the high levels of BPNS generally found in cross-sectional and longitudinal research (Huyghebaert et al., 2018b; Trépanier et al., 2015a). However, what this study adds, is that solely focusing on these high average levels is misleading, given the presence of significant inter-individual variability in these levels. As a result, our results highlight the need to move beyond simplistic representations of average results happening in a sample as a whole, but to adopt a dynamic perspective making it possible to simultaneously consider inter-individual differences in person-specific levels of BPNS and BPNS variability anchored in a direct consideration of occasion-specific fluctuations in these levels.

ICT-Related Demands and BPNS

Most prior studies on BPNS at work have considered job demands as if they were relatively stable characteristics of the work environment (Trépanier et al., 2015b). Furthermore, most previous dynamic studies of BPNS at work, although they acknowledged the fluctuating nature of job demands, were limited by their focus on concurrent associations between job demands and BPNS (Aldrup et al., 2017; Haar et al., 2018; Hetland et al., 2015). Although some dynamic studies have properly considered lagged relations between job demands and BPNS, these studies either focused on an undifferentiated measure of generic job demands (De Gieter et al., 2018) or on a task-specific measure of BPNS unrepresentative of employees' global work-related BPNS (Bakker & Oerlemans, 2016). The present study is therefore the first to focus on specific measures of job demands related to ICT (Cho et al., 2020; Day et al., 2012) as lagged predictors of occasion-specific and person-specific levels of work-related BPNS.

At the occasion level, daily fluctuations in ICT-related demands shared no associations with daily BPNS fluctuations, failing to support Hypothesis 2. These results suggest that strong homeostatic processes might limit the interference of time-specific increases or decreases in ICT-related demands on BPNS. In other words, employees might be aware that ICT-related demands fluctuate over time and have developed ways to handle these fluctuations without allowing them to negatively impact their BPNS. In contrast, research also suggests that the effects of less desirable work characteristics, such as job demands, may be far more pronounced when employees' levels of need frustration or unfulfillment are considered, rather than their levels of need satisfaction (Huyghebaert et al., 2018b; Huyghebaert-Zouaghi et al., 2021; Trépanier et al., 2015b). This hypothesis would need to be more thoroughly investigated in future research.

In contrast, at the person level, weekly levels of perceived lack of control and communication problems predicted lower average BPNS. Person-specific levels of communication problems also predicted higher variability in BPNS over the week. In contrast, person-specific levels of immediacy, workload, or segmentation norms shared no associations with BPNS weekly levels or variability. These results partially support Hypothesis 3. In relation to employees' average BPNS, this study is thus the first to demonstrate that previously reported negative associations between generic types of job demands and BPNS levels (e.g., Bakker & Oerlemans, 2016; De Gieter et al., 2018; Gillet et al., 2015; Trépanier et al., 2015b) generalize to ICT-related types of job demands. Importantly, these associations were found while considering more stable characteristics of employees' work context (i.e., segmentation norms and workload), and even while controlling for their demographic characteristics, thus supporting the robustness of these associations. These results also indicate that even if homeostatic mechanisms contribute to help employees' handle short-term fluctuations in job demands, their accumulation over the work week appears sufficient to result in a breakdown of these mechanisms. However, more research is needed to understand the mechanisms underpinning the effects of ICT-related demands related to employees' interactions (communication problems) and decisions (lack of control), relative to the lack of effects of those related to time-pressure (immediacy).

Supporting previous reports of negative associations between job demands and BPNS instability (Huyghebaert et al., 2018b), our results finally indicated that person-specific levels of communication problems were related to higher weekly variability in BPNS. More precisely, ICT's ability to disrupt employees' interactions with others as a result of the lack of verbal and nonverbal cues that usually help to correctly interpret interpersonal communication may play an important role in generating instability in BPNS levels. This result suggests that inefficient communications are likely to play a highly disruptive role in relation to employees' work experience by generating instability through a lack of clarity, a possibility that will need to be addressed in future research.

BPNS Dynamics and their Implications for Employees

Previous studies of the short-term dynamics of BPNS at work have typically failed to consider how the outcome implications of global levels of BPNS across all three needs differed across the occasion and person levels (Aldrup et al., 2017; De Gieter et al., 2018; Haar et al., 2018; Hetland et al., 2015). This study is the first to dynamically consider the outcomes of employees' global BPNS experience, which is known to represent a more important driver of well-being than each need considered in isolation (Ryan & Deci, 2017).

At the occasion level, daily fluctuations in BPNS levels did not predict any of the outcomes, thus failing to support Hypothesis 4. This result thus suggest that the aforementioned hypothetical homeostatic mechanisms also help employees to maintain their typical level of functioning despite short term fluctuations in BPNS. This result also suggests the possible presence of compensatory processes whereby employees can compensate for momentary fluctuations in BPNS occurring in one domain (e.g., work) by capitalizing on another domain (e.g., family; Hewett et al., 2017). Arguably, future research would be required to validate this compensatory hypothesis, and to better understand the psychological mechanisms underpinning these homeostatic processes.

In contrast, at the person level, weekly levels of BPNS were associated with higher levels of perceived productivity, job satisfaction, and personal life satisfaction, as well as with lower levels of work family conflict. Furthermore, higher person-specific variability in BPNS was associated with lower levels of psychological detachment, as well as with higher levels of work family conflict. These results partially support Hypothesis 5. In relation to employees' average levels of BPNS, our results corroborate the importance of BPNS at work for various facets of employees' functioning (Deci et al., 2017; Huyghebaert-Zouaghi et al., 2022; Huyghebaert et al., 2018c; Leroy et al., 2015; Trépanier et al., 2015b; Van den Broeck et al., 2016). These results also match those obtained when we considered predictors of BPNS, suggesting that although employees seem well-equipped to handle daily fluctuations in BPNS, this ability does not translate to weekly levels of BPNS.

Considering that previous research has never considered whether and how BPNS could influence psychological recovery processes (Sonnentag et al., 2010), it was interesting to note that person-specific variability in BPNS over the work week was associated with lower levels of psychological detachment, as well as with higher levels of work-family conflict. Thus, work weeks in which employees' BPNS fluctuates more widely makes it harder for them to stop thinking about work during their off-job time (i.e., psychological detachment) and interferes with their family life (i.e., work-family conflict). These fluctuations may generate a state of arousal, leaving employees unable to psychologically distance themselves from their work experience (Sonnentag et al., 2010). Employees may also tap into their limited personal resources to handle these fluctuations, thus leaving them with fewer resources to allocate to their family (Edwards & Rothbard, 2000). Fortunately, these weekly fluctuations in BPNS did not interfere with employees' work functioning (perceived productivity) or with their more stable subjective well-being (job and personal life satisfaction), thus showing that both levels and stability need to be considered when trying to capture the dynamics of BPNS at work.

Limitations

Notwithstanding its contributions, this research presents limitations that need to be considered. First, we relied on self-report measures, which increase the risk of social desirability and self-report biases. Scholars have suggested that this issue may not be as concerning when considering fluctuations (occasion-specific and person-average levels of variability) in dynamic analyses, given that these fluctuations are explicitly expressed as deviations from employees' levels across the whole study period (Beal, 2012; De Gieter et al., 2018). However, these concerns remain when considering person-specific averages across the whole study period. To address this limitation, future studies should consider incorporating more objective measures (e.g., organizational data on employees' productivity) and informant ratings (e.g., spouse ratings of work-family conflict) of employees' functioning.

Second, we relied on a convenience sample, limiting the generalizability of our findings. It should still be noted that we used snowball sampling, which is known to increase the heterogeneity of a convenience sample, and thus to enhance its external validity (Demerouti & Rispens, 2014). Indeed, the presence of substantial heterogeneity in our sample composition in terms of sex, age, type of contract, tenure, work domain, sector, and weekly work hours is consistent with this interpretation. Yet, we did not collect information related to race/ethnicity and socioeconomic status. Likewise, although our sample remains reasonably large for dynamic analyses (129 participants and 521 ratings), it remains

small from a perspective of generalizability, and was recruited in a single country (France). As a result, caution is warranted when interpreting our results, at least until more evidence of generalizability across racial/ethnic and socioeconomic groups, as well as countries, can be obtained.

Third, we relied on end-of-day measures over the course of five working days. As such, we had no information regarding employees' BPNS and functioning (e.g., perceived productivity, psychological detachment) at the start of their working day, or during their working days. Indeed, workers' functioning on a given evening may not only be related to their level of functioning at the end of the previous day, but also to their level of functioning at the beginning or in the middle of the same day (e.g., van Hoof & Geurts, 2015). It would thus be highly interesting for future studies to consider shorter (i.e., measures taken at the beginning, middle, and end of each day; e.g., Naubauer & Vos, 2018) and longer (i.e., weakly measures over the course of one or more months; see Coxen et al., 2021) timeframes to more clearly delineate the dynamics of BPNS at work.

Perhaps more importantly, DSEM analyses are known to benefit from a more extensive set of repeated measures than that used in the present study (Gistelinck et al., 2021; McNeish, 2020; Schultzberg, & Muthén, 2018). Thus, although this analytic approach brings substantial value relative to more classical multilevel analyses in allowing us to test for lagged predictions and to disaggregate three sources of variability (i.e., occasion-specific day-to-day fluctuations in BPNS, person-specific average levels of BPNS, and person-specific BPNS variability), it remains limited by the consideration of only five repeated measures. With more measurement occasions, more complex models (including reciprocal associations, predictors and outcomes, multiple components of need satisfaction) could have been estimated, allowing us to go beyond the present results. Moreover, more measurement occasions could have led to higher estimates of within-person variability, perhaps allowing us to achieve some prediction at this level had a longer time frame been considered. However, to ensure that our results were trustworthy despite this limitation, we conducted extensive tests of replication (2 vs 3 MCMC chains, 5,000 vs 10,000 iterations, uninformative vs weakly informative priors, which have been found to be more robust to low sample sizes; NcNeish, 2019). Trace plots, posterior distributions, and autocorrelation plots supported the proper convergence of our models (e.g., Depaoli, 2021; Depaoli & Van de Schoot, 2017). Moreover, we also considered alternative solutions relying on manifest aggregation procedures with a manual group mean centering for the variables considered at both levels, played with more numerous chains, and even different sampler algorithms. Finally, we also considered lag 2 and 3 predictions, which were not retained. All of these tests supported the robustness of our solution. Perhaps more importantly, we also considered far more complex models in our initial estimation procedures: (a) Adding cross lagged paths to test reciprocal effects; (b) including predictors and outcomes in the same model; and (c) including all facets of need satisfaction rather than, or in addition to (bifactor), a global indicator. These more complex models were discarded as they failed to replicate, or yielded convergence problems. These multiple tests of replication allow us to be confident that our model is trustworthy.

Fourth, we relied on single-item measures of job and personal life satisfaction, which some might consider a limitation. Single-item measures are very common in dynamic studies, as they are less demanding (De Gieter et al., 2018), and prior research has supported the validity of similar measures of job and life satisfaction (Fisher et al., 2016; Gillet et al., 2022a; Huyghebaert-Zouaghi et al., 2021). Finally, we focused exclusively on need satisfaction, whereas recent research has demonstrated the equally important (and distinct) role of need frustration and need unfulfillment (Huyghebaert-Zouaghi et al., 2021). Examining the daily effects of all three experiential need states (i.e., need satisfaction, frustration, and unfulfillment) on employees' functioning could considerably extend our understanding of the daily dynamics of psychological needs at work. Moreover, in line with recent SDT research (Huyghebaert-Zouaghi et al., 2021), future studies should consider the possibility that the satisfaction, frustration, and unfulfillment of each of the three needs for autonomy, competence, and relatedness could share distinct associations with daily predictors and outcomes. For instance, daily lack of ICT control could relate more strongly to employees' autonomy experiential states as this demand directly impedes their need for volition. Similarly, employees' relatedness states might primarily be impacted by communication problems related to ICT, as such demands make them feel less secure in their relationships at work. Finally, employees' competence states could be more strongly predicted by their daily experiences of immediacy, as this type of demand interferes with their ability to focus on their work and feel efficient in accomplishing their tasks (Gillet et al., 2022c). Future studies could also

consider the role of other work characteristics (e.g., supervisors' or colleagues' daily interpersonal behaviors; e.g., Huyghebaert-Zouaghi et al., 2023) likely to promote the homeostatic function of high person-specific levels of BPNS, as well as other indices of employees' functioning (e.g., sleeping problems, relaxation) that could stem from person- or occasion-specific BPNS.

Practical Implications

Despite these limitations, our results have several practical implications. Perhaps most importantly, this study indicates that, although within-person fluctuations in BPNS do occur over the course of a work week, they might not be "the most fruitful place to focus attention" (Deci & Ryan, 2000, p. 232) because they do not predict fluctuations in employees' functioning, nor do they vary as a function of fluctuations in their work environment. In contrast, person-specific weekly levels of BPNS were found to be far more relevant predictors of employees' weekly levels of work functioning and showed reactivity to weekly levels of ICT-related demands. However, this conclusion is only partially accurate. On the one hand, employees were able to handle daily fluctuations in their ICT-related work demands and BPNS levels without letting these fluctuations impact their functioning. On the other hand, weeks characterized by more communication problems led employees to experience more variability in their BPNS levels over the course of the week, and this weekly level of variability made it harder from them to psychologically detach from their work, in addition to increasing their experience of work-family conflict. These differentiated within- and between- person results are important, because they imply that interventions aiming to promote BPNS should seek to target not only BPNS levels, but also their stability. Whereas ICT-related interventions focused on employees' sense of control) seems relevant to address the first component (levels), an improvement in communications appeared important for both components (levels and stability).

Thus, organizations could identify ways to increase employees' sense of control in their use of ICT. Organizations may consider paying attention to employees' perspective when it comes to the use of ICT at work, offering them choices, allowing them to participate in decision-making, and providing them with a meaningful rationale for why ICT needs to be used in certain ways (Huyghebaert-Zouaghi et al., 2021). Likewise, it may also be useful to establish clear norms regarding when and where ICT is expected to be used for work purposes, allowing employees to use ICT beyond these boundaries in a discretionary manner (Cho et al., 2020; Park et al., 2018).

Organizations could also nurture more accurate and efficient ICT-related communications. For instance, awareness should be raised among employees that the messages they send through ICT may communicate emotion, and that individuals are inclined to misinterpret such messages as more negative than intended by their sender (Byron, 2008). Likewise, it would seem important to increase employees' awareness of the negative turns that such miscommunications can take (i.e., cyber incivility; Park et al., 2018). Employees could then be trained on ways to accurately communicate through ICT at work and to seek clarity in such communications (e.g., asking questions, stating their interpretation of the message, being cautious of their tone and wording, being civil and respectful; Byron, 2008; Cho et al., 2020; Park et al., 2018).

References

Aldrup, K., Klusmann, U., & Lüdtke, O. (2017). Does basic need satisfaction mediate the link between stress exposure and well-being? A diary study among beginning teachers. *Learning and Instruction, 50*, 21-30.

Ashforth, B.E., Kreiner, G.E., & Fugate, M. (2000). All in a day's work: Boundaries and micro role transitions. *Academy of Management Review*, *25*, 472-491.

Asparouhov, T., & Muthén, B. (2010). *Bayesian analysis using Mplus: Technical implementation*. Muthén & Muthén.

Asparouhov, T., & Muthén, B. (2020). Comparison of models for the analysis of intensive longitudinal data. *Structural Equation Modeling*, *27*, 275-297.

Asparouhov, T., Hamaker, E.L., & Muthen, B. (2018). Dynamic structural equation models. *Structural Equation Modeling, 25*, 359-388.

Bakker, A.B., & Oerlemans, W.G. (2016). Momentary work happiness as a function of enduring burnout and work engagement. *The Journal of Psychology*, *150*, 755-778.

Bakker, A.B., & Oerlemans, W.G. (2019). Daily job crafting and momentary work engagement: A self-determination and self-regulation perspective. *Journal of Vocational Behavior*, *112*, 417-430.

Beal, D.J. (2012). Industrial/organizational psychology. In M.R. Mehl & T.S. Conner (Eds.), *Handbook*

of research methods for studying daily life (pp. 601-619). Guilford Press.
Bowling, N.A., Beehr, T.A., Wagner, S.H., & Libkuman, T.M. (2005). Adaptation-level theory, opponent process theory, and dispositions: An integrated approach to the stability of job satisfaction. *Journal of Applied Psychology*, *90*, 1044-1053.
Byron, K. (2008). Carrying too heavy a load? The communication and miscommunication of emotion by email. *Academy of Management Review*, *33*, 309-327.
Cangiano, F., Parker, S.K., & Yeo, G.B. (2019). Does daily proactivity affect well-being? The moderating role of punitive supervision. *Journal of Organizational Behavior*, *40*, 59-72.
Cho, S., Kim, S., Chin, S. W., & Ahmad, U. (2020). Daily effects of continuous ICT demands on work-family conflict: Negative spillover and role conflict. *Stress and Health*, *36*, 533-545.
Coxen, L., Van Der Vaart, L., Van den Broeck, A., & Rothmann, S. (2021). Basic psychological needs in the work context: A systematic literature review of diary studies. *Frontiers in psychology*, *12*.
Day, A., Paquet, S., Scott, N., & Hambley, L. (2012). Perceived information and communication technology (ICT) demands on employee outcomes: The moderating effect of organizational ICT support. *Journal of Occupational Health Psychology*, *17*, 473-491.
De Gieter, S., Hofmans, J., & Bakker, A.B. (2018). Need satisfaction at work, job strain, and performance: A diary study. *Journal of Occupational Health Psychology*, *23*, 361-372.
Deci, E.L., Olafsen, A.H., & Ryan, R.M. (2017). Self-determination theory in work organizations: The state of a science. *Annual Review of Organizational Psychology and Organizational Behavior*, *4*, 19-43.
Deci, E.L., & Ryan, R.M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*, 227-268.
Demerouti, E., & Rispens, S. (2014). Improving the image of student-recruited samples: A commentary. *Journal of Occupational and Organizational Psychology*, *87*, 34-41.
Depaoli, S. (2021). *Bayesian Structural Equation Modeling*. Guilford.
Depaoli, S., & Van de Schoot, R. (2017). Improving transparency and replication in Bayesian statistics: The WAMBS-checklist. *Psychological Methods*, *22*, 240-261.
Edwards, J.R., & Rothbard, N.P. (2000). Mechanisms linking work and family: Clarifying the relationship between work and family constructs. *Academy of Management Review*, *25*, 178-199.
Enders, C.K. (2010). *Applied missing data analysis*. Guilford.
Fisher, G.G., Matthews, R.A., & Gibbons, A.M. (2016). Developing and investigating the use of single-item measures in organizational research. *Journal of Occupational Health Psychology*, *21*, 3-23.
Foulk, T.A., Lanaj, K., & Krishnan, S. (2019). The virtuous cycle of daily motivation: Effects of daily strivings on work behaviors, need satisfaction, and next-day strivings. *Journal of Applied Psychology*, *104*, 755-775.
Gillet, N., Fouquereau, E., Huyghebaert, T., & Colombat, P. (2015). The effects of job demands and organizational resources through psychological need satisfaction and thwarting. *The Spanish Journal of Psychology*, *18*, E28.
Gillet, N., Huyghebaert-Zouaghi, T., Austin, S., Fernet, C., & Morin, A.J.S. (2022a). Remote working: A double-edged sword for workers' personal and professional well-being. *Journal of Management & Organization*, *27*, 1060-1082.
Gillet, N., Morin, A. J., Fernet, C., Austin, S., & Huyghebaert-Zouaghi, T. (2022c). Telepressure and recovery experiences among remote and onsite workers. *Journal of Personnel Psychology*, *22*, 13-19.
Gillet, N., Morin, A.J.S., Huart, I., Odry, D., Chevalier, S., Coillot, H., & Fouquereau, E. (2018). Self-determination trajectories during police officers' vocational training program: A growth mixture analysis. *Journal of Vocational Behavior*, *109*, 27-43.
Gillet, N., Morin, A.J.S., Sandrin, É., & Fernet, C. (2022b). Predictors and outcomes of teachers' burnout trajectories over a seven-year period. *Teaching and Teacher Education*, *117*, 103781.
Gillet, N., Rosnet, E., & Vallerand, R.J. (2008). Développement d'une échelle de satisfaction des besoins fondamentaux en contexte sportif [Development of a scale of satisfaction of the fundamental requirements in sporting context]. *Canadian Journal of Behavioural Science*, *40*, 230-237.
Gistelinck, F., Loeys, T., & Flamant, N. (2021). Multilevel autoregressive models when the number of time points is small. *Structural Equation Modeling*, *28*, 15-27.
Grimm, K.J., Ram, N., & Estabrook, R. (2016). *Growth modeling*. Guilford.
Haar, J. M., Roche, M., & ten Brummelhuis, L. (2018). A daily diary study of work-life balance in

managers: Utilizing a daily process model. *The International Journal of Human Resource Management*, *29*, 2659-2681.

Hancox, J.E., Quested, E., Ntoumanis, N., & Duda, J.L. (2017). Teacher-created social environment, basic psychological needs, and dancers' affective states during class: A diary study. *Personality and Individual Differences*, *115*, 137-143.

Hetland, J., Hetland, H., Bakker, A.B., Demerouti, E., Andreassen, C.S., & Pallesen, S. (2015). Psychological need fulfillment as a mediator of the relationship between transformational leadership and positive job attitudes. *Career Development International*, *20*, 464-481.

Hewett, R., Haun, V.C., Demerouti, E., Rodríguez Sánchez, A.M., Skakon, J., & De Gieter, S. (2017). Compensating need satisfaction across life boundaries: A daily diary study. *Journal of Occupational and Organizational Psychology*, *90*, 270-279.

Hofmans, J., Morin, A.J.S., Ceulemans, E., Chénard-Poirier, L.A., Driver, C.C., Fernet, ... & Wille, B. (2021). The baby and the bathwater: On the need for substantive-methodological synergy in organizational research. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, *14*, 497-504.

Huyghebaert, T., Fouquereau, E., Lahiani, F.J., Beltou, N., Gimenes, G., & Gillet, N. (2018a). Examining the longitudinal effects of workload on ill-being through each dimension of workaholism. *International Journal of Stress Management*, *25*, 144-162.

Huyghebaert, T., Gillet, N., Fernet, C., Lahiani, F.-J., Chevalier, S., & Fouquereau, E. (2018b). Investigating the longitudinal effects of surface acting on managers' functioning through psychological needs. *Journal of Occupational Health Psychology*, *23*, 207-222.

Huyghebaert, T., Gillet, N., Fernet, C., Lahiani, F.J., & Fouquereau, E. (2018c). Leveraging psychosocial safety climate to prevent ill-being: The mediating role of psychological need thwarting. *Journal of Vocational Behavior*, *107*, 111-125.

Huyghebaert-Zouaghi, T., Morin, A.J.S., Forest, J., Fouquereau, E., & Gillet, N. (2022). A longitudinal examination of nurses' need satisfaction profiles: A latent transition analysis. *Current Psychology*, *41*, 4837-4859.

Huyghebaert-Zouaghi, T., Morin, A.J.S, Ntoumanis, N., Berjot, S., & Gillet, N. (2023). Supervisors' interpersonal styles: An integrative perspective and a measure based on self-determination theory. *Applied Psychology: An International Review*, *72*, 1097-1133.

Huyghebaert-Zouaghi, T., Ntoumanis, N., Berjot, S., & Gillet, N. (2021). Advancing the conceptualization and measurement of psychological need states: A 3 × 3 model based on self-determination theory. *Journal of Career Assessment*, *29*, 396-421.

Jiang, W., Jiang, J., Du, X., Gu, D., Sun, Y., & Zhang, Y. (2020). Striving and happiness: Between-and within-person-level associations among grit, needs satisfaction and subjective well-being. *The Journal of Positive Psychology*, *15*, 543-555.

Kinnunen, U., Geurts, S., & Mauno, S. (2004). Work-to-family conflict and its relationship with satisfaction and well-being: A one-year longitudinal study on gender differences. *Work & Stress*, *18*, 1-22.

Kreiner, G.E. (2006). Consequences of work-home segmentation or integration: A person-environment fit perspective. *Journal of Organizational Behavior*, *27*, 485-507.

Kushlev, K., & Dunn, E.W. (2015). Checking email less frequently reduces stress. *Computers in Human Behavior*, *43*, 220-228.

Lequeurre, J., Gillet, N., Ragot, C., & Fouquereau, E. (2013). Validation of a French questionnaire to measure job demands and resources. *Revue Internationale de Psychologie Sociale*, *26*, 93-124.

Leroy, H., Anseel, F., Gardner, W.L., & Sels, L. (2015). Authentic leadership, authentic followership, basic need satisfaction, and work role performance: A cross-level study. *Journal of Management*, *41*, 1677-1697.

Lucas, R.E., & Donnellan, M.B. (2007). How stable is happiness? Using the STARTS model to estimate the stability of life satisfaction. *Journal of Research in Personality*, *41*, 1091-1098.

McDonald, R.P. (1970). Theoretical foundations of principal factor analysis, canonical factor analysis, and alpha factor analysis. *British Journal of Mathematical & Statistical Psychology*, *23*, 1-21.

McNeish, D. (2019). Two-level dynamic structural equation models with small samples. *Structural Equation Modeling*, *26*, 948-966.

McNeish, D. (2020). Specifying location-scale models for heterogeneous variances as multilevel SEMs.

Organizational Research Methods, *24*, 630-653
McNeish, D., & Hamaker, E.L. (2020). A primer on two-level dynamic structural equation models for intensive longitudinal data in Mplus. *Psychological Methods*, *25*, 610-635.
Morin, A.J.S., Boudrias, J.-S., Marsh, H.W., McInerney, D.M., Dagenais-Desmarais, V., Madore, I., & Litalien, D. (2017a). Complementary variable- and person-centered approaches to exploring the dimensionality of psychometric constructs: Application to psychological wellbeing at work. *Journal of Business and Psychology*, *32*, 395-419.
Morin, A.J.S., Maïano, C., Marsh, H.W., Nagengast, B., & Janosz, M. (2013). School life and adolescents' self-esteem trajectories. *Child Development*, *84*, 1967-1988.
Morin, A.J.S., Maïano, C., Scalas, L.F., Janosz, M., & Litalien, D. (2017b). Adolescents' body image trajectories: A further test of the self-equilibrium hypothesis. *Developmental Psychology*, *53*, 1501-1521.
Morin, A.J.S., Marsh, H.W., Nagengast, B., & Scalas, L.F. (2014). Doubly latent multilevel analyses of classroom climate: An illustration. *The Journal of Experimental Education*, *82*, 143-167.
Mund, M., & Neyer, F.J. (2016). Rising high or falling deep? Pathways of self-esteem in a representative German sample. *European Journal of Personality*, *30*, 341-357.
Muthén, L., & Muthén, B. (2020). *Mplus user's* guide. Muthén & Muthén.
Navarro, J., Rueff-Lopes, R. & Rico, R. (2020). New nonlinear and dynamic avenues for the study of work and organizational psychology: an introduction to the special issue. *European Journal of Work and Organizational Psychology*, *29*, 477-482.
Neubauer, A.B., & Voss, A. (2018). The structure of need fulfillment: Separating need satisfaction and dissatisfaction on between- and within-person level. *European Journal of Psychological Assessment*, *34*, 220-228.
Park, Y., Fritz, C., & Jex, S.M. (2018). Daily cyber incivility and distress: The moderating roles of resources at work and home. *Journal of Management*, *44*, 2535-2557.
Reis, H.T., Sheldon, K.M., Gable, S.L., Roscoe, J., & Ryan, R.M. (2000). Daily well-being: The role of autonomy, competence, and relatedness. *Personality & Social Psychology Bulletin*, *26*, 419-435.
Ryan, R.M., & Deci, E.L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford.
Scharp, Y.S., Bakker, A.B., & Breevaart, K. (2022). Playful work design and employee work engagement: A self-determination perspective. *Journal of Vocational Behavior*, *134*, 103693.
Schultzberg, M., & Muthén, B. (2018). Number of subjects and time points needed for multilevel time-series analysis: A simulation study of dynamic structural equation modeling. *Structural Equation Modeling*, *25*, 495-515.
Shimazu, A., Schaufeli, W.B., Kamiyama, K., & Kawakami, N. (2015). Workaholism vs. work engagement: The two different predictors of future well-being and performance. *International Journal of Behavioral Medicine*, *22*, 18-23.
Skrondal, A., & Laake, P. (2001). Regression among factor scores. *Psychometrika*, *66*, 563-576.
Sonnentag, S., & Fritz, C. (2007). The Recovery Experience Questionnaire: development and validation of a measure for assessing recuperation and unwinding from work. *Journal of Occupational Health Psychology*, *12*, 204-221.
Sonnentag, S., Kuttler, I., & Fritz, C. (2010). Job stressors, emotional exhaustion, and need for recovery: A multi-source study on the benefits of psychological detachment. *Journal of Vocational Behavior*, *76*, 355-365.
Stadin, M., Nordin, M., Broström, A., Hanson, L.L.M., Westerlund, H., & Fransson, E.I. (2019). Repeated exposure to high ICT demands at work, and development of suboptimal self-rated health: Findings from a 4-year follow-up of the SLOSH study. *International Archives of Occupational and Environmental Health*, *92*, 717-728.
Trépanier, S.-G., Fernet, C., & Austin, S. (2015a). A longitudinal investigation of workplace bullying, basic need satisfaction, and employee functioning. *Journal of Occupational Health Psychology*, *20*, 105-116.
Trépanier, S.-G., Forest, J., Fernet, C., & Austin, S. (2015b). On the psychological and motivational processes linking job characteristics to employee functioning: Insights from self-determination theory. *Work & Stress*, *29*, 286-305.
Ulfert, A.S., Probst, D., & Scherer, S. (2022). Virtual work communication during a pandemic—The moderating effect of technology expertise on technology overload. *Technology, Mind, and*

Behavior, *3*, 1-16.

Van den Broeck, A., Ferris, D. L., Chang, C.H., & Rosen, C.C. (2016). A review of self-determination theory's basic psychological needs at work. *Journal of Management*, *42*, 1195-1229.

Van den Broeck, A., Vansteenkiste, M., De Witte, H., & Lens, W. (2008). Explaining the relationships between job characteristics, burnout, and engagement: The role of basic psychological need satisfaction. *Work & Stress*, *22*, 277-294.

van Hooff, M.L., & De Pater, I.E. (2019). Daily associations between basic psychological need satisfaction and well-being at work: The moderating role of need strength. *Journal of Occupational and Organizational Psychology*, *92*, 1027-1035.

van Hooff, M.L., & Geurts, S.A. (2014). Need satisfaction during free evening hours: Examining its role in daily recovery. *Stress and Health*, *30*, 198-208.

van Hooff, M.L.M., & Geurts, S.A.E. (2015). Need satisfaction and employees' recovery state at work: A daily diary study. *Journal of Occupational Health Psychology*, *20*, 377-387.

van Hooff, M.L., & van Hooft, E.A. (2017). Boredom at work: Towards a dynamic spillover model of need satisfaction, work motivation, and work-related boredom. *European Journal of Work and Organizational Psychology*, *26*, 133-148.

Van Laethem, M., Van Vianen, A.E., & Derks, D. (2018). Daily fluctuations in smartphone use, psychological detachment, and work engagement: The role of workplace telepressure. *Frontiers in Psychology*, *9*, 1808.

Vallerand, R.J. (1997). Toward a hierarchical model of intrinsic and extrinsic motivation. In M.P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 29, pp. 271-360). Academic Press.

Vandercammen, L., Hofmans, J., & Theuns, P. (2014). The mediating role of affect in the relationship between need satisfaction and autonomous motivation. *Journal of occupational and organizational psychology*, *87*, 62-79.

Vansteenkiste, M., Neyrinck, B., Niemiec, C.P., Soenens, B., De Witte, H., & Van den Broeck, A. (2007). On the relations among work value orientations, psychological need satisfaction and job outcomes: A self-determination theory approach. *Journal of Occupational and Organizational Psychology*, *80*, 251-277.

Vansteenkiste, M., Ryan, R.M. & Soenens, B. (2020). Basic psychological need theory: Advancements, critical themes, and future directions. *Motivation and Emotion*, *44*, 1-31.

Wang, N., Zhu, J., Dormann, C., Song, Z., & Bakker, A.B. (2020). The daily motivators: Positive work events, psychological needs satisfaction, and work engagement. *Applied Psychology*, *69*, 508.

Xanthopoulou, D., Bakker, A.B., Demerouti, E., & Schaufeli, W.B. (2009). Work engagement and financial returns: A diary study on the role of job and personal resources. *Journal of Occupational and Organizational Psychology*, *82*, 183-200.

Zirkel, S., Garcia, J.A., & Murphy, M.C. (2015). Experience-sampling research methods and their potential for education research. *Educational Researcher*, *44*, 7-16.

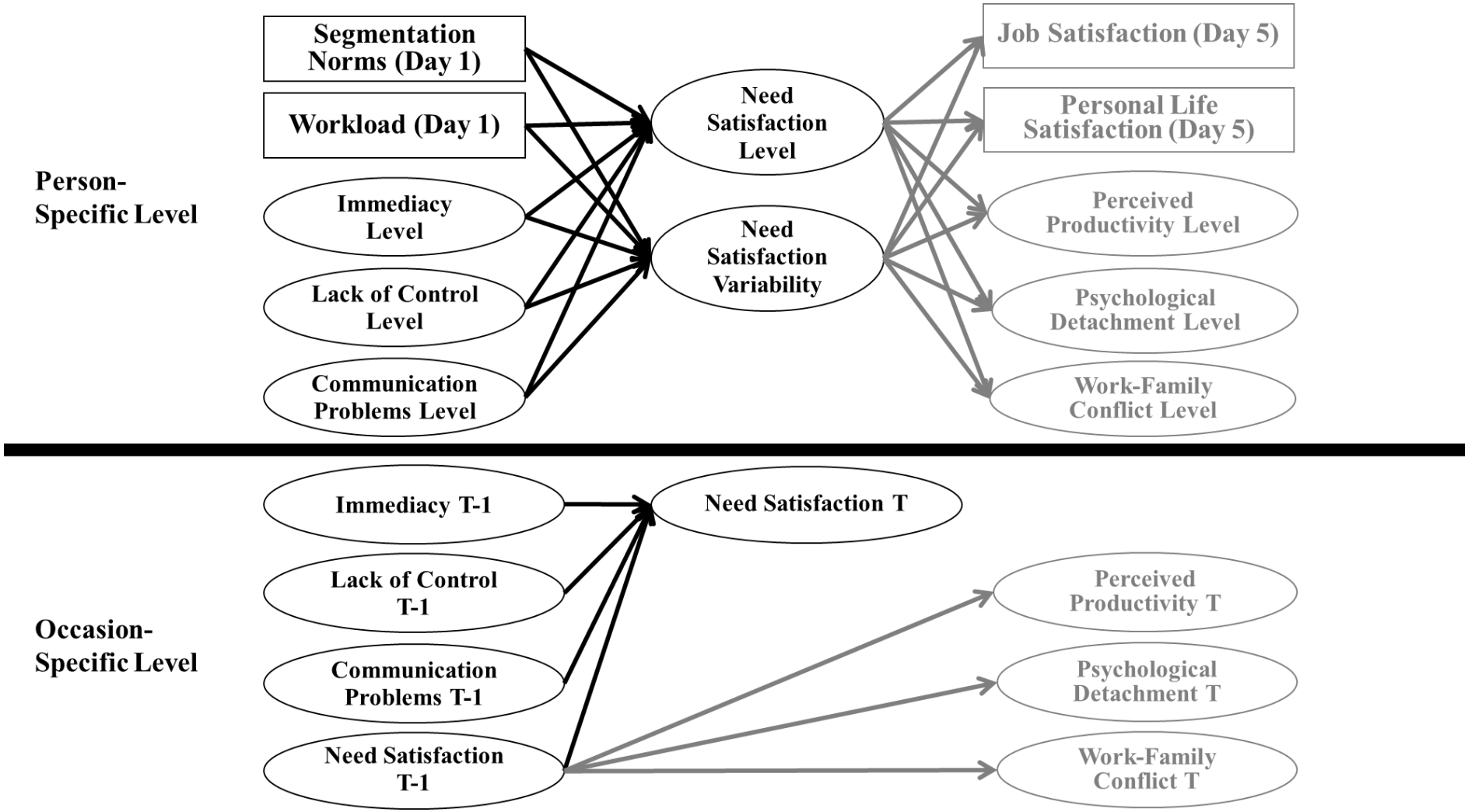

Figure 1. Theoretical Predictions Tested in the Present Study.
Note. All variables are factor scores saved from preliminary measurement models; squares reflect variables that are directly represented by these factor scores; ovals reflect variables that are disaggregated into a within-person and between-person component via a latent aggregation process; analyses of predictors are represented in black; analyses of outcomes are represented in greyscale; T: Measure taken at a specific day; and T-1: Measure taken on the previous day (a lag 1 prediction).

Table 1

Results from the Model Including the Predictors of Need Satisfaction

Predictors	Need satisfaction level				Need satisfaction log variability (natural unit in parentheses)			
	Point Estimate (Posterior Median)	Posterior S.D.	Credibility Interval	Std. Estimate	Point Estimate (Posterior Median)	Posterior S.D.	Credibility Interval	Std. Estimate
Regression Intercept	9.088	.310	8.485; 9.699*		-5.314 (.005)	.902	-7.065; -3.486*	
Regression Residual	.141	.043	.069; 237*		1.585 (4.879)	.400	.933; 2.497*	
Level 1								
Need satisfaction T-1 (mean slope)	.353	.078	.200; .505*	.316				
Need satisfaction T-1 (slope var.)	.137	.049	.058; .245*					
Immediacy T -1 (mean slope)	.020	.035	-.052; .085	.034				
Immediacy T -1 (slope var.)	.004	.007	.001; .025*					
Lack of control T -1 (mean slope)	.046	.048	-.045; .146	.060				
Lack of control T -1 (slope var.)	.055	.036	.005; .142*					
Communication prob. T-1 (mean slope)	.069	.134	-.194; .331	.044				
Communication prob. T-1 (slope var.)	.278	.140	.098; .634*					
R^2	.507	.050	.401; .598*					
Level 2								
Immediacy	-.058	.080	-.218; .097	-.097	-.232 (.793)	.250	-.723; .258	-.142
Lack of control	-.258	.082	-.423; -.102*	-.366	.261 (1.298)	.258	-.249; .758	.135
Communication problems	-.853	.233	-1.340; -.426*	-.545	1.673 (5.328)	.700	.267; 3.016*	.392
Segmentation norms	.058	.048	-.036; .152	.133	-.045 (.956)	.144	-.325; .243	-.038
Workload	.044	.074	-.111; .184	.065	.075 (1.078)	.240	-.412; .532	.040
R^2	.522	.113	.307; 752*		.263	.124	.074; .549*	

Note. * The credibility interval excludes 0 (similar to $p < .05$); T -1: Previous occasion-specific measurement; var.: Variance; prob.: Problems; S.D.: Standard deviation; Std.: Standard; results related to need satisfaction variability as in log units, their conversion to natural units is reported in parentheses.

Table 2

Results from the Model Including the Outcomes of Need Satisfaction

Predictors	Perceived productivity Point Estimate (Posterior Median)	Posterior S.D.	Credibility Interval	Std. Estimate	Psychological detachment Point Estimate (Posterior Median)	Posterior S.D.	Credibility Interval	Std. Estimate
Regression Intercept	-5.486	1.008	-7.454; -3.533*		.100	1.933	-3.910; 3.782	
Regression Residual	.045	.034	.008; .138*		.998	.171	.721; 1.389*	
Level 1								
Need satisfaction T -1 (mean slope)	.167	.116	-.063; .392	.061	-.010	.135	-.272; .254	-.025
Need satisfaction T -1 (slope var.)	.184	.130	.013; .495*		.137	.109	.012; .405*	
R^2	.065	.023	.025; .114*		.033	.022	.011; .089*	
Level 2								
Need satisfaction level	1.534	.144	1.254; 1.813*	.958	.398	.286	-.145; .992	.180
Need satisfaction variability	-.005	.056	-.109; .109	-.008	-.226	.106	-.425; -.007*	-.281
R^2	.926	.056	.770; .987*		.133	.068	.027; .289*	
Predictors	Work-family conflict Point Estimate (Posterior Median)	Posterior S.D.	Credibility Interval	Std. Estimate	Job satisfaction Point Estimate (Posterior Median)	Posterior S.D.	Credibility Interval	Std. Estimate
Regression Intercept	4.452	1.027	2.506; 6.577*		-5.574	1.107	-7.852; -3.532*	
Regression Residual	.292	.050	.211; .404*		.350	.057	.251; .478*	
Level 1								
Need satisfaction T -1 (mean slope)	-.072	.066	-.196; .061	-.054				
Need satisfaction T -1 (slope var.)	.061	.034	.013; .145*					
R^2	.072	.022	.032	.116				
Level 2								
Need satisfaction level	-.327	.152	-.641; -.041*	-.270	.774	.160	.472; 1.102*	.533
Need satisfaction variability	.116	.056	.002; .223*	.261	-.035	.058	-.160; .070	-.066
R^2	.162	.069	.045; .312*		.299	.089	.143; .485*	
Predictors	Personal life satisfaction Point Estimate (Posterior Median)	Posterior S.D.	Credibility Interval	Std. Estimate				
Regression Intercept	-5.451	1.507	-8.601; -2.721*					
Regression Residual	.610	.095	.451; .824*					
Level 1								
Need satisfaction T -1 (mean slope)								
Need satisfaction T -1 (slope var.)								
R^2								
Level 2								
Need satisfaction level	.775	.218	.376; 1.226*	.433				
Need satisfaction variability	.015	.069	-.118; .154	.023				
R^2	.197	.088	.057; .397*					

Note. * The credibility interval excludes 0 (similar to $p < .05$); T -1: Previous occasion-specific measurement; var.: Variance; S.D.: Standard deviation; Std.: Standard; results related to need satisfaction variability as in log units, so that the regression coefficients describe increases in the outcome levels for each increase of 1 log unit in the predictor.

Online Supplements for:

The Daily Dynamics of Basic Psychological Need Satisfaction at Work, their Determinants, and their Implications: An Application of Dynamic Structural Equation Modeling

Section 1.
Preliminary Measurement Models

Model Specification and Assessment

Preliminary (single level and multilevel) measurement models were estimated to verify the psychometric properties of all multi-item measures used in the present study, as well as their equivalence (i.e., *isomorphism*) across levels (i.e., occasion versus person). Given the complexity of these analytic models, separate models were estimated for the need satisfaction measure, and for the covariates' measures.

A bifactor confirmatory factor analytic (CFA; Reise, 2012) solution was used to represent the need satisfaction measure. This solution included one global need satisfaction factor (G-factor) defined form all items, and three orthogonal specific factors representing the satisfaction of the need for competence, autonomy, and relatedness (S-factors) left unexplained by the G-factor. The decision to rely on a bifactor operationalization of need satisfaction is linked to recent recommendations for the operationalization of need satisfaction measures (Gillet et al., 2019a, 2020a, 2020b; Huyghebaert et al., 2021; Sánchez-Oliva et al., 2017) based on self-determination theory (Ryan & Deci, 2017). This operationalization also made it possible to obtain one over-arching indicator of need satisfaction (matching the objectives of the present study to focus on global levels of need satisfaction), while still accounting for the presence of the three need-specific subscales included in this global measure (Gillet et al., 2019b). However, to ensure the adequacy of this solution, a comparative CFA solution including three correlated factors was also estimated. Thus, for the need satisfaction measure, we first estimated single-level (i.e., occasion-specific) measurement models while controlling for the nesting of the measurement occasions within participants using Mplus' design-based correction for nesting (i.e., the COMPLEX function; Asparouhov, 2005). We then estimated a multilevel measurement model in which matching factors were estimated at the occasion-specific (L1) and person-specific (L2) levels, before testing whether the definition of the factors could be considered to be equivalent across levels by constraining the factor loadings to equality across levels (i.e., measurement isomorphism). Measurement isomorphism allows one to directly conceptualize the L1 latent construct as being a random variable with L2 variability (Metha & Neale, 2005).

For the covariates model, a simple multilevel CFA solution solution including six correlated factors at the occasion-specific level (L1: feelings of immediacy, lack of control, communication problems, perceived productivity, psychological detachment and work-family conflict) and two correlated factors at the person-specific level (L2: workload and segmentation norms) was first estimated. The observed indicators reflecting job and personal life satisfaction were also included at L2 and simply allowed to correlate with the L2 factors. At L1, an orthogonal method factor was also included to control for the distinct referents used in the work-family conflict instrument, where 4 items were referred to "today" and four other items referred to "tonight" (Marsh et al., 2010, 2013). The method factor was linked to the former. This initial model was then contrasted with a more parsimonious model in which the local identification of the feelings of immediacy factor (estimated from only two indicators) was achieved using essentially tau-equivalent constraints (ETEC: placing equality constraints on the two factor loadings associated with this factor; Little et al., 1999). As no factor was estimated across levels in this solution, we hereafter refer to this solution as a single-level model. We then estimated a matching multilevel solution in which matching L1 and L2 factors were used to represent all constructs assessed across all measurement occasions (feelings of immediacy, lack of control, communication problems, perceived productivity, psychological detachment and work-family conflict), and retaining the factor used to represent the time-invariant measures at L2 only (workload and segmentation norms, as well as the observed indicators of job and personal life satisfaction). From this model, we then tested the measurement isomorphism of the constructs measured across levels. Finally, we also imposed ETEC

on the two indicators of feelings of immediacy across levels.

Model fit was assessed using sample-size independent goodness-of-fit indices (e.g., Hu & Bentler, 1999; Marsh, Hau, & Grayson, 2005): The comparative fit index (CFI), the Tucker-Lewis index (TLI), as well as the root mean square error of approximation (RMSEA). Values greater than .90 for the CFI and TLI indicate adequate model fit, although values greater than .95 are preferable. Values smaller than .09 or .06 for the RMSEA respectively support acceptable and excellent model fit. In model comparisons ΔCFI/TLI of .010 or less and a ΔRMSEA of .015 or less between a more restricted model and the previous one supports the more restricted model (Chen, 2007; Cheung & Rensvold, 2002). For model comparisons, we also report the Akaike information criterion (AIC), the Consistent AIC, the Bayesian information criterion (BIC), and the sample-size adjusted BIC (ABIC). For these information criteria, a lower value indicates a better fitting model.

Results

The model fit results associated with the alternative measurement models are reported in Table S1 of these online supplements. For need satisfaction, these results indicated that our a priori bifactor model was able to achieve a satisfactory level of fit (superior to that of the correlated factors CFA solution) to the data across all level of analyses, and demonstrated measurement isomorphism across levels. Likewise, the covariates measurement model was also able to achieve a satisfactory level of fit to the data across all levels of analyses, demonstrated measurement isomorphism across levels, and that the imposition of ETEC was also supported by the data. The parameter estimates from the final single level models are reported in Table S2 of these online supplements, whereas those from the final multilevel solutions are reported in Table S3 of these online supplements. These results revealed generally well-defined factors across all levels of analyses for all constructs included in our main analyses (i.e., the need satisfaction S-factor were more weakly defined at L1, but are not included in our main analyses). Factor scores for our main analyses were saved from the single level models to allow the multilevel disaggregation process to be done directly as part of the estimation of our main predictive models via latent person-mean centering procedures, which results in L2 estimates that are corrected for inter-occasion unreliability (Asparouhov & Muthén, 2020; NcNeish & Hamaker, 2020).

References used in this Supplement

Asparouhov, T. (2005). Sampling weights in latent variable modeling. *Structural Equation Modeling, 12*, 411-434.

Asparouhov, T. & Muthén, B. (2020). Comparison of models for the analysis of intensive longitudinal data. *Structural Equation Modeling, 27*, 275-297.

Chen, F.F. (2007). Sensitivity of goodness of fit indexes to lack of measurement. *Structural Equation Modeling, 14*, 464-504.

Cheung, G.W., & Rensvold, R.B. (2002). Evaluating goodness-of fit indexes for testing measurement invariance. *Structural Equation Modeling, 9*, 233-255.

Gillet, N., Morin, A.J.S., Choisay, F. & Fouquereau, E (2019a). A person-centered representation of basic need satisfaction balance at work. *Journal of Personnel Psychology, 18*, 113-128.

Gillet, N., Morin, A.J.S., Huart, I., Colombat, P., & Fouquereau, E. (2020a). The forest and the trees: Investigating the globability and specificity of employees' basic need satisfaction at work. *Journal of Personality Assessment, 102*, 702-713.

Gillet, N., Morin, A.J.S., Huyghebaert, T., Alibran, E., Barrault, S., & Vanhove-Mériaux, C. (2020b). Students' need satisfaction profiles: Similarity and change over the course of a University semester. *Applied Psychology: An International Review, 69*, 1396-1437.

Gillet, N., Morin, A.J.S, Huyghebaert, T., Burger, L., Maillot, A., Poulin, A., & Tricard, E. (2019b). University students' need satisfaction trajectories: A growth mixture analysis. *Learning & Instruction, 60*, 275-285

Hu, L.-T., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1-55.

Huyghebaert, T., Morin, A.J.S., Forest, J., Fouquereau, E., & Gillet, N. (2021, In Press). A longitudinal examination of nurse's need satisfaction profiles: A latent transition analysis. *Current Psychology*. Early View doi: 10.1007/s12144-020-00972-1.

Little, T.D., Lindenberger, U., & Nesselroade, J.R. (1999). On selecting indicators for multivariate measurement and modeling with latent variables: When "good" indicators are bad and "bad" indicators are good. *Psychological Methods, 4*, 192-211.

Marsh, H.W., Abduljabbar, A.S., Abu-Hilal, M., Morin, A.J.S., Abdelfattah, F., Leung, K.C., Xu, M.K., Nagengast, B., & Parker, P.D. (2013). Factor structure, discriminant and convergent validity of TIMSS math and science motivation measures: A comparison of USA and Saudi Arabia. *Journal of Educational Psychology*, *105*, 108–128.

Marsh, H.W., Hau, K., & Grayson, D. (2005). Goodness of fit in structural equation models. In A. Maydeu-Olivares & J.J. McArdle (Eds.), *Contemporary psychometrics: A festschrift for Roderick P. McDonald.* (pp. 275-340). Mahwah, NJ: Erlbaum.

Marsh, H.W., Scalas, L.F., & Nagengast, B. (2010). Longitudinal tests of competing G-factor structures for the Rosenberg self-esteem scale: Traits, ephemeral artifacts, and stable response styles. *Psychological Assessment*, *22*, 366–381.

McNeish, D. & Hamaker, E.L. (2020). A primer on two-level dynamic structural equation models for intensive longitudinal data in Mplus. *Psychological Methods*, *25*, 610–635.

Metha, P.D., & Neale, M.C. (2005). People are variable too: Multilevel structural equations modeling. *Psychological Methods*, *10*, 259-284.

Reise, S.P. (2012). The rediscovery of bifactor measurement models. *Multivariate Behavioral Research*, *47*, 667-696.

Sánchez-Oliva, D., Morin, A.J.S., Teixeira, P.J., Carraça, E. V., Palmeira, A.L., & Silva, M.N. (2017). A bifactor exploratory structural equation modelling representation of the Basic Psychological Needs at Work Scale. *Journal of Vocational Behavior, 98, 173-187.*

Table S1

Goodness-of-Fit Statistics of the Main Measurement Models

Description	χ^2 (*df*)	CFI	TLI	RMSEA	LogL	FP	Scaling	AIC	CAIC	BIC	ABIC
Need Satisfaction											
Single Level Models											
CFA	80.835 (24)*	.959	.939	.067	-6527.761	30	2.5767	13115.523	13273.195	13243.195	13147.968
Bifactor-CFA	29.771 (18)	.992	.983	.035	-6485.382	36	2.4590	13042.764	13231.971	13195.971	13081.699
Two-Level (Person/Occasion) Models											
CFA	147.768 (48)*	.931	.901	.063	-6209.268	51	2.0154	12520.535	12788.579	12737.579	12575.693
Isomorphism	148.967 (54)*	.934	.912	.058	-6215.344	45	2.0468	12520.688	12757.197	12712.197	12569.357
Bifactor-CFA	106.540 (36)*	.952	.903	.061	-6186.403	63	1.8337	12498.807	12829.919	12766.919	12566.943
Isomorphism	115.477 (50)*	.954	.934	.050	-6188.404	49	2.0989	12474.807	12732.339	12683.339	12527.802
Covariates											
Single Level Model2											
Basic Model	464.861 (237)*	.956	.944	.043	-19136.861	127	2.1419	38527.721	39195.202	39068.202	38665.075
Essentially-Tau-Equivalent Constraints	464.708 (238)*	.956	.945	.043	-19136.866	126	2.1479	38525.733	39187.957	39061.957	38662.005
Two-Level (Person/Occasion) Models											
Basic Model	1143.383 (658)*	.919	.903	.038	-18067.403	212	1.5929	36558.807	37673.026	37461.026	36788.091
Isomorphism	1159.193 (675)*	.919	.906	.037	-18085.652	195	1.5861	36561.305	37586.176	37391.176	36772.203
Essentially-Tau-Equivalent Constraints	1159.634 (676)*	.919	.906	.037	-18085.821	194	1.5897	36559.642	37579.257	37385.257	36769.458
Need Satisfaction Trend											
Null	NA	NA	NA	NA	-415.595	3	3.2519	837.189	852.957	849.957	840.434
Linear	NA	NA	NA	NA	-408.749	6	2.2132	829.498	861.032	855.032	835.987
Quadratic	NA	NA	NA	NA	-398.772	10	2.0596	817.544	870.101	860.101	828.359
Cubic	NA	NA	NA	NA	-396.873	15	1.9615	823.745	902.582	887.582	839.968

Note. * $p < .01$; CFA: Confirmatory factor analysis;.χ^2: Robust chi-square test of exact fit; *df*: Degrees of freedom; CFI: Comparative fit index; TLI: Tucker-Lewis index; RMSEA: Root mean square error of approximation; LogL: Model loglikelihood; FP: Number of free parameters; Scaling: Scaling correction factor; AIC: Akaïke information criterion; CAIC: Consistent AIC; BIC: Bayesian information criterion; ABIC: Sample-size adjusted BIC; NA: Not applicable.

Table S2

Standardized Factor Loadings (λ), Uniquenesses (δ), and Composite Reliability Coefficients (ω) from the Level-Specific Measurement Models.

	Need Satisfaction					Predictors						Outcomes			
	G-λ	A. S-λ	C S-λ	R S-λ	δ	Imm λ	L.Cont λ	Com.P λ	Seg. λ	Wload λ	δ	Acc. λ	Det. λ	WFC λ	δ
Level 1															
Item 1	.703	.168			.477	.859					.263	.921			.151
Item 2	.668	.742			.004	.816					.334	.895			.199
Item 3	.667	.395			.399		.828				.314	.846			.284
Item 4	.620		.593		.264		.842				.291		.950		.097
Item 5	.656		.666		.126		.561				.685		.809		.345
Item 6	.610		.445		.430			.556			.691		.912		.168
Item 7	.672			.566	.318			.644			.586		.884		.219
Item 8	.601			.467	.330			.864			.254			.471	.721
Item 9	.777			.266	.325									.645	.584
Item 10														.681	.536
Item 11														.834	.304
Item 12														.762	.285
Item 13														.753	.200
Item 14														.867	.248
Item 15														.574	.567
ω	.930	.659	.780	.634		.825	.794	.736				.918	.938	.901	
Level 2															
Item 1									.776		.397				
Item 2									.732		.464				
Item 3									.697		.515				
Item 4									.861		.258				
Item 5										.817	.333				
Item 6										.911	.170				
Item 7										.801	.359				
Item 8										.596	.645				
ω									.852	.866					

Note. All coefficients are statistically significant ($p \leq .05$); G: Global factor from a bifactor model; S: Specific factor from a bifactor model; A: Autonomy satisfaction; C: Competence satisfaction; R: Relatedness satisfaction; Imm.: Feelings of immediacy of new information technologies; LCont.: Perceived lack of control in relation to the new information technologies; Com.P.: Communication problems related to the new information technologies; Seg.: Segmentation norms related to the work-life interface; WLoad: Perceived workload; Acc.: Feelings of personal accomplishment; Det.: Psychological detachment at work; WFC: work-family conflict; λ: Standardized factor loading; δ: Standardized item uniqueness; ω: Omega coefficient of composite reliability.

Table S3

Standardized Factor Loadings (λ), Uniquenesses (δ), and Composite Reliability Coefficients (ω) from the Multilevel Measurement Models.

	Need Satisfaction					Predictors						Outcomes			
	G-λ	A. S-λ	C S-λ	R S-λ	δ	Imm λ	L.Cont λ	Com..P λ	Seg. λ	Wload λ	δ	Acc. λ	Det. λ	WFC λ	δ
Level 1															
Item 1	.532	.145			.696	.700					.510	.842			.291
Item 2	.566	.392			.526	.612					.625	.872			.240
Item 3	.569	.351			.553		.604				.635	.763			.419
Item 4	.477		.620		.388		.651				.576		.881		.224
Item 5	.520		.709		.227		.423				.821		.731		.466
Item 6	.490		.421		.583			.393			.846		.843		.289
Item 7	.483			.629	.422			.465			.784		.798		.363
Item 8	.428			.487	.530			.658			.567			.314	.823
Item 9	.627			.341	.490									.510	.740
Item 10														.551	.696
Item 11														.685	.531
Item 12														.596	.396
Item 13														.566	.332
Item 14														.783	.386
Item 15														.457	.644
ω	.833	.308	.719	.595		.603	.581	.511				.866	.887	.814	
Level 2															
Item 1	.800	.320			.257	.943					.111	.992			.016
Item 2	.698	.711			.008	.932					.131	.933			.129
Item 3	.677	.613			.166		.960				.078	.955			.088
Item 4	.800		.524		.086		.982				.036		.996		.009
Item 5	.818		.562		.014		.612				.625		.890		.208
Item 6	.808		.349		.225			.916			.160		.965		.068
Item 7	.875			.583	.086			.895			.199		.956		.086
Item 8	.758			.462	.021			.983			.034			.771	.406
Item 9	.891			.254	.142				.780		.392			.808	.347
Item 10									.734		.461			.800	.360
Item 11									.675		.545			.947	.103
Item 12									.864		.254			.947	.104
Item 13										.813	.340			.952	.094
Item 14										.912	.169			.927	.140
Item 15										.805	.352			.638	.592
										.593	.649				
ω	.981	.862	.864	.871		.936	.898	.952	.849	.866	.	.973	.975	.956	

Note. All coefficients are statistically significant ($p \leq .05$); G: Global factor from a bifactor model; S: Specific factor from a bifactor model; A: Autonomy satisfaction; C: Competence satisfaction; R: Relatedness satisfaction; Imm.: Feelings of immediacy of new information technologies; LCont.: Perceived lack of control in relation to the new information technologies; Com.P.: Communication problems related to the new information technologies; Seg.: Segmentation norms related to the work-life interface; WLoad: Perceived workload; Acc.: Feelings of personal accomplishment; Det.: Psychological detachment at work; WFC: work-family conflict; λ: Standardized factor loading; δ: Standardized item uniqueness; ω: Omega coefficient of composite reliability.

Table S4

Latent Correlations, Reliability, and Descriptive Information

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Level 1															
1. Need satisfaction	---														
2. Immediacy	-.117	---													
3. Lack of control	-.229*	-.126	---												
4. Communication problems	-.398*	.496**	-.024	---											
5. Perceived productivity	.382**	.115	-.198*	-.109	---										
6. Psychological detachment	.070	-.216**	-.057	-.130	-.094	---									
7. Work-family conflict	-.101	.231**	.001	.230**	-.016	-.563**	---								
Level 2															
1. Need satisfaction	---														
2. Immediacy	-.304*	---													
3. Lack of control	-.266	-.083	---												
4. Communication problems	-.601**	.482**	.179	---											
5. Perceived productivity	.729**	-.295*	-.178	-.369**	---										
6. Psychological detachment	.519**	-.293**	.081	-.382**	.319**	---									
7. Work-family conflict	-.575**	.240*	.187	.347**	-.359**	-.731**	---								
8. Segmentation norms	.266*	-.213	.082	-.190	.275**	.645**	-.637**	---							
9. Workload	-.219	.199	.068	.104	-.185	-.367**	.472**	-.370**	---						
10. Job satisfaction	.389**	.007	-.266*	-.186	.667**	.051	-.118	.044	-.079	---					
11. Personal life satisfaction	.486**	-.166	-.136	-.186	.463**	.323**	-.391**	.239*	-.085	.373*	---				
12. Sex	.038	-.237*	-.053	-.180*	-.037	.060	-.089	.168	-.162	-.069	.061	---			
13. Tenure	.289**	-.084	-.257**	-.249**	.141	.077	-.138	-.272*	.206**	.080	-.066	-.147	---		
14. Full-time/part-time	.129	-.010	.080	-.113**	.146*	.099	.023	.044	.229**	-.013	.191*	-.160**	.053	---	
15. Permanent/temporary	-.284*	-.052	.136	.235	-.145	-.085	.080	-.002	.038	-.172	.104	.125	-.234**	.041	---
ω (single level)	.930	.825	.794	.736	.918	.938	.901	.852	.866	NA	NA	NA	NA	NA	NA
ω (Level 1: Occasion)	.833	.603	.581	.511	.866	.887	.814	NA	NA	NA	NA	NA	NA	NA	NA
ω (Level 2: Person)	.981	.936	.952	.849	.973	.975	.956	.849	.866	NA	NA	NA	NA	NA	NA
ICC1	.673	.769	.754	.677	.523	.621	.678	NA	NA	NA	NA	NA	NA	NA	NA
ICC2	.893	.931	.925	.894	.815	.869	.895	NA	NA	NA	NA	NA	NA	NA	NA
Mean	7.033	2.447	2.265	1.499	5.382	3.507	1.845	5.072	4.824	3.960	3.990	.398	8.77	.035	.168
Standard Deviation	.672	1.055	.934	.437	1.060	1.314	.702	1.234	2.577	.777	.938	.490	9.92	.184	.374
Minimum	4.003	1.109	.961	1.167	1.564	.819	1.026	1.962	.781	1	1	0	.5	0	0
Maximum	7.997	4.840	4.533	3.699	6.946	5.031	3.887	7.192	6.731	5	5	1	29	1	1

Note. * $p < .05$; ** $p < .01$; Variables 1 to 9 are factor scores from preliminary measurement models; ω: Omega coefficient of composite reliability; ICC1: Intraclass correlation coefficient 1, reflecting the proportion of the variance occurring at Level 2 (person) relative to Level 1 (occasion); ICC2: Intraclass correlation coefficient 1, reflecting the inter-occasion reliability of the person-level aggregates.

Table S5

Results from the Model Including the Predictors of Need Satisfaction and the Demographic Controls

Predictors	Need satisfaction level				Need satisfaction log variability (natural units in parentheses)			
	Point Estimate (Posterior Median)	Posterior S.D.	Credibility Interval	Std. Estimate	Point Estimate (Posterior Median)	Posterior S.D.	Credibility Interval	Std. Estimate
Regression Intercept	8.861	.355	8.171; 9.557*		-4.950 (.007)	1.052	-7.028; -2.873*	
Regression Residual	.139	.039	.075; .229*		1.703 (5.490)	.440	.944; 2.659*	
Level 1								
Need satisfaction T -1 (mean slope)	.328	.081	.169; .482*	.307				
Need satisfaction T -1 (slope var.)	.128	.049	.046; .235*					
Immediacy T -1 (mean slope)	.010	.033	-.054; .076	.013				
Immediacy T -1 (slope var.)	.005	.007	.001; .025*					
Lack of control T -1 (mean slope)	.032	.050	-.059; .135	.035				
Lack of control T -1 (slope var.)	.055	.040	.004; .156*					
Communication prob. T -1 (mean slope)	.087	.137	-.197; .352	.060				
Communication prob. T -1 (slope var.)	.288	.135	.112; .640*					
R^2	.494	.048	.387; .580*					
Level 2								
Immediacy	-.051	.081	-.210; .107	-.082	-.159 (.853)	.262	-.674; .355	-.093
Lack of control	-.223	.082	-.388; -.068*	-.310	.186 (1.204)	.281	-.367; .718	.092
Communication prob.	-.763	.264	-1.302; -.262*	-.475	1.413 (4.108)	.739*	.010; 2.861	.319
Segmentation norms	.070	.051	-.029; .170	.158	-.079 (.924)	.158	-.388; .235	-.065
Workload	-.009	.076	-.162; .138	-.013	.071 (1.074)	.255	-.432; .577	.037
Sex	-.002	.117	-.232; .228	-.002	-.044 (.957)	.359	-.777; .643	-.015
Tenure	.081	.059	-.037; .195	.148	-.149 (.862)	.189	-.512; .231	-.100
Full-time/part-time	.327	.356	-.364; 1.053	.111	.268 (1.307)	1.016	-1.836; 2.162	.033
Permanent/temporary	-.303	.170	-.647; .026	-.208	.116 (1.123)	.500	-.857; 1.116	.029
R^2	.546	.100	.351; .740*	-.082	.275 (1.317)	.110**	.109; .533	-.093

Note. * The credibility interval excludes 0 (similar to $p < .05$); T -1: Previous occasion-specific measurement; Results related to need satisfaction variability as in log units, their conversion to natural units is reported in parentheses.

Table S6

Results from the Model Including the Outcomes of Need Satisfaction and the Demographic Controls

Predictors	Perceived productivity Point Estimate (Posterior Median)	Posterior S.D.	Credibility Interval	Std. Estimate	Psychological detachment Point Estimate (Posterior Median)	Posterior S.D.	Credibility Interval	Std. Estimate
Regression Intercept	-5.373	1.079	-7.741; -3.522*		.071	1.983	-3.975; 3.844	
Regression Residual	.050	.034	.012; .141*		1.009	.179	.718; 1.415*	
Level 1								
Need satisfaction T -1 (mean slope)	.162	.115	-.078; .378	.088	-.003	.129	-.245; .258	-.009
Need satisfaction T -1 (slope var.)	.179	.133	.010; .506*		.163	.115	.023; .460*	
R^2	.059	.028	.020; .126*		.046	.020	.013; .093*	
Level 2								
Need satisfaction level	1.518	.154	1.250; 1.854*	.941	.393	.289	-.156; .987	.174
Need satisfaction variability	-.014	.053	-.117; .094	-.023	-.209	.106	-.420; -.001*	-.245
Sex	-.077	.121	-.302; .181	-.049	.300	.221	-.144; .732	.134
Tenure	-.023	.061	-.139; .103	-.030	-.058	.111	-.274; .159	-.054
Full-time/part-time	.153	.282	-.406; .711	.036	.424	.564	-.682; 1.514	.072
Permanent/temporary	-.054	.155	-.370; .234	-.026	-.195	.295	-.777; .389	-.067
R^2	.920	.055	.772; .981*		.180	.071	.066; .339*	
Predictors	Work-family conflict Point Estimate (Posterior Median)	Posterior S.D.	Credibility Interval	Std. Estimate	Job satisfaction Point Estimate (Posterior Median)	Posterior S.D.	Credibility Interval	Std. Estimate
Regression Intercept	4.397	1.084	2.310; 6.595*		-5.482	1.190	-7.965; -3.295*	
Regression Residual	.301	.052	.218; .419*		.359	.059	.260; .492*	
Level 1								
Need satisfaction T -1 (mean slope)	-.071	.069	-.204; .064	-.060				
Need satisfaction T -1 (slope var.)	.055	.034	.011; .142*					
R^2	.064	.026	.017; .115*					
Level 2								
Need satisfaction level	-.313	.158	-.635; -.011*	-.250	.765	.173	.443; 1.126*	.513
Need satisfaction variability	.119	.057	.010; .236*	.251	-.047	.062	-.168; .071	-.084
Sex	-.116	.119	-.346; .118	-.094	-.109	.128	-.356; .143	-.074
Tenure	.004	.060	-.111; .123	.007	-.010	.063	-.133; .113	-.014
Full-time/part-time	.104	.313	-.519; .708	.032	-.205	.326	-.846; .437	-.053
Permanent/temporary	.068	.161	-.253; .380	.042	-.061	.170	-.393; .271	-.032
R^2	.196	.070	.077; .346*		.320	.089	.159; .506	

Predictors	Personal life satisfaction Point Estimate (Posterior Median)	Posterior S.D.	Credibility Interval	Std. Estimate
Regression Intercept	-6.083	1.569	-9.447; -3.341*	
Regression Residual	.585	.096	.420; .801*	
Level 1				
Need satisfaction T -1 (mean slope)				
Need satisfaction T -1 (slope var.)				
R^2				
Level 2				
Need satisfaction level	.852	.227	.448; 1.333*	.460
Need satisfaction variability	.022	.074	-.132; .164	.032
Sex	.107	.155	-.196; .414	.059
Tenure	-.055	.076	-.204; .096	-.061
Full-time/part-time	.529	.399	-.250; 1.319	.110
Permanent/temporary	.242	.206	-.166; .642	.102
R^2	.281	.095	.120; .489*	

Note. * The credibility interval excludes 0 (similar to $p < .05$); T -1: Previous occasion-specific measurement; Results related to need satisfaction variability as in log units, so that the regression coefficients describe increases in the outcome levels for each increase of 1 log unit in the predictor.

TITLE: Dynamic SEM model with predictors

```
DATA: File = FSCORESTOT.dat;
VARIABLE:
NAMES ARE SEG1 SEG2 SEG3 SEG4 WLOAD1 WLOAD2 WLOAD3 WLOAD4
SATPRO SATPERSO IMM1 CONT1 COM1 IMM2 CONT2 COM2 CONT3 COM3
ACC1 ACC2 ACC3 DET1 DET2 DET3 DET4 WFC1 WFC2 WFC3 WFC4 WFC5 WFC6 WFC7
WFC8 DAY AGE GENRE ANCIEN TEMPS LIENEMP SECT PRIPUB HEURE
SAFF_W SCOMP_W SAUT_W SAT_W IMM_W CONT_W COM_W ACC_W
DET_W WFC_W MF_W SEG_B WLOAD_B SAPRO_B SAPERS_B ID;
USEVARIABLES ARE SAT_W IMM_W CONT_W COM_W SEG_B WLOAD_B ;
Lagged = SAT_W (1)  IMM_W (1) CONT_W (1) COM_W (1) ;
Tinterval = day (1);
CLUST = ID;
MISSING ARE *;
between = SEG_B WLOAD_B ;
DEFINE:
Center SEG_B WLOAD_B (GRANDMEAN);

ANALYSIS:
ESTIMATOR = Bayes;
TYPE = twolevel random;
BITERATIONS = (10000);
Process = 3;
chains = 3;
MODEL:
%WITHIN%
PHI_sat | SAT_W ON SAT_W&1 ;
logv_sat | SAT_W ;
PHI_SI | SAT_W ON IMM_W&1 ;
PHI_SC | SAT_W ON CONT_W&1 ;
PHI_SM | SAT_W ON COM_W&1 ;

%BETWEEN%
[SAT_W];
SAT_W;
[PHI_sat];
PHI_sat;
[logv_sat];
logv_sat;
PHI_SI;
PHI_SC ;
PHI_SM ;
[PHI_SI];
[PHI_SC] ;
[PHI_SM] ;
IMM_W CONT_W COM_W SEG_B WLOAD_B;
[IMM_W CONT_W COM_W SEG_B WLOAD_B];
SAT_W ON IMM_W CONT_W COM_W SEG_B WLOAD_B;
logv_sat ON IMM_W CONT_W COM_W SEG_B WLOAD_B;
SAT_W WITH logv_sat;

OUTPUT:
SAMPSTAT STANDARDIZED RESIDUAL CINTERVAL MODINDICES (3.0) ;
TECH1 TECH2 TECH3 TECH4 SVALUES;
```

TITLE: Dynamic SEM model with outcomes

```
DATA: File = FSCORESTOT.dat;
VARIABLE:
NAMES ARESEG1 SEG2 SEG3 SEG4 WLOAD1 WLOAD2 WLOAD3 WLOAD4
SATPRO SATPERSO IMM1 CONT1 COM1 IMM2 CONT2 COM2 CONT3 COM3
ACC1 ACC2 ACC3 DET1 DET2 DET3 DET4 WFC1 WFC2 WFC3 WFC4 WFC5 WFC6 WFC7
WFC8 DAY AGE GENRE ANCIEN TEMPS LIENEMP SECT PRIPUB HEURE
SAFF_W SCOMP_W SAUT_W SAT_W IMM_W CONT_W COM_W ACC_W
DET_W WFC_W MF_W SEG_B WLOAD_B SAPRO_B SAPERS_B ID;
USEVARIABLES ARE SAT_W ACC_W DET_W WFC_W SAPRO_B SAPERS_B;
Lagged = SAT_W (1)  ;
Tinterval = day (1);
CLUST = ID;
MISSING ARE *;
between = SAPRO_B SAPERS_B;
DEFINE:
Center SAPRO_B SAPERS_B (GRANDMEAN) ;

ANALYSIS:
ESTIMATOR = Bayes;
TYPE = twolevel random;
BITERATIONS = (10000);
Process = 3;
MODEL:
%WITHIN%
PHI_sat | SAT_W ON SAT_W&1 ;
logv_sat | SAT_W ;
PHI_AS | ACC_W ON SAT_W&1 ;
PHI_DS | DET_W ON SAT_W&1 ;
PHI_WS | WFC_W ON SAT_W&1 ;

%BETWEEN%
[SAT_W];
SAT_W;
[PHI_sat];
PHI_sat;
[logv_sat];
logv_sat;
PHI_AS;
PHI_DS ;
PHI_WS ;
[PHI_AS];
[PHI_DS] ;
[PHI_WS] ;
ACC_W DET_W WFC_W SAPRO_B SAPERS_B;
[ACC_W DET_W WFC_W SAPRO_B SAPERS_B];
ACC_W DET_W WFC_W SAPRO_B SAPERS_B ON SAT_W ;
ACC_W DET_W WFC_W SAPRO_B SAPERS_B ON logv_sat ;
PHI_sat WITH logv_sat ;

OUTPUT:
SAMPSTAT STANDARDIZED RESIDUAL CINTERVAL MODINDICES (3.0) ;
TECH1 TECH2 TECH3 TECH4 SVALUES;
```