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Early Career Nurses' Need Fulfillment Profiles: A Longitudinal Person-Centered Perspective on their Nature, Stability, Determinants and Consequences

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Abstract

In this study, we investigate the nature of Canadian early career (0 to 3 years) nurses' (N = 704; 87.8% female, aged 20 to 52) psychological need fulfillment profiles, accounting for the global and specific level of satisfaction and frustration of their needs for autonomy, relatedness, and competence. Our adoption of a longitudinal design (12 months, three time points with n = 626 at Time 1, 459 at Time 2, and 370 at Time 3) made it possible to test the within-person and within-sample stability of these profiles. To obtain a more in depth understanding of these profiles, we investigated the role of job demands and resources in the prediction of profile membership, and several work-related outcomes of these profiles. Latent transition analysis revealed five profiles differing in global and specific need fulfillment levels. These profiles remained stable over the 12 months, although nurses tended to transition into less fulfilled profiles over time. Nurses' perceptions of job demands and resources shared well-differentiated relations with the profiles, and more fulfilled profiles tended to report more adaptive functioning and well-being at work.

Keywords: self-determination theory (SDT); basic psychological needs; profiles; nurse; job demands; job resources; early career; well-being.

Nursing is a stressful and demanding occupation (Aiken et al., 2013; Pisanti et al., 2011), placing nurses at a higher risk of experiencing professional and personal difficulties likely to interfere with patient care quality (Nantsupawat et al., 2011; OIIQ, 2019). This risk seems particularly important for early career nurses (Rudman et al., 2014), who present particularly high rates of turnover (Giallonardo et al., 2010; Hayes et al., 2012; Rush et al., 2013). In Canada, these trends have only been exacerbated by the COVID-19 pandemic, during which 9 out of 10 nurses reported feeling more stressed and tired at work, leading to even higher rates of turnover (Statistics Canada, 2022). Beyond the socio-economic burden associated with recruitment and training, turnover also creates organizational instability that could substantially decrease the quality of care provided to patients. If we are to introduce multi-layered strategies to retain and support nurses, it is thus imperative to ensure that the experiences of early career nurses can be adequately understood (Ben Ahmed & Bourgeault, 2022).

Among the factors that might influence nurses' adaptation to their work environment, self-determination theory (SDT; Ryan & Deci, 2017) propose the satisfaction of the basic psychological needs for competence, relatedness, and autonomy as critical drivers of well-being and functioning. SDT also positions the frustration of these needs as distinct drivers of ill-being and maladaptive behaviors. Although SDT highlights the multidimensional nature of psychological needs, most prior studies failed to fully account for its complex multidimensionality incorporating both global and specific components, thus yielding an incomplete understanding of the role of need fulfillment for psychological health and work adaptation. Moreover, little is known about the early development and maintenance of need fulfillment experiences, especially among employees occupying stressful jobs such as nursing. Understanding the typical configurations (i.e., profiles) of need fulfillment experienced by early career nurses as well as the work conditions and outcomes differentially associated with these profiles should help guide the development of interventions designed to increase need fulfillment and positive functioning in early career. As early work experiences have a lasting impact on job attitudes and behaviors (Kammeyer et al., 2003), maximizing the need fulfillment of early career nurses should help improve their chances of engaging in fulfilling careers whilst providing quality care to patients. To inform these questions, we relied on a longitudinal person-centered methodology to: (1) identify early career nurses' profiles of global and specific experiences of need fulfillment; (2) assess the within-sample (i.e., replicability) and within-person (i.e., changes in profile membership) longitudinal stability of these profiles; (3) determine how perceptions of job demands and resources predict profile membership; and (4) investigate associations between these profiles and psychological health and work adaptation.

This study seeks to achieve three main contributions. First, focusing on early career nurses who recently entered the workforce allows us to monitor how their need fulfillment profiles evolve during a critically important normative transition period involving marked changes in roles, new challenges, and increased responsibilities across multiple occupational and professional domains. The successful negotiation of this challenging transition is likely to create long-lasting benefits, whereas the failure to do so may take a substantial toll on new employees (Dietrich et al., 2012). Given the societal importance of nurses for healthcare systems, particularly for public health care systems such as the Canadian one, a difficult integration of new nurses into the workforce is likely to result in a variety of macro-level societal problems including a shortage of qualified nurses (Ben Ahmed & Bourgeault, 2022), higher healthcare costs (Keyes & Grzywacz, 2005) and GDP losses (Schofield et al., 2011). Whereas our data was not collected during the COVID-19 pandemic, this pandemic has highlighted the hugely important role of nurses as a critical line of defense and support (Al Thobaity & Alshammari, 2020). As such, better understanding their early career experiences should help ensure that they are offered adequate opportunities for long-lasting psychological growth and development. This contribution also extends previous research by thoroughly documenting the predictors (emotional, cognitive and physical demands and resources) and outcomes (dedication, satisfaction, vigor, quality of care, somatization, distress) of nurses' need fulfillment profiles.

Second, by considering both basic psychological need satisfaction and need frustration, we capture a wider range of need-based experiences than what is been typically considered in previous research and one that is consistent with recent theoretical developments (Ryan & Deci, 2017). We also rely on a comprehensive operationalization of need fulfillment that explicitly considers its global/specific multidimensionality. With this contribution, we seek to address limitations of previous studies that relied on an incomplete (excluding any number of theoretically-relevant dimensions or collapsing them

into global constructs) or suboptimal (ignoring the global/specific components) representation of need fulfillment, thus adopting a methodological framework that better aligns with the theoretical underpinning of SDT.

Third, by adopting a longitudinal perspective, we investigate the extent to which need fulfillment is stable over one year (across three measurement occasions) during the early stages of nurses' career. The importance of this longitudinal perspective should not be understated, as it directly speaks to the temporal validity of cross-sectional studies (i.e., can what is observed in one moment in time be generalized to a different moment in time) in addition to providing direct information about temporal generalizability, stability, and change.

Psychological Need Fulfillment at Work

According to SDT (Ryan & Deci, 2017), all humans seek the fulfillment of three basic psychological needs at work, the need for autonomy (i.e., a sense of volition and choice), relatedness (i.e., a sense of sharing positive relationships and belongingness), and competence (i.e., a sense of confidence about one's abilities). When these three needs are satisfied, employees are more likely to take ownership for their actions, to feel engaged in their work, and to display a healthier and more effective way of functioning (Ryan & Deci, 2017). This proposition has been consistently supported in the work area, where need satisfaction was found to predict performance and psychological adjustment (Van den Broeck et al., 2016), engagement (Clément et al., 2020), and commitment (Greguras & Diefendorff, 2009). In contrast, the frustration of these needs predicts suboptimal levels of functioning and a variety of undesirable outcomes (Chen et al., 2015; Trépanier et al., 2015a; Vander Elst et al., 2012; Vansteenkiste & Ryan, 2013).

Within SDT, two main perspectives have been taken to investigate need fulfillment. The first proposes that need fulfillment should be conceptualized as a global holistic experience across all three needs (e.g., Campbell et al., 2017), which would mean assessing nurses' need fulfillment as a single global indicator. As such, this perspective simultaneously considers the satisfaction and the frustration of all three needs as distinct indicators of a single global dimension of need fulfillment. The second perspective proposes that the satisfaction and frustration of all three needs capture complementary facets of the reality likely to vary independently from one another, and thus should be investigated separately (e.g., Cordeiro et al., 2016). Tóth-Király et al. (2018) more recently highlighted how these two apparently diverging perspectives could be reconciled via the bifactor exploratory structural equation modeling (bifactor ESEM; Morin et al., 2016a, 2016b), an analytic approach able to properly disaggregate global and specific components of need fulfillment. Theoretically, whereas the global component provides a synthesis of all facets of need fulfillment, reflecting the global extent to which participants' basic psychological needs are fulfilled in their workplace, each specific need can be more or less satisfied or frustrated on its own in a way that deviates from these global levels of need fulfillment. This second, specific, component has been interpreted as reflecting an imbalance in the satisfaction or frustration of each need relative to individuals' global levels of need fulfillment (Gillet et al., 2019, 2020a, 2020b). In practical terms, this operationalization makes it possible to test the relative importance of the global and specific components in a way that makes it possible to capture the unique effect of each need beyond that of all others in a way that remains untainted by multicollinearity. In this regard, research has shown that global levels of need fulfillment typically share the strongest association with outcomes, whereas imbalances in the satisfaction or frustration of each need also share differentiated associations with outcomes (Sánchez-Oliva et al., 2017; Tóth-Király et al., 2019). At the same time, ignoring either of these components is likely to lead to measurement imprecision and in biased estimates of factor correlations (Asparouhov et al., 2015) and regressions (Mai et al., 2018)[1]. These observations indicate that, to achieve a comprehensive understanding of need fulfillment, both components should be considered given their unique and complementary associations with distinct facets of psychological health and performance at work.

Nature of Need Fulfillment Profiles at Work

According to SDT (Ryan & Deci, 2000, 2017), employees should differ from one another in their experience of global and specific levels of need fulfillment. Yet, rather than having to consider each employee individually, it should be theoretically possible to summarize these inter-individual differences by way of a reduced number of need fulfillment profiles reflecting qualitatively and

[1] For more details about the operationalization of need fulfillment, see Appendix 1 in the online supplements.

quantitatively distinct prototypical configurations. Rather than representing a theoretically different conceptualization of need fulfillment, these prototypical configurations rather represent a way to achieve a more parsimonious theoretical understanding of inter-individual differences in nurses' psychological need fulfillment profiles (Meyer & Morin, 2016). These prototypes are also likely to play an important role in guiding interventions, given practitioners and managers tendency to think about their workforce in terms of prototypical categories of workers rather than in terms of complex variable associations (Meyer & Morin, 2016; Morin et al., 2011). While only considering the satisfaction (but not the frustration) of all three needs, studies have typically identified a highly satisfied profile (e.g., Ferrand et al., 2014), a moderately satisfied profile (e.g., Hawkins et al., 2014), a weakly satisfied profile (e.g., Raiziene et al., 2017), and profiles corresponding to several other configurations dominated by specific needs, such as competence-driven (e.g., Esdar et al., 2016) or autonomy-driven (e.g., Schmahl & Walper, 2012). Although such studies have supported the value of considering need satisfaction profiles, without simultaneously considering need frustration these studies only capture a restricted range of need-based experiences (i.e., a subset of need fulfillment experiences ranging from a lack of satisfaction to a high level of satisfaction, and thus neglecting another subset of experiences involving the frustration of these needs). To address these limitations, Tóth-Király et al. (2020) recently investigated need satisfaction and frustration profiles across multiple life domains among adults, and identified three profiles matching the aforementioned configurations (i.e., high, moderate, and low need fulfillment), as well as a relatedness-driven profile.

Unfortunately, none of these studies have relied on an adequate disaggregation of the global (need fulfillment across all three needs) versus specific (the imbalanced satisfaction or frustration of each need relative to that global level) nature of need fulfillment. Unfortunately, ignoring global levels of need fulfillment to solely consider its separate components (or vice-versa) is theoretically inconsistent with SDT (Ryan & Deci, 2000, 2017; Gillet et al., 2019, 2020a; Sheldon & Niemiec, 2006), which explicitly assumes that a balance between needs is essential to optimal functioning and that specific levels of each need may have differential effects based on the context created by the degree of fulfillment of the other needs. For instance, a high specific level of autonomy satisfaction might have distinct implications when it occurs within the context of a globally high levels of need fulfillment (i.e., reflecting a globally satisfied profile in which the need for autonomy is even more positively fulfilled than the other needs) than when it occurs in the context of globally low levels of need fulfillment (i.e., reflecting a globally unsatisfied profile in which employees still feel having enough autonomy but lacking in relatedness and competence). Beyond this theoretical inconsistency, statistical research has also shown that failure to control for this common core (i.e., global levels of need fulfillment) makes it harder to detect the role uniquely associated with each need and tends to mask important qualitative differences between the profiles (Morin et al., 2016a, 2017).

We only identified three other person-centered studies in which researchers have adopted a similar global/specific perspective in a work setting, albeit limited to need satisfaction (Gillet et al., 2019, 2020a; Huyghebaert-Zouaghi et al., 2022). These studies identified four (Gillet et al., 2019, 2020a) and five (Huyghebaert-Zouaghi et al., 2022) profiles among samples of employees, university students and nurses, respectively. Their results revealed the presence of common and yet distinct configurations differing only in global levels of need satisfaction (e.g., satisfied, average, dissatisfied). Similarly, uncommon configurations have also been identified which were driven by the imbalanced satisfaction of one specific need (e.g., satisfied and connected, dissatisfied and autonomous). Unfortunately, none of these additional studies considered need frustration, in addition to need satisfaction. As need satisfaction and need frustration are both posited to be important (Ryan & Deci, 2017), need satisfaction only accounts for a portion of need fulfillment that can be experienced in sync, or not, with need frustration. To illustrate how satisfaction and frustration are not mutually exclusive, let us imagine, for instance, an employee occupying a job in which it is easy to decide what to do and how to do it (likely to provide a high level of autonomy satisfaction). This employee might also feel some frustration linked to having to deal with a lot of red tape (hence likely to frustrate the need for autonomy). Thus, workers with high need satisfaction and high need frustration are bound to perform differently than those with high need satisfaction and low need frustration, yet when considering only need satisfaction (as the above-mentioned studies) these individuals would inextricably end up in the same highly satisfied profile. Our first objective is thus to identify early career nurses' need fulfillment profiles while accounting for their global and specific levels of need frustration and satisfaction. Based on previous

findings (Gillet et al., 2019, 2020b; Huyghebaert-Zouaghi et al., 2022; Tóth-Király et al., 2020):

Hypothesis 1. Four to five profiles will be identified: One of the profiles will present average global need fulfillment, one high global need fulfillment, and one low global need fulfillment. These profiles are also expected to differ from one another in terms of the specific frustration or satisfaction of each need. We should identify at least one additional profile mainly defined by the specific satisfaction or frustration of one or more specific need. However, we leave the nature of this additional profile as an open research question.

Stability of Need Fulfillment Profiles

Our second objective is to examine the stability of these profiles over time, as an important test of generalizability (Meyer & Morin, 2016). In doing so, we consider two forms of longitudinal stability (Kam et al., 2016; Morin et al., 2020): (a) within-sample stability, reflecting the replicability of the profiles themselves (number, shape, variability, and size), and (b) within-person stability, reflecting the extent to which nurses transition, or not, between profiles over time. However, beyond providing a robust test of generalizability, knowledge of both forms of stability is also important for intervention purposes. Indeed, highly stable profiles are likely to be harder to change, while highly unstable ones may reflect transient phenomenon not worth intervention efforts.

Only two of the previous person-centered studies have considered these two forms of stability over a period of 10 weeks (Gillet et al., 2020b) or 3 months (Huyghebaert-Zouaghi et al., 2022). Both studies reported highly similar profiles over time, although Huyghebaert-Zouaghi et al. (2022) reported slightly lower levels of within-profile variability over the longer time interval considered in their study relative to Gillet et al.'s (2020b). Moderate-to-high within-person stability was also observed in both studies, revealing that most participants remained in the same profiles (stability of 64.8% to 100% for most profiles across studies). However, transitions also happened and both studies led to the identification of one very unstable highly satisfied profile (stability of 12.2% to 26.1%).

To further evidence that basic need fulfillment profiles are likely to remain stable over time and of maximizing the chance of observing transitions between profiles as nurses' need fulfillment evolves in their early career, we opted for a 12-month period involving three (rather than two) measurement occasions taken 6 months apart. Our decision to rely on a six-month interval is linked to the observation that employees' adaptation to a new work environment takes at least six months (Solinger et al., 2013), while also fluctuating over even longer time periods for more established employees (Houle et al., 2022). Incorporating three time points also has the advantage of allowing us to investigate whether individuals have a tendency of transitioning back and forth between similar profiles, remaining in the same profile for a full year, or transitioning to a completely different profile before settling into this new need fulfillment configuration. Lastly, considering a longer (12 months) time period than previous studies is linked to our focus on early career nurses (i.e., three years or less in their profession), who are still adapting to their occupation, a process that has been reported to take up to four to five years in occupations such as nursing (Rudman et al., 2014). Monitoring nurses need fulfillment profiles over a full year with six-month intervals thus appeared optimal to study how well they are adapting to their profession in early career. We propose that:

Hypothesis 2a. The profiles will display relatively high within-sample stability (i.e., minimally related to the number of profiles, their structure, and their variability).

Hypothesis 2b: The profiles will display moderate-to-high within-person stability (≥ 60%).

Job Demands and Resources as Predictors of Need Fulfillment Profiles

This study relies on the Job Demands-Resources (JD-R) model (Bakker & Demerouti, 2007; Demerouti et al., 2001) to identify the effects of different work characteristics on profile membership. Indeed, formal connections have been established between the JD-R model and SDT (Boudrias et al., 2011, 2014; De Gieter et al., 2018; Morin et al., 2023; Van den Broeck et al., 2008), positioning need satisfaction as a mechanism through which job demands and resources affect employees.

The JDR model describes demands as job characteristics requiring continued effort that take a toll on employees, depleting their psychological energy (Bakker & Demerouti, 2007, 2017) and making it harder for them to find need fulfillment at work (Morin et al., 2023; Van den Broeck et al., 2008). Conversely, resources are job characteristics that help employees achieve their work objectives while also supporting and nurturing growth, engagement and performance, and thus helping them better cope with demands and replenish their resources (Bakker & Demerouti, 2007, 2017). For this reason, resources are expected to support need fulfillment (Boudrias et al., 2011, 2014; Van den Broeck et al.,

2008). More precisely, excessive job demands tend to frustrate basic needs as employees who perceive their jobs as being overly demanding tend to internalize this feeling as a lack of competence on their part, to feel impeded in their ability to autonomously engage in their work, and to lack time to build supportive relationships at work (Van den Broeck et al., 2008). In contrast, job resources are likely to spark a motivational process by initiating employees' willingness to engage in their work, while helping them to better cope with the demands of their work. The joint JDR-SDT framework thus positions resources as mechanisms likely to help employees act in a way that will support the satisfaction of their basic psychological needs for autonomy, competence, and relatedness by limiting the energy depletion effect of demands (Van den Broeck et al., 2008).

Our study focuses on the cognitive, emotional and physical job demands and resources of nurses given the characteristics of their job. More specifically, nurses need to perform many cognitively challenging tasks, often simultaneously (e.g., administering medication to multiple patients in quick succession). They also are routinely exposed to emotionally charged situations (e.g., severe injuries, death, interacting with patients and relatives), and need to be physically active for long periods of time. As such, being able to capitalize on cognitive resources (e.g., a mentor to help guide tough decisions), emotional (e.g., colleagues' support), or physical (e.g., opportunities to take a break) resources can help them experience a higher level of need fulfillment at work when managing these difficult job demands. Indeed, nurses who have access to more job resources are likely to experience greater well-being at work (Chou et al., 2012) and feel less strained (Fernet et al., 2013; Ghanayem et al., 2020). Thus, first and foremost, all job resources and job demands should have a positive and negative effect, respectively, on global need fulfillment (e.g., nurses with more job resources more likely to belong to a profile characterized by high global need fulfillment).

Beyond the effects of job demands and resources on global need fulfillment levels, one may also consider how specific resources and demands may contribute to an imbalance in specific need fulfillment levels (i.e., satisfaction or frustration of the need for autonomy, competence, and relatedness). Emotional demands are of critical consideration for nurses as these are often beyond the control of the organization or the nurse in question. Based on the conservation of resources theory (Hobfoll et al., 2018), this loss of control, which can be seen as an important resource, is likely to lead to a loss spiral; in this case this loss might manifest in autonomy frustration as nurses are unable to adjust their work characteristics to avoid the burden of emotional demands, leading to further deteriorations of their well-being (Hakanen & Schaufeli, 2012). Conversely, emotional resources are likely to help them achieve greater relatedness at work as these resources, at least in part, come from social interactions with colleagues or managers. This process can help alleviate the burden associated with emotional demands and give some control back to nurses (e.g., ability to rely on a colleague for support after a death), thus also helping them satisfy their need for autonomy. With regards to physical and cognitive demands, both of these are likely to take a toll on employees' energy levels (e.g., de Jonge & Huter, 2021), possibly making it harder to fulfill work tasks and maintain positive social relationships with patients and colleagues, thus frustrating their need for competence and relatedness respectively. Conversely, cognitive and physical resources will act to restore energy (e.g., de Jonge & Huter, 2021). This should help employees better cope with work tasks and have more energy to engage in social interactions, thus satisfying their need for competence and relatedness respectively. Of course, these propositions mainly pertain to the strength of association between predictors and profile membership, as it is fully possible for emotional demands and resources to be associated with differential effects on specific levels of need satisfaction and frustration not considered above. As such, from a theoretical perspective, we posit that:

Hypothesis 3a. Cognitive, emotional and physical job resources and demands will predict nurses' likelihood of belonging to profiles presenting higher global need fulfillment.

Hypothesis 3b. Emotional demands will have the strongest effect on the likelihood of membership into profiles characterized by higher levels of autonomy and relatedness frustration, while cognitive and physical demands will increase the likelihood of membership into profiles driven by competence and relatedness frustration. The same effects are expected between emotional, cognitive, and physical resources and profiles driven by autonomy, competence, and relatedness satisfaction.

Implications of Need Fulfillment Profiles for Nurses' Well-Being and Performance

Our last objective is to assess the associations between the profiles and indicators of well-being

and performance at work to document their psychological consequences, desirability, and practical implications of these profiles (Meyer & Morin, 2016; Morin & Litalien, 2019). At its core, SDT suggests that need satisfaction should help nurture psychological well-being, while need frustration should be harmful to it (Ryan & Deci, 2017). Yet, understanding the links between need fulfillment and functioning leads to several intricacies upon which research has yet to shed light. For example, positive relations have been found between need satisfaction vigor (Van den Broeck et al., 2010a), job satisfaction (Gillet et al., 2020a), dedication (Gillet et al., 2015), and care quality (Gillet et al., 2018), while need frustration was found to be related to distress and somatization (Olafsen et al., 2017). In person-centered studies, more desirable profiles (i.e., higher need satisfaction for most previous studies, and lower need frustration in Tóth-Király et al., 2020) were found to display more adaptive outcomes (vigor and satisfaction: Huyghebaert-Zouaghi et al., 2022; positive affect: Tóth-Király et al., 2020; lower anxiety: Gillet et al., 2019; lower dropout intentions: Gillet et al., 2020b).

However, none of these studies have properly disaggregated global and specific components of need satisfaction and frustration, which raises several important questions for intervention purposes (e.g., Gillet et al., 2019, 2020a). For instance, are associations with outcomes primarily driven by the global need fulfillment observed in each profile? Does the satisfaction and frustration of each specific need play an additional role in these associations? The response to the first question will reveal whether interventions should focus primarily at increasing need satisfaction, decreasing need frustration, or both. The response to the second question will also indicate whether these interventions should primarily seek to nurture a balanced level of need fulfillment across all three needs, or whether targeting one need in particular may yield more benefits compared to the others. Understanding these intricacies is critical to guide interventions seeking to foster, nurture, and support psychological well-being and performance at work. With this in mind, we specifically investigate the associations between need fulfillment profiles and diverse indices of well-being (vigor, dedication, job satisfaction, psychological distress, and somatization) and performance (quality of care) at work, which are currently assumed to provide a comprehensive view of nurses' adaptation to, and well-being within, their work-life (e.g., Jarden et al., 2019; Keyes, 2005; Patrician et al., 2022). Overall, we propose that:

Hypothesis 4a: Profiles presenting higher need fulfillment to display higher well-being and performance across outcomes

Hypothesis 4b: Conversely, profiles presenting lower need fulfillment should display higher ill-being and lower performance across outcomes.

Methods

Procedure and Participants

The data[2] was collected in October 2014 (Time 1), April 2015 (Time 2) and October 2015 (Time 3) among early career nurses in Quebec, Canada who had a maximum of three years of tenure in their occupation. In 2014, nurses were recruited via a letter which explained our objectives and invited them to participate. To be eligible, they had to be members of the Quebec Nursing Association, with a maximum of 3 years of experience, and work in the Quebec public healthcare system. Participants completed online consent forms and questionnaires at three time points, taken at 6 months intervals (12 months total). Participants were 704 French-Canadian nurses (87.8% female, aged 20 to 52, M_{age} = 27.02, SD = 6.84) working in the Quebec public health care system. Most (77.6%) held permanent positions, and they had an average of 2.05 years (0 to 3; SD = 1.45) of tenure in their occupation. Overall, 626 respondents completed measures at Time 1, 459 at Time 2, and 370 at Time 3. More precisely, 204 respondents participated at one time point, 221 participated at two time points, and 279 participated at all three time points. Missing data was moderately low (Time 1: 0% to 15.65%, M = 4.34%, SD = 4.03%; Time 2: 0% to 6.97%, M = 3.20%, SD = 2.38%; Time 3: 0% to 5.68%, M = 3.09%, SD = 1.86%) for participants who completed each time point.

Measures

Respondents completed the validated French versions of the questionnaires. Sample items and scale score reliabilities (Cronbach's alpha) are reported in Table 1.

Need satisfaction and frustration. The Work-related Basic Need Satisfaction scale (Van den Broeck et al., 2010a; French version by Gillet et al., 2020a) and Psychological Need Thwarting Scale adapted to the work context (Bartholomew et al., 2011; French version by Gillet et al., 2012b), were

[2] A data transparency table is presented at the end of the online supplements.

used to assess participants experiences of autonomy satisfaction and frustration, competence satisfaction and frustration, and relatedness satisfaction and frustration. Items were scored on a 5-point scale (1-*totally disagree* to 5-*totally agree*).

Predictors. We used the Demand-Induced Strain Compensation, Version 2.0 (DISC 2.0; van de Ven et al., 2008; French version by Fernet et al., 2020) to assess emotional demands, cognitive demands, physical demands, emotional resources, cognitive resources, and physical resources. All items were scores on a 7-point scale (1-*never* to 7-*almost always*).

Outcomes. Vigor and dedication were measured with the relevant subscales from the short Work Engagement Scale (Schaufeli et al., 2006; French version by Zecca et al., 2015), rated using a 7-point scale (0-*never* to 6-*every day*). Work satisfaction was assessed using the Satisfaction with Life Scale (Diener et al., 1985; French version by Bouizegarene et al., 2018) adapted to work by replacing the word "life" by "work" by Houlfort et al. (2015). The resulting work satisfaction scale has been extensively used in previous research among French-speaking employees (e.g., Gillet et al., 2012a; Lévesque-Coté et al., 2018). Items were rated on a 7-point scale (1-*do not agree at all* to 7-*completely agree*). Quality of care (Aiken et al., 2002; French version by Lavoie-Tremblay et al., 2016) was assessed using 4 items, rated using a 4-point scale (1-*poor* to 4-*great*). Psychological distress was assessed with the Kessler Psychological Distress Scale (Kessler et al., 2003; French version by Arnaud et al., 2010) whereby participants indicate how often they experienced each item on a 1 (*never*) to 5 (*often*) scale. Somatization (i.e., physiological symptoms) was measured with items from Knäuper et al. (2004; French version by Trépanier et al., 2016). Participants indicated how often they experienced each symptom on a 0 (*never*) to 7 (*almost always*) scale.

Analyses

Estimation and Missing Data

Mplus 8.6's (Muthén & Muthén, 2021) maximum likelihood estimator robust to non-normality and full information maximum likelihood (FIML) missing data procedures were used for all analyses. FIML allowed us to retain everyone who participated at least one time point, rather than inappropriately discarding participants with missing time points (Enders, 2010). By allowing missingness to be conditioned on participants' scores on the same variables at other time points, FIML missing at random assumptions provide a high degree of flexibility, making them essentially robust to most forms of attrition even under high rates of attrition (i.e., 75%+; Lee et al., 2019; Newman, 2003, 2014).

Preliminary Analyses

Preliminary analyses were conducted to confirm the factor structure and measurement invariance of our measures over time. Following recent recommendations (Gillet et al., 2019, 2020a, 2020b; Sánchez-Oliva et al., 2017; Tóth-Király et al., 2018, 2019), need fulfillment was operationalized using a bifactor ESEM (Morin et al., 2016a, 2016b) model incorporating seven non-redundant factors all directly estimated from the items (one global need fulfillment factor and six specific factors representing the combinations of autonomy, competence, relatedness × satisfaction and frustration). The predictors (job demands and resources) were similarly modeled via ESEM, while the outcomes were modeled with confirmatory factor analyses. These analyses are presented in Appendix 2 of the online supplements and support the adequacy, invariance, and composite reliability of all factors. These analyses were used to generate time-invariant factor scores (estimated with $M = 0$ and $SD = 1$ over time) for the main analyses.

Latent Profile and Latent Transition Analyses

At each time point, we estimated latent profile analytic (LPA) models encompassing one to eight profiles based on the free estimation of the indicators means and variances (Morin & Litalien, 2019; Peugh & Fan, 2013). For all time-specific models, we used 5000 random starts, 1000 iterations, and 200 optimizations (Hipp & Bauer, 2006), and increased these values to 10000, 1000, and 100 for longitudinal models. Once each time-specific optimal solution was selected, they were combined into a longitudinal LPA for tests of profile similarity (Morin et al., 2016d): (1) configural (equal number of profiles); (2) structural (equal within-profile means); (3) dispersion (equal within-profile variability); and (4) distributional (equal profile size). In these tests, as well as when contrasting predictive models, at least two indicators out of the Bayesian Information Criterion (BIC), Sample-Size-Adjusted BIC (SSABIC), and Consistent Akaike Information Criterion (CAIC) (see Appendix 3 in the online supplements) should decrease from the previous model to support similarity (Morin et al., 2016d). The final longitudinal LPA solution was transformed to a latent transition analytic (LTA) solution (Collins

& Lanza, 2010) to assess within-person similarity and profile transitions.

Predictors

Predictors were incorporated to the final LTA solution to test their effects on profile membership (multinomial logistic regression), in three alternative solutions. First, the predictors-profile associations could differ over time, and predictions involving the T2 and T3 profiles could respectively differ across T1 and T2 profiles (to test if predictors predicted specific profile transitions). Second, predictors-profile associations could differ over time but not profiles estimated at the previous time point. Third, predictive similarity was tested by constraining the predictors-profile associations to be equal over time.

Outcomes

Outcomes were incorporated to the final LTA to verify if they differed across profiles in two models. First, profile-specific outcome levels could vary over time and profiles. Second, the *explanatory similarity* of these associations was tested by constraining outcomes' means to be equal over time (Morin, & Litalien, 2019). The statistical significance of mean differences was tested using the MODEL CONSTRAINT (multivariate delta) function (Raykov & Marcoulides, 2004).

Results

Profile Selection and Interpretation

The process leading to the selection of the final time-specific LPAs is presented in Appendix 3 of the online supplements. These results converged on a five-profile solution at all time points. Tests of profile similarity are reported in the middle of Table 2, and support the configural, structural and dispersion similarity of this five-profile solution over time. However, its distributional similarity was not supported, suggesting changes in profile size over time. We thus retained the model of dispersion similarity. This model is visually depicted in Figure 1, the size of the profiles is reported in Table 3, and parameter estimates are reported in Table S15 of the online supplements.

Profile 1 (*Globally fulfilled with satisfied competence and autonomy*) described nurses displaying higher than average global need fulfillment and specific autonomy and competence satisfaction, close to average relatedness satisfaction, competence frustration and relatedness frustration, and lower than average specific autonomy frustration. The size of this profile remained relatively stable over time (T1: 7.30%, T2: 8.14%, T3: 5.88%). Profile 2 (*Moderately fulfilled with unsatisfied competence*) described nurses presenting slightly higher than average global need fulfillment, lower than average specific competence satisfaction and close to average levels on all other factors. The size of this profile decreased over time (T1: 33.76%, T2: 27.75%, T3: 24.48%). Profile 3 (*Balanced average*) described nurses displaying average levels on all seven need fulfillment factors with the least amount of conflict of any profiles between specific and global levels. The size of this profile increased over time (T1: 3.71%, T2: 17.95%, T2: 29.13%). Profile 4 (*Globally unfulfilled*) described nurses presenting lower than average global need fulfillment, slightly lower than average specific relatedness satisfaction, and close to average levels on all other need fulfillment factors. The size of this profile also decreased over time (T1: 40.63%, T2: 34.55%, T3: 26.14%). Finally, Profile 5 (*Globally fulfilled with satisfied competence and unsatisfied autonomy*) described nurses presenting higher than average global need fulfillment and specific competence satisfaction, slightly higher than average autonomy frustration and close to average levels on all other need fulfillment factors. The size of this profile remained stable over time (T1: 14.60%, T2: 11.61%, T3: 14.38%).

Latent Transitions

The model of dispersion similarity was transformed to a LTA to assess within-person stability and change in profile membership. Table 3 includes the transition probabilities from this solution. Profile membership remained moderately to highly stable over time, with probabilities of staying in the same profile ranging from 56.6% to 79.1% between T1 and T2, and from 64% to 97.4% between T2 and T3. When we consider the main transitions for nurses who did not stay in the same profile, most of the transitions occurring between T1 and T2 were toward Profile 3 (*Balanced average*) and Profile 2 (*Moderately fulfilled with unsatisfied competence*). More specifically, 16.7% of nurses initially corresponding to Profile 1 (*Globally fulfilled with satisfied competence and autonomy*), 23.5% of nurses initially corresponding to Profile 2, 15.2% of nurses initially corresponding to Profile 4 (*Globally unfulfilled*), and 13% of nurses initially corresponding to Profile 5 (*Globally fulfilled with satisfied competence and unsatisfied autonomy*) transitioned into Profile 3 at T2. Similarly, 11% of nurses initially corresponding to Profile 3, 11.8% of nurses initially corresponding to Profile 4 and 15.2% of nurses initially corresponding to Profile 5 transitioned into Profile 2 at T2. Additionally, 11.2% of

nurses initially corresponding to Profile 2 transitioned to Profile 4 at T2. Profile transitions were scarcer between T2 and T3, suggesting that nurses' need fulfillment experiences become more stable as they become more established in their occupation, while change remains possible. Three noteworthy transitions did occur: (a) 30.1% of nurses corresponding to Profile 1 at T2 transitioned to Profile 3 at T3; (b) 19.2% of nurses corresponding to Profile 2 at T2 transitioned to Profile 3 at T3; and (c) 16.1% of nurses corresponding to Profile 4 at T2 transitioned to Profile at T3.

Predictors

The results from the predictive models are reported in the bottom of Table 1, and support the predictive similarity of the solution, revealing that predictors-profiles associations were equivalent over time, and that the predictors did not influence transitions. The results from this solution are reported in Table 4, and show that nurses reporting higher emotional demands were more likely to belong to Profiles 2 (*Moderately fulfilled with unsatisfied competence*), 3 (*Balanced average*), and 4 (*Globally unfulfilled*) relative to Profile 1 (*Globally fulfilled with satisfaction competence and autonomy*), as well as to Profile 4 relative to Profiles 2, 3 (*Balance average*) and 5 (*Globally fulfilled with satisfied competence and unsatisfied autonomy*). Nurses reporting higher physical demands more likely to belong to Profiles 2 and 3 relative to Profiles 1 and 5. Nurses reporting higher cognitive demands were more likely to belong to Profile 1 relative to Profiles and 3, and to Profile 5 relative to Profiles 2, 3 and 4. Nurses reporting higher emotional resources were more likely to belong to Profile 1 relative to all other profiles, to Profile 2 relative to 3 and 4, to Profile 5 relative to 4, and less likely to belong to Profile 4 relative to 3 and 5. Nurses reporting higher cognitive resources were more likely to belong to Profile 1 relative to Profiles 2, 3, and 4, and less likely to belong to Profile 4 relative to Profiles 2, 3, and 5. Finally, nurses reporting higher physical resources were less likely to belong to Profile 2 relative to Profiles 3 and 4.

Outcomes

The results from the models including outcomes are disclosed in the lowest section of Table 2 and support the explanatory similarity of this solution, showing that profiles-outcomes associations were equivalent over time. These results, reported in Table 5, reveal that the most optimal outcomes (i.e., higher vigor, dedication, work satisfaction and quality of care, lower distress and somatization) were associated with Profile 1 (*Globally fulfilled with satisfaction competence and autonomy*), followed by Profiles 2 (*Moderately fulfilled with unsatisfied competence*) and 5 (*Globally fulfilled with satisfied competence and unsatisfied autonomy*), followed by Profile 3 (*Balanced average*), and lastly Profile 4 (*Globally unfulfilled*). However, it must be noted that these comparisons were less clear-cut for distress and somatization, for which Profile 5 did not differ from Profiles 2 and 3.

Discussion

Given the importance of global and specific levels of psychological need fulfillment as key drivers of optimal functioning (Ryan & Deci, 2017), we sought to extend previous findings obtained outside of the work context (Tóth-Király et al., 2020) to capture the nature, stability, predictors, and outcomes of early career Canadian nurses' need fulfillment profiles over a 12-month period.

Need Fulfillment Profiles

Supporting Hypothesis 1, we identified five need fulfillment profiles. Three of these profiles matched the three "core" profiles previously identified in person-centered studies. First, our *Globally fulfilled with satisfied competence and autonomy* demonstrated similarities with the previously identified highly fulfilled profile (Huyghebaert-Zouhagi et al., 2020; Tóth-Király et al., 2020). This profile was defined by a combination of scores on the global need fulfillment factor and a subset of specific need satisfaction and frustration factors. Second, our *Balanced average* profile was aligned with the moderately satisfied profiles reported previously (Gillet et al., 2020b; Huyghebaert-Zouhagi et al., 2020). Third, our *Globally unfulfilled* profile matched the previously identified low need satisfaction profile (Gillet et al., 2020; Huyghebaert-Zouhagi et al., 2020; Tóth-Király et al., 2020). Our results thus suggest that these three profiles may be central enough to systematically appear across studies relying on different operationalizations of need fulfillment, countries, types of employees, and stage of career progression.

We identified two additional profiles with a more distinctive configuration than those identified in previous studies. Our *Moderately fulfilled profile with unsatisfied competence* described nurses whose basic psychological needs are globally fulfilled at work and who simultaneously experience a low satisfaction of their need for competence. Likewise, our *Globally fulfilled with satisfied competence*

and frustrated autonomy profile described nurses whose needs were globally fulfilled at work and who simultaneously experienced a high satisfaction of their need for competence but a similarly high frustration of their need for autonomy. This profile is particularly interesting in suggesting that some nurses may attribute some of their work-related challenges to the constraints of their workplace rather than to personal limitations.

The distinctive shape of these two profiles, as well as of our *Globally fulfilled with satisfied competence and autonomy* profile, highlights the need to account for nurses' global levels of need fulfillment together with their specific levels of autonomy, competence and relatedness satisfaction and frustration. Global levels of need fulfillment were critical in three profiles, while specific levels of need satisfaction/frustration also played a critical role in three profiles. Our results also supported the relevance of simultaneously considering need satisfaction and frustration, which capture distinct psychological processes, at least in one of our profiles (Ryan & Deci, 2017; Vansteenkiste & Ryan, 2013). We also note that specific levels of relatedness satisfaction and frustration, as well as specific levels of competence frustration, differed the least across profiles, suggesting that these specific levels may have little relevance beyond their contributions to nurses' global need fulfillment levels. It is possible that relatedness satisfaction and frustration may be partly dependent on the extent to which social interactions nurture or thwart nurses' needs for autonomy and competence. Individuals who report strong autonomy and competence satisfaction likely possess strong social relationships that assist in the satisfaction of these needs, and vice versa. As for specific levels of competence frustration, this lack of difference across profiles may be the result of the early career status for our sample, in which some feelings of inadequacy can be expected (e.g., competence frustration may be tied to a lack of autonomy and social support). Practically speaking, and pending replication, this result supports the benefits of improving autonomy and relatedness fulfillment amongst newcomers as it may reduce competence frustration which are inextricably tied to global fulfillment levels.

Temporal Stability of Need Fulfillment Profiles

Partially supporting Hypothesis 2a, we identified the same number of profiles, with the same structure and within-profile variability across all time points. These results match those from longitudinal person-centered investigations of need satisfaction profiles conducted over shorter time intervals (10 weeks: Gillet et al., 2020; 3 months: Huyghebaert-Zouaghi et al., 2022). We also identified longitudinal changes in the size of the profiles, consistent with the idea that nurses' workplace adaptation is still ongoing changes early in the career. As the average tenure of our sample progressively increases, the size of the *Moderately fulfilled with unsatisfied competence* and *Globally unfulfilled* profiles progressively decreased, whereas that of the *Average* profile increased. In contrast, the size of the *Globally fulfilled with satisfaction competence and autonomy* and the *Globally fulfilled with satisfied competence and unsatisfied autonomy* profiles remained roughly unchanged over time. Thus, whereas the number of globally fulfilled nurses remained relatively stable, the number of moderately fulfilled or unfulfilled nurses decreased over time, with many nurses transitioning towards more average and balanced profiles. These results are consistent with the fact that many nurses who initially fail to reach a high level of need fulfillment early in their career will eventually go on to develop a balanced level of need fulfillment as they learn the ropes of their new role and adapt to various aspects of their work life (e.g., competence with tasks, forming social relationships, acquiring autonomy). However, by the end of the study, only a small portion of nurses (~20%) presented a globally fulfilled profile (Profiles 1 or 5), whereas more than a fourth still displayed a *Globally unfulfilled* profile, highlighting the need to allocate resources to help this substantial number of early career nurses to develop a more balanced level of need satisfaction over time. The fact that the size of this profile decreased from 40.63% to 26.14% suggests that time helps, but also that letting things run their course may not be enough if one wants to help early career nurses to remain in the profession.

Supporting Hypothesis 2b, our results revealed that nurses' profile membership was moderately to highly stable (56.6% to 97.4%). These stability rates are slightly lower than those reported in previous studies conducted over shorter periods of time (10 weeks: Gillet et al., 2020; 3 months: Huyghebaert-Zouaghi et al., 2022), and yet are consistent with our expectations that stability might be lower when considering a longer time interval (6 months). These results indicate that changes in profile membership do occur, reinforcing the value of intervention. In contrast, it was preoccupying to note that many transitions entailed a reduction in nurses' need fulfillment, consistent with Huyghebaert-Zouaghi et al. (2020) observation that nurses seemed to have difficulty maintaining high levels of need satisfaction

over time. In our sample, need fulfillment worsened over the course of the study, a result that is troubling for Canada where the retention of health care professionals is currently a hot topic (Boamah et al., 2021). However, it seemed equally hard to maintain low levels of need fulfillment as we observed multiple transitions out of the *Globally Unfulfilled* profile toward more desirable ones, which suggests that some improvement also occurs as experience sets in. Lastly, our results support the need to intervene as early as possible in the career, given that profile membership seemed to become increasingly stable (i.e., higher between Time 2 and 3 than between Time 1 and 2).

Drivers of Need Fulfillment Profiles

Partially supporting Hypothesis 3a, emotional and cognitive resources were associated with an increased likelihood of membership to profiles characterized by higher global need fulfillment levels (e.g., Profiles 1 & 5). Emotional resources displayed the most systematic, and strongest, associations with the most desirable need fulfillment profiles based on global levels. Interestingly, and supporting Hypothesis 3b, emotional resources increased the odds of membership in the *Moderately fulfilled with unsatisfied competence* profile relative to the *Average* and *Globally unfulfilled* profiles, while physical resources had an opposite effect. These two profiles are mainly differentiated by the slightly lower global need fulfillment levels and higher competence satisfaction levels observed in the *Average* and *Globally unfulfilled* profiles. As such, it appears that physical resources play a unique role in improving satisfaction with the need for competence but have no effect on global need fulfillment. Conversely, emotional resources appear more entwined with global need fulfillment levels. Partially supporting Hypothesis 3b, cognitive resources were also systematically associated with a decreased likelihood of membership in the *Globally unfulfilled* profile relative to all other profiles, and increased likelihood of membership to the *Globally Fulfilled with satisfied autonomy and competence* profile relative to the two moderate profiles. Thus, cognitive resources did not display the same beneficial effect on competence satisfaction as physical resources (i.e., Hypothesis 3b) but rather appears to also be useful in preventing low global need fulfillment levels. These observations are consistent with previous results highlighting the benefits of emotional (Lavoie-Tremblay et al., 2014) and cognitive (Trépanier et al., 2015b) resources for optimal functioning and well-being, while also underscoring that these resources seem particularly useful in keeping nurses from adopting a *Globally unfulfilled* profile. These results are consistent with SDT, suggesting that emotional resources, especially those stemming from social interactions, can help nurses develop positive social relationships (relatedness) and increase their coping abilities (competence and autonomy). Cognitive resources are conceptually close to the need for competence and autonomy, as they may provide avenues for employees to perform better and more autonomously in their work. As cognitive resources may only benefit two out of the three needs, they may be vital to avoiding global need un-fulfillment (Ryan & Deci, 2000, 2017), and necessary to adopt a *Globally fulfilled* profile.

With regards to job demands, emotional job demands increased nurses' likelihood of membership into profiles characterized by lower global levels of fulfillment. This result is consistent with previous findings highlighting negative associations between emotional demands and need satisfaction (van den Broeck, 2008). From a JDR perspective (Bakker & Demerouti, 2007), this result suggests that nurses exposed to a higher level of emotional demands are more likely to feel emotionally depleted. Indeed, emotional demands seemed detrimental to achieving a globally fulfilled (*Globally fulfilled with satisfied competence and autonomy*) profile while reinforcing membership to the *Globally unfulfilled* one, without influencing membership into average profiles. Yet, contrary to our expectations (i.e., Hypothesis 3b), emotional demands did not increase the likelihood of membership in the *Globally fulfilled with satisfied competence and autonomy frustration* profile relative to the *Globally fulfilled with satisfied competence and* autonomy profile despite the former having greater autonomy frustration and lower global need fulfillment. Thus, it seems that emotional demands may not be as burdensome when global need fulfillment levels become quite high, possibly due to being adept at coping with emotional demands. Physical demands were also associated with membership into profiles characterized by moderate (i.e., *Moderately fulfilled with unsatisfied competence*) or average (i.e., *Balanced average*) need fulfillment, relative to both globally fulfilled profiles. Like emotional demands, the toll taken by physical demands could prevent nurses' from experiencing optimal functioning at work (i.e., global need fulfillment), yet this pattern of results is also consistent with physical demands having a detrimental impact on competence satisfaction, and possibly competence frustration. These results are also consistent with SDT (Ryan & Deci, 2017), which positions psychological need fulfillment as a

core indicator of the extent to which one's work environment supports one's functioning. Considering the highly stressful nature of nursing (Aiken et al., 2013; Pisanti et al., 2011), our results highlight the relevance of interventions targeting emotional and physical demands to help increase nurses' adaptation to their workplace.

Contrary to our expectations, we found that cognitive demands increased nurses' likelihood of membership into the globally fulfilled profiles relative to the moderately fulfilled or average profiles. While unexpected, it has been proposed that not all demands are equal in terms of their impact on employees (De Cooman et al., 2013; Van den Broeck et al., 2010b). Whereas some demands are seen as hindrances (i.e., threatening obstacles that drain personal resources), other demands are seen as challenges (i.e., stimulating opportunities for improvement). Cognitive demands often fall into this second category (Olafsen & Frølund, 2018), suggesting that nurses who feel cognitively challenged may experience a greater sense of need fulfillment and competence satisfaction (Van den Broeck et al., 2010b). Similar observations have been made in previous studies (Huyghebaert-Zouaghi et al., 2022; Sánchez-Oliva et al., 2017; Tóth-Király et al., 2019), in which the need for competence seemed particularly important. However, and consistent with the idea that cognitive job demands will not always be perceived as a challenge, our results also suggested that they might interfere with nurses' feelings of autonomy (i.e., increasing their likelihood of membership into the *Globally fulfilled with satisfied competence and unsatisfied autonomy* profile). Lastly, the lack of variability around the specific levels of relatedness across profiles indicates that our hypotheses pertaining to the effects of job demands and resource on relatedness are not supported, at least to the extent of an imbalance in relatedness being present as a result of job demands and resources.

Consequences of Need Fulfillment Profiles

Our results were consistent with Hypotheses 4a and 4b, revealing that more desirable outcomes accompanied profiles characterized by higher global need fulfillment and higher specific need satisfaction. These observations suggest that nurses' global need fulfillment represents the main driver of profiles-outcomes associations, consistent with similar conclusions obtained in the education (Gillet et al., 2020), work (Gillet et al., 2019) and general life (Tóth-Király et al., 2020) areas, although previous studies also highlighted the value of balanced levels of need satisfaction, particularly among nurses (Huyghebaert-Zouhagi et al., 2020). Our results also match the theoretical propositions of SDT (Ryan & Deci, 2000, 2017) insofar as need fulfillment should contribute to support individuals' psychological health and performance (Gillet et al., 2015, 2018, 2020a).

Lastly, we did not identify outcome differences between the *Moderately fulfilled with unsatisfied competence* and the *Globally fulfilled with satisfied competence and unsatisfied autonomy* profiles. Autonomy has been positioned as critical in allowing individuals to regulate their behavior and manage their work experiences (Vansteenkiste & Ryan, 2013). Our results are consistent with this expectation and suggest that higher specific level of autonomy frustration observed in the latter profile might have been enough to reduce some of the benefits associated with the higher global need fulfillment noted in the same profile. Thus, despite feeling globally fulfilled, nurses who feel forced to act in a certain way or are prevented from making decisions autonomously could subject themselves to controlled forms of motivations that have been shown to predict poorer mental health (Ryan & Deci, 2017). These observations match previous results highlighting the value of considering specific levels of need satisfaction and frustration above global levels of fulfillment (Gillet et al., 2020; Sánchez-Oliva et al., 2017; Tóth-Király et al., 2019a).

Limitations

The present study has limitations that are worth mentioning. First, we relied on self-report questionnaires which could introduce biases. More objective indicators of well-being and work adaptation could be used in future studies to circumvent this limitation. Second, we only investigated a limited range of predictors and outcomes, making it hard to generalize our findings to the full range of experiences nurses can encounter at work. Future studies should consider a wider range of predictors across culturally distinct samples to demonstrate the generalizability of need-based profiles and their associations with outcomes and predictors. Third, although this study is longitudinal and our selection of predictors and outcomes was rooted in theory, our design and the limitations of our analyses preclude us from inferring causality or from clearly establishing the direction of the associations between the predictors, profiles, and outcomes. Future research is thus needed to establish temporal directionality and causality.

Another limitation comes from our reliance on a sample of early career Canadian nurses. While our results should be generalizable to early career nurses from other countries with a public health care system, and potentially to early career employees occupying similarly stressful occupations (e.g., teachers, police officers), any conclusions about generalizability and contextualization (Rousseay & Fried, 2001) are conditioned on replications among new and more diversified samples recruited in other countries and occupational groups. We also note that while our focus was on early career nurses the age range of the participants was wide (20 to 52 years), suggesting that some of them might have started their career right out of university while others might have had previous work experiences. Consequently, need fulfillment experiences might also have been influenced by the developmental stage of each participant. Indeed, some research has already shown that the global and specific components of need fulfillment evolve differently over time (Tóth-Király et al., 2018), possibly as a result of changes in personality (Caspi et al., 2005; Marsh et al., 2013). Similarly, most of the study participants held permanent positions which might have afforded them a certain level of job security. In turn, this job security might have lessened the impact of early career difficulties. While this remains plausible, current evidence is inconclusive and inconsistent about the psychological consequences of being permanently employed (e.g., De Cuyper & De Witte, 2007; De Witte & Näswall, 2003; Liukkonen et al., 2004). Although we found no evidence for an effect of tenure, age or employment status (see Appendix 4 in the online supplements), future studies should seek to more clearly isolate the normative effects of demographic variables.

Practical Implications

Despite these limitations, our study provides incremental evidence suggesting that organizations may want to consider how changing work designs (by altering cognitive, physical, and emotional job demands and resources) may contribute to support need fulfillment at work. Specifically, as job demands increase, nurses could do well with additional resources (or decreased demands) to help them maintain adequate levels of need fulfillment over time. Although the emotional burden placed on nurses is inherent to their occupation, organizations could benefit from implementing strategies to help nurses manage these demands. These strategies could include providing reassurance and creating environments that promote relaxation, belonging, involvement, and security (Ebrahimi et al., 2016). They could also include mentoring or peer support activities, as well as taking a mental break or alternating between easy and complex tasks. Cognitive demands did not appear to frustrate nurses, but rather seemed to positively challenge and stimulate them. It has been suggested that nurses who feel competent are more satisfied and engaged at work (Biagioli et al., 2018), and thus, that need-supportive activities might help foster need fulfillment. Organizations may benefit more from providing early career nurses the opportunity to develop new skills and techniques that nurture competence, rather than reducing the cognitive challenges of nursing. Our results suggested that nurses need to feel cognitively challenged at work and to have the resources to overcome these challenges, as a lack in either one of those elements may be detrimental to the long-term fulfillment of their needs. Lastly, the physical characteristics of the nursing environment had the fewest associations with profile membership. Consequently, organizations should prioritize the provision of with emotionally supportive work environments to foster nurses' feelings of need fulfillment.

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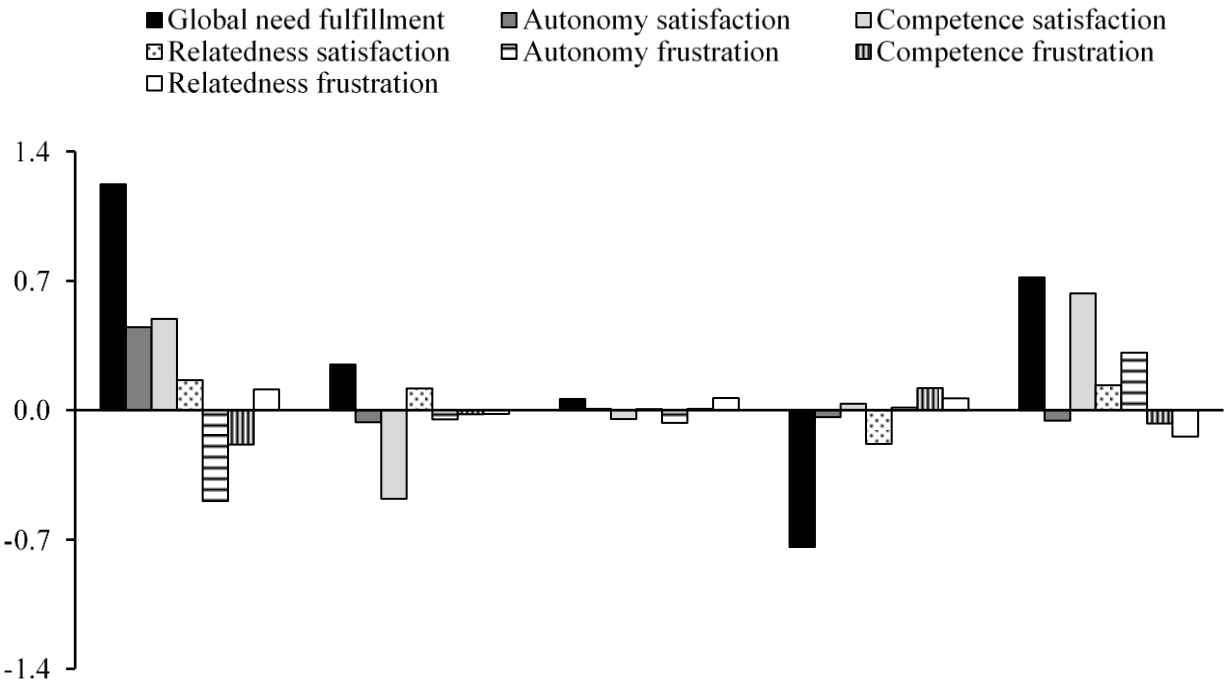

Figure 1
Final 5-Profile Solution

Note. Profile indicators were standardized factor scores ($M = 0$, $SD = 1$) derived preliminary measurement model. Profile 1: Globally fulfilled with satisfied competence and autonomy; Profile 2: Moderately fulfilled with unsatisfied competence; Profile 3: Average; Profile 4: Globally unfulfilled; Profile 5: Globally fulfilled with satisfied competence and frustrated autonomy.

Table 1

Descriptive Information on the Questionnaires Used in the Present Study

Variable	Number of items	Sample item	Scale score reliability (alpha) between Time 1 and 3
Profile indicators			
Autonomy satisfaction	3	I feel I can be myself at work	.71 to .76
Autonomy frustration	3	I feel forced to accept the way that I am told to do things	.82 to .84
Competence satisfaction	4	I feel competent in my work	.82 to .86
Competence frustration	3	Some situations at work make me feel incompetent	.82 to .84
Relatedness satisfaction	3	I feel part of the group at work	.71 to .73
Relatedness frustration	3	I think my colleagues do not like me	.70 to .73
Profile predictors			
Emotional demands	4	I have to do a job requiring a big emotional effort	.78 to .79
Cognitive demands	4	I need to remember lots of things at the same time	.83 to .86
Physical demands	4	I need to bend over or stretch often while I work	.88 to .91
Emotional resources	4	I receive moral support from others	.88 to .91
Cognitive resources	4	I can alternate between more complex and easy tasks	.71 to .72
Physical resources	4	I can take a break when the work becomes too exhausting physically	.75 to .77
Profile outcomes			
Vigor	3	When I get up in the morning, I feel like going to work	.88 to .91
Dedication	3	I am enthusiastic about my job	.91 to .93
Work satisfaction	5	In most ways my work is close to my ideal	.88 to .89
Quality of care	4	How would you rate the quality of care that you are giving to patients	.79 to .84
Psychological distress	6	Experiences of different sensations for example, nervousness, desperation	.85 to .88
Somatization	8	Experiences of physical symptoms for example, headaches, shortness of breath	.85 to .88

Table 2

Results from the Latent Profile and Latent Transition Analyses

Model	LL	fp	Scaling	AIC	CAIC	BIC	SSABIC	Entropy	aLMR	BLRT
Latent Profile Analysis (Time 1)										
1 Profile	−5608.307	14	1.222	11244.614	11322.026	11308.026	11263.574	Na	Na	Na
2 Profiles	−5380.628	29	1.103	10819.255	10979.608	10950.608	10858.529	.644	< .001	< .001
3 Profiles	−5262.403	44	1.175	10612.806	10856.101	10812.101	10672.394	.780	.001	< .001
4 Profiles	−5180.269	59	1.212	10478.537	10804.773	10745.773	10558.440	.823	.086	< .001
5 Profiles	−5128.267	74	1.269	10404.534	10813.711	10739.711	10504.750	.757	.554	< .001
6 Profiles	−5076.874	89	1.134	10331.749	10823.867	10734.867	10452.280	.786	.071	< .001
7 Profiles	−5050.867	104	1.179	10309.733	10884.793	10780.793	10450.579	.761	.531	.013
8 Profiles	−5001.669	119	1.180	10241.337	10899.338	10780.338	10402.497	.773	.251	< .001
Latent Profile Analysis (Time 2)										
1 Profile	−5381.230	14	1.265	10790.461	10867.873	10853.873	10809.421	Na	Na	Na
2 Profiles	−5134.938	28	1.135	10327.876	10487.229	10459.229	10367.150	.622	< .001	< .001
3 Profiles	−5029.417	44	1.270	10146.834	10390.128	10346.128	10206.422	.738	.043	< .001
4 Profiles	−4972.259	59	1.218	10062.518	10388.754	10329.754	10142.421	.776	.067	< .001
5 Profiles	−4922.485	74	1.229	9992.969	10402.146	10328.146	10093.186	.723	.297	< .001
6 Profiles	−4880.185	89	1.794	9938.370	10430.488	10341.488	10058.901	.756	.198	< .001
7 Profiles	−4840.856	104	1.707	9889.712	10464.772	10360.772	10030.558	.748	.757	< .001
8 Profiles	−4806.593	119	1.174	9851.185	10509.186	10390.186	10012.345	.794	.568	< .001
Latent Profile Analysis (Time 3)										
1 Profile	−5060.182	14	1.395	10148.364	10225.775	10211.775	10167.324	Na	Na	Na
2 Profiles	−4724.619	29	1.075	9507.238	9667.591	9638.591	9546.512	.701	< .001	< .001
3 Profiles	−4606.002	44	1.145	9300.004	9543.299	9499.299	9359.593	.751	< .001	< .001
4 Profiles	−4546.811	59	1.245	9211.622	9537.858	9478.858	9291.525	.729	.373	< .001
5 Profiles	−4495.751	74	1.398	9139.502	9548.679	9474.679	9239.719	.727	.627	< .001
6 Profiles	−4442.991	89	1.152	9063.983	9556.101	9467.101	9184.513	.764	.085	< .001
7 Profiles	−4409.431	104	1.091	9026.862	9601.921	9497.921	9167.707	.766	.062	< .001
8 Profiles	−4361.127	119	1.134	8960.254	9618.255	9499.255	9121.414	.774	.468	< .001
Tests of Profile Similarity										
Configural similarity	−14547.379	222	1.298	29538.759	30766.290	30544.290	29839.406	.745	Na	Na
Structural similarity	−14657.199	152	1.308	29618.397	30458.869	30306.869	29824.248	.721	Na	Na
Dispersion similarity	−14736.828	82	1.612	29637.655	30091.067	30009.067	29748.706	.755	Na	Na
Distributional similarity	−14788.686	74	1.808	29725.372	30134.549	30060.549	29825.588	.746	Na	Na
Latent Transition Analyses with Predictors										
Effects free across time and profiles	−11957.764	545	.777	25005.528	28027.743	27482.743	25752.268	.851	Na	Na
Effects free across time	−12146.885	305	1.206	24903.771	26595.102	26290.102	25321.671	.827	Na	Na
Predictive similarity	−12189.353	257	1.284	24892.706	26317.861	26060.861	25244.839	.809	Na	Na
Latent Transition Analyses with Outcomes										
Effects free across time and profiles	−15470.006	152	1.332	31244.011	31396.011	31935.123	31452.494	.861	Na	Na
Explanatory similarity	−15357.808	92	1.956	30899.616	30991.616	31317.920	31025.803	.876	Na	Na

Note. LL: loglikelihood; fp: number of free parameters; AIC: Akaike Information Criterion; CAIC: constant AIC; BIC: Bayesian Information Criterion; SSABIC: Sample-Size Adjusted BIC; aLMR: p-value associated with the adjusted Lo-Mendell-Rubin likelihood ratio test; BLRT: Bootstrap Likelihood Ratio Test; Na: Not applicable.

Table 3

Transition Probabilities for the Final Latent Transition Analysis Model

		Transition Probabilities to Time 2 Profiles				
Time 1 profiles	Relative size	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5
Profile 1	7.30%	.791	.005	.167	.000	.037
Profile 2	33.76%	.032	.566	.235	.112	.054
Profile 3	3.71%	.065	.110	.788	.000	.037
Profile 4	40.63%	.000	.118	.152	.713	.017
Profile 5	14.60%	.050	.152	.130	.000	.667
		Transition Probabilities to Time 3 Profiles				
Time 2 profiles	Relative size	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5
Profile 1	8.14%	.640	.000	.058	.000	.301
Profile 2	27.75%	.009	.737	.192	.042	.020
Profile 3	17.95%	.026	.000	.974	.000	.000
Profile 4	34.55%	.000	.161	.077	.761	.002
Profile 5	11.61%	.009	.029	.023	.032	.907
Relative size		5.88%	24.48%	29.13%	26.14%	14.38%

Note. Profile 1: Globally fulfilled with satisfied competence and autonomy; Profile 2: Moderately fulfilled with unsatisfied competence; Profile 3: Average; Profile 4: Globally unfulfilled; Profile 5: Globally fulfilled with satisfied competence and frustrated autonomy.

Table 4

Results from the Multinomial Logistic Regressions Evaluating the Relations between Predictors and Profile Membership

	Profile 1 vs. Profile 2		Profile 1 vs. Profile 3		Profile 1 vs. Profile 4		Profile 1 vs. Profile 5		Profile 2 vs. Profile 3	
	Coeff. (SE)	OR	Coeff. (SE)	OR	Coeff. (SE)	OR	Coeff. (SE)	OR	Coeff. (SE)	OR
Cognitive demand	.555 (.266)*	1.742	.583 (.270)*	1.791	.575 (.294)	1.777	−.026 (.287)	.974	.028 (.126)	1.028
Emotional demand	−.510 (.215)*	.600	−.694 (.238)**	.500	−1.131 (.255)**	.323	−.450 (.236)	.638	−.184 (.145)	.832
Physical demand	−.353 (.167)*	.703	−.430 (.186)*	.651	−.218 (.191)	.804	−.061 (.207)	.941	−.077 (.126)	.926
Cognitive resource	.570 (.203)**	1.768	.546 (.224)*	1.726	.849 (.234)**	2.337	.417 (.235)	1.517	−.023 (.136)	.977
Emotional resource	1.827 (.442)**	6.215	2.402 (.449)**	11.045	3.091 (.464)**	21.999	1.765 (.459)**	5.842	.575 (.148)**	1.777
Physical resource	.275 (.303)	1.317	−.092 (.344)	.912	−.154 (.333)	.857	.255 (.326)	1.290	−.367 (.160)*	.693
	Profile 2 vs. Profile 4		Profile 2 vs. Profile 5		Profile 3 vs. Profile 4		Profile 3 vs. Profile 5		Profile 4 vs. Profile 5	
	Coeff. (SE)	OR	Coeff. (SE)	OR	Coeff. (SE)	OR	Coeff. (SE)	OR	Coeff. (SE)	OR
Cognitive demand	.020 (.147)	1.020	−.581 (.177)**	.559	−.008 (.160)	.992	−.609 (.205)**	.544	−.601 (.210)**	.548
Emotional demand	−.622 (.153)**	.537	.060 (.163)	1.062	−.438 (.160)**	.645	.244 (.197)	1.276	.682 (.208)**	1.978
Physical demand	.136 (.125)	1.146	.292 (.144)*	1.339	.213 (.134)	1.237	.369 (.168)*	1.446	.156 (.168)	1.169
Cognitive resource	.279 (.128)*	1.322	−.153 (.136)	.858	.303 (.150)*	1.354	−.130 (.168)	.878	−.432 (.159)**	.649
Emotional resource	1.264 (.150)**	3.540	−.062 (.212)	.940	.689 (.149)**	1.992	−.637 (.243)**	.529	−1.327 (.252)**	.265
Physical resource	−.428 (.165)**	.652	−.019 (.173)	.981	−.062 (.171)	.940	.347 (.210)	1.415	.409 (.213)	1.505

Note. *$p < .05$, **$p < .01$; Predictors are standardized factor scores (M = 0, SD = 1); Profile 1: Globally fulfilled with satisfied competence and autonomy; Profile 2: Moderately fulfilled with unsatisfied competence; Profile 3: Average; Profile 4: Globally unfulfilled; Profile 5: Globally fulfilled with satisfied competence and frustrated autonomy; SE: standard error of the coefficient; OR: odds ratio. The coefficients and OR reflects the effects of the predictors on the likelihood of membership into the first listed profile relative to the second listed profile.

Table 5

Time-Invariant Associations between Profile Membership and Outcomes

	Profile 1 Mean [95% CI]	Profile 2 Mean [95% CI]	Profile 3 Mean [95% CI]	Profile 4 Mean [95% CI]	Profile 5 Mean [95% CI]	Differences between profiles
Vitality	1.146 [1.026, 1.267]	.485 [.242, .728]	−.230 [−.328, −.133]	−1.149 [−1.480, −.817]	.648 [.389, .908]	4 < 3 < 2 = 5 < 1
Dedication	1.084 [.981, 1.188]	.490 [.276, .703]	−.200 [−.318, −.081]	−1.209 [−1.622, −.795]	.643 [.395, .892]	4 < 3 < 2 = 5 < 1
Work satisfaction	1.235 [1.111, 1.358]	.484 [.296, .672]	−.196 [−.328, −.064]	−1.096 [−1.371, −.820]	.487 [.193, .780]	4 < 3 < 2 = 5 < 1
Quality of care	.935 [.822, 1.047]	.283 [.067, .499]	−.253 [−.346, −.160]	−.601 [−.777, −.425]	.470 [.251, .688]	4 < 3 < 2 = 5 < 1
Distress	−.814 [−.868, −.761]	−.402 [−.531, −.293]	.035 [−.230, .300]	1.042 [.797, 1.288]	−.344 [−.660, −.029]	1 < 2 = 5 < 4; 1 < 2 < 3 < 4; 3 = 5
Somatization	−.743 [−.881, −.604]	−.298 [−.496, −.132]	.054 [−.224, .332]	.742 [.534, .951]	−.173 [−.681, .334]	1 < 2 = 5 < 4; 1 < 2 < 3 < 4; 3 = 5

Note. CI: confidence interval; Profile 1: Globally fulfilled with satisfied competence and autonomy; Profile 2: Moderately fulfilled with unsatisfied competence; Profile 3: Average fulfilled (normative); Profile 4: Globally unfulfilled; Profile 5: Globally fulfilled with satisfied competence and frustrated autonomy.

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We would also be happy to have some of these materials brought back into the main manuscript, or included as published appendices if you deem it useful. We developed these materials to provide additional technical information and to keep the main manuscript from becoming needlessly long.

Appendix 1
Questions Around the Measurement and Operationalization of Need Fulfillment

Our decision to operationalize need fulfillment this way followed recent recommendations highlighting the need to account for the construct-relevant psychometric multidimensionality inherently associated with complex multidimensional constructs such as need fulfillment. Construct-relevant psychometric multidimensionality refers to the idea that item ratings often reflect more than one latent construct (Morin et al., 2016a, 2016b, 2017, 2020). This understanding emphasizes the importance of explicitly distinguishing two different forms of construct-relevant psychometric multidimensionality. The first form refers to the assessment of co-existing global (G-factor: global levels of need fulfillment captured across all items) and specific (S-factors: unique levels of satisfaction/frustration of each need, need imbalance) latent constructs. The second form refers to the presence of associations between these items and more than one conceptually-related factors (i.e., cross-loadings). For instance, levels of autonomy need satisfaction may influence responses to items designed to assess competence or relatedness needs satisfaction, but also autonomy frustration. In this example, these cross-loadings could occur in part because of the naturally imperfect nature of these ratings, but also because the satisfaction and frustration of the needs for autonomy, competence, and relatedness are conceptually interrelated. Importantly, ignoring either form of psychometric multidimensionality, when present in items ratings, has been shown to lead to measurement imprecision, biased estimates of factor correlations (e.g., Asparouhov et al., 2015) and of associations with external criterion-variables (Mai et al., 2018). In practical terms, failure to consider the possibility that need fulfillment ratings may simultaneously tap into two types of latent constructs (G- and S-factors) is likely to erroneously lead a biased view of the validity of the constructs under consideration and the reality under study. For example, a more accurate representation of need fulfillment (in which both the G- and S-factors are taken into account) may reveal differentiated effects associated with an imbalance in the satisfaction/frustration of one specific need that would be impossible to detect using more traditional operationalizations. Indeed, empirical studies have already provided support for this proposition in relation to psychological need fulfillment (e.g., Blechman et al., 2022, In Press; Gillet et al., 2020; Huyghebaert-Zouaghi et al., 2023; Sánchez-Oliva et al., 2017; Tóth-Király et al., 2019).

Appendix 2
Preliminary Measurement Models

Analyses

Model Specification

A series of time-specific and longitudinal preliminary measurement models were estimated to verify the psychometric properties of our measures, as well as to obtain factor scores for our main analyses. Factor scores, when compared to manifest scale scores (i.e., the sum or the average of the items forming a scale), tend to preserve the nature of the underlying measurement model (e.g., bifactor, invariance; Morin et al., 2016c, 2016d, 2017) and afford a partial control for unreliability (Skrondal & Laake, 2001).

Based on recent evidence (Gillet et al., 2019, 2020a, 2020b; Sánchez-Oliva et al., 2017; Tóth-Király et al., 2018, 2019) showing that measures of need satisfaction and/or need fulfillment were best represented via a bifactor exploratory structural equation modeling (bifactor ESEM; Morin et al., 2016a, 2016b) including one global factor (need fulfillment) and six specific factors, we relied on this approach to model psychological need fulfillment. The bifactor component allows one to estimate a global (G-) factor reflecting nurses' global levels of need fulfillment measured across all indicators, and non-redundant specific (S-) factors reflecting the unique qualities associated with the satisfaction and/or frustration of each need. These S-factors reflect an imbalanced level in the satisfaction/frustration of each need relative to global levels of need fulfillment (Gillet et al., 2019, 2020a, 2020b). In contrast, the ESEM component allows for the free estimation of all cross-loadings between the S-factors, which has been shown to result in more accurate factor definitions (Asparouhov et al., 2015; Morin et al., 2020).

To ascertain the appropriateness of the bifactor-ESEM representation of need fulfillment, we followed common recommendations (Morin et al., 2016c, 2017d, 2020) and contrasted first-order and bifactor confirmatory factor analytic (CFA) and ESEM solutions. In CFA, items were only associated with their a priori factors, cross-loadings were constrained to be exactly zero, and factors were allowed to freely correlate with one another. In ESEM, the factors were defined in the same manner as in the CFA, but all cross-loadings were freely estimated but targeted to be as close to zero as possible using target rotation, a confirmatory rotation procedure (Browne, 2001). In bifactor-CFA, all items were associated with one G-factor and with their a priori S-factor, cross-loadings were constrained to exactly zero between the S-factors, and all factors were specified as orthogonal (Morin et al., 2020; Reise, 2012). In bifactor-ESEM, factors were defined as in bifactor-CFA, but cross-loadings were freely estimated between all S-factors but targeted to be close to zero using an orthogonal bifactor target rotation procedure (Reise, 2012). When contrasting the first-order CFA and ESEM models, support for the ESEM solution comes from the observation of equally well-defined factors coupled with reduced estimates of factor correlations (Morin et al., 2016c, 2017, 2020). When comparing first-order and bifactor models, support for the bifactor solution would come from the observation of a well-defined G-factor together with at least a subset of well-defined S-factors (Morin et al., 2016c, 2017, 2020).

The multidimensional measure of all predictors (job demands and resources) was estimated using ESEM, which allowed for the estimation of cross-loadings between the various predictors measured from the same questionnaire and referring to the same workplace in order to avoid converging on inflated estimates of factor correlations (Asparouhov et al., 2015; Mai et al., 2018). These cross-loadings were targeted to be as close to zero as possible through a target rotation procedure. For comparison purposes, we also estimated corresponding CFA models in which items only loaded on their a priori factors and cross-loadings were set to be zero. Finally, the outcomes (vigor, dedication, work satisfaction, quality of care, distress, and somatization), which all came from different, and conceptually distinct, questionnaires were represented using a CFA in which items loaded only on their a priori factors.

To ascertain that the definition of all constructs remained unchanged over time, tests of longitudinal measurement invariance were performed separately for need fulfillment, the predictors, and the outcomes. These tests were performed in sequence (Millsap, 2011): (1) configural invariance (same factor structure), (2) weak invariance (same factor loadings), (3) strong invariance (same factor loadings and item intercepts), (4) strict invariance (same factor loadings, item intercepts, and item uniquenesses); (5) invariance of the latent variance-covariance matrix (same factor loadings, item intercepts, item uniquenesses, and factor

variances-covariances); and (6) latent means invariance (same factor loadings, item intercepts, item uniquenesses, factor variances-covariances, and factor means). A priori correlated uniquenesses were added between matching indicators of the constructs over time to avoid inflated estimates of stability (Marsh, 2007).

Model Estimation and Evaluation

Analyses were conducted with Mplus 8.6 (Muthén & Muthén, 2021) using the maximum likelihood robust (MLR) estimator, which is robust to non-normality. All measurement models were evaluated using common goodness-of-fit indices (Hu & Bentler, 1999; Marsh et al., 2005): the comparative fit index (CFI), the Tucker-Lewis Index (TLI), and the root mean square error of approximation (RMSEA). CFI and TLI values are considered to be adequate or excellent when they are above .90 and .95, respectively. RMSEA values are considered to be adequate or excellent below .08 and .06, respectively. As the chi-square test (χ^2) is known to be oversensitive to minor model misspecifications and sample size (Marsh et al., 2005), it is simply reported for the sake of transparency. Nested models' comparisons in tests of measurement invariance were based on examination of changes (Δ) in fit indices where a decrease of $\geq .010$ on the CFI and TLI and an increase of $\geq .015$ on the RMSEA reveal a lack of invariance (Chen, 2007; Cheung & Rensvold, 2002). For all models, we report the composite reliability of the factors (ω; McDonald, 1970; Morin et al., 2020).

Results

Need Fulfillment

The results associated with the time-specific need fulfillment models are reported in Table S1. All of these measurement models displayed an excellent level of fit to the data (all CFI/TLI $\geq .90$ and all RMSEA $\leq .06$), although the first-order ESEM solutions systematically outperformed their CFA counterparts, and the bifactor ESEM solutions outperformed all other solutions. Standardized parameter estimates from these solutions are reported in Table S2 (Time 1), Table S3 (Time 2), Table S4 (Time 3), and Table S5 (CFA and ESEM factor correlations). These time-specific results show that all first-order factors remained well-defined and reliable for the CFA ($\lambda = .464$ to .880, $\omega = .707$ to .868) and ESEM ($\lambda = .117$ to .997, $\omega = .602$ to .868) solutions. Moreover, the ESEM solution resulted in substantially reduced factor correlations (r = .127 to .632, M = .396) relative to the CFA solution (r = .279 to .854, M = .570).

The ESEM solution was thus retained and compared to its bifactor counterpart. Each time-specific bifactor ESEM solutions revealed generally well-defined and reliable factors across all three time points, supporting the superiority of this solution (Gillet et al., 2019, 2020a, 2020b; Sánchez-Oliva et al., 2017; Tóth-Király et al., 2018, 2019). However, to more precisely assess the extent to which results from these solutions were replicated over time, tests of measurement invariance were realized on this solution. The results associated with these tests are reported in Table S6 and supported the complete measurement invariance of this solution (ΔCFI/TLI $\leq .010$, ΔRMSEA $\leq .015$). The final parameter estimates from the most invariant bifactor-ESEM solution (i.e., latent mean invariance) are reported in Table S7 and reveal a reliable and well-defined need fulfillment G-factor (-.684 to .725, $\omega = .936$). In addition, competence satisfaction ($\lambda = .405$ to .615, $\omega = .734$), relatedness satisfaction ($\lambda = .350$ to .541, $\omega = .556$), autonomy frustration ($\lambda = .529$ to .733, $\omega = .751$) and competence frustration ($\lambda = .511$ to .659, $\omega = .730$) S-factors retained relatively high levels of specificity once the G-factor was taken into account. In contrast, autonomy satisfaction ($\lambda = .116$ to .486, $\omega = .429$) and relatedness frustration ($\lambda = .211$ to .432, $\omega = .378$) retained moderate amounts of specificity. Importantly, because bifactor-ESEM solutions separate true score (i.e., reliable) variance present at the item level in two (the G- and S- factors), typical interpretation guidelines have to be relaxed for the S-factors, with suggestions that composite reliability values approaching .500 should be considered acceptable (Morin et al., 2020; Perreira et al., 2018). Moreover, the factor scores used to represent these S-factors incorporated a partial correction for unreliability. Factor scores were saved from this latent mean invariant model and used as input for the main analyses.

Predictors

The goodness-of-fit associated with the time-specific measurement models underpinning the predictors are reported in Table S1. These results show that the CFA models failed to reach an adequate level of fit to the data, whereas the fit of the ESEM solutions was adequate (all CFI/TLI $\geq .90$ and all

RMSEA ≤ .06). Parameter estimates from all first-order solutions are reported in Table S8 (Time 1), Table S9 (Time 2), Table S10 (Time 3), and S11 (factor correlations). The ESEM factors (λ = -.098 to .998, ω = .518 to .920) were defined as well as the CFA factors (λ = .373 to .939, ω = .714 to .914), and factor correlations were lower in ESEM (r = .036 to .562, M = .283) than CFA (r = .039 to .990, M = .442), thus supporting the superiority of the ESEM solution. Tests of measurement invariance also supported the complete measurement invariance of the ESEM solution over time (ΔCFI/TLI ≤ .010, ΔRMSEA ≤.015). The final parameter estimates from the most invariant solution (i.e., latent mean invariance) are reported in Table S12 and revealed well-defined and reliable factors for cognitive demands (λ = .688 to .780, ω = .841), emotional demands (λ = .547 to .876, ω = .795), physical demands (λ = .700 to .930, ω = .899), emotional resources (λ = .535 to .935, ω = .892), physical resources (λ = .278 to .834, ω = .754) and cognitive resources (λ = .031 to .893, ω = .511). The lower reliability of cognitive resource subscale seems due to the fact that: (a) Item 3 ("*I get information from others (e.g., colleagues, supervisors) to solve complex tasks*") seems to contribute to the definition of the other types of resources (emotional and physical) more than to its own factor; (b) Item 4 ("*I am able to use my knowledge and intellectual skills to solve complex tasks*") seemed to correspond more to the definition of cognitive demands (as a reversed indicator) and physical resources which is consistent with the formulation of this item.

Outcomes

The results associated with the outcome measurement models are reported in Table S1 (time-specific) and Table S6 (measurement invariance). All of the time-specific measurement models displayed an acceptable fit to the data, and the results also supported the complete measurement invariance of this solution over time (ΔCFI/TLI ≤ .010, ΔRMSEA ≤ .015). Final parameter estimates are reported in Table S13 and revealed well-defined and reliable factors for vigor (λ = .690 to .955, ω = .898), dedication (λ = .774 to .947, ω = .914), work satisfaction (λ = .657 to .867, ω = .781), quality of care (λ = .708 to .798, ω = .826), distress (λ = .547 to .828, ω = .870) and somatization (λ = .454 to .730, ω = .806). Factor scores were saved from this model for the main analyses. Correlations among these factor scores are reported in Table S14 of these online supplements.

Appendix 3
Selecting the Optimal Number of Profiles

Model Selection and Comparison

Selection of the optimal number of profiles at each time point was guided by the heuristic meaning, theoretical significance, and statistical adequacy (e.g., the absence of negative variance estimates) of the extracted profiles (Marsh et al., 2009; Muthén, 2003). This selection was also guided by statistical indicators, including the Akaike Information Criterion (AIC), the Bayesian Information Criterion (BIC), the Constant AIC (CAIC), the Sample-Size-Adjusted BIC (SSABIC), the adjusted Lo-Mendell-Rubin (aLMR) likelihood ratio test, and the Bootstrap Likelihood Ratio Test (BLRT). Lower values on AIC, BIC, CAIC and SSABIC suggest a better fitting solution, whereas a non-significant p-value associated with aLMR and BLRT suggest the superiority of a model including one fewer profile. We also report the classification accuracy (i.e., entropy), noting that this descriptive indicator should not be used in the selection of the optimal solution (Lubke & Muthén, 2007). Simulation studies have supported the usefulness of the CAIC, BIC, SSABIC, and BLRT, but not that of the AIC and aLMR (which are only reported to ensure full disclosure), as providing reliable information regarding the optimal number of profiles (e.g., Diallo et al., 2016, 2017; Peugh & Fan, 2013). All of these indicators are heavily impacted by sample size and often keep on improving with the addition of profiles to the solution (Marsh et al., 2009). In these situations, indicators should be graphically presented in "elbow plots" where the point after which the slope flattens suggests that the optimal number of profiles may have been reached and that the contribution of additional profiles becomes negligible (Morin & Litalien, 2019).

Results

The results from the solutions including different number of profiles at each time points are reported in top half of Table 2 in the main manuscript, and the information criteria are graphically depicted in Figure S1 of these online supplements. These plots revealed a similar decreasing trend across all three time points. The lowest CAIC values were associated with the 4-profile solution. The BIC was lowest for the 5- (Time 2) or 6- (Time 1 and Time 3) profile solutions. The SSABIC kept on decreasing without reaching a minimal value, while the BLRT also failed to support a specific solution. As a result, solutions including 4 to 6 profiles were more thoroughly inspected. This inspection revealed that all solutions were statistically proper, had moderately high levels of classification accuracy (entropy values ranged from .723 to .823) and were highly similar across time points (providing early evidence of configural similarity). Increasing the number of profiles from 4 to 5 resulted in the addition of theoretically meaningful, well-defined, and distinct profiles at all time points. In contrast, adding a sixth profile did not bring additional information, but resulted in the division of one existing profile into smaller ones characterized by similar shapes. For these reasons, the 5-profile solutions were retained at the three time points, supporting their configural similarity.

Appendix 4
Additional Analyses

Following the suggestion from an anonymous reviewer, we conducted additional analyses to verify the presence of associations between tenure, age and employment status (permanent versus temporary) and participants' likelihood of profile membership. These analyses were performed in the same sequence as the predictor analyses reported in the manuscript (i.e., null effects model; freely estimated effects across time points and profiles; freely estimated effects across time points; predictive similarity) and relied on the same indicators for model evaluation (information criteria: AIC, CAIC, BIC, SSABIC). The results from these additional analyses are reported in Table S16 and show that the null effect model resulted in the lowest values on three of the four information criteria, suggesting a lack of relations between these demographic variables and the likelihood of profile membership. This conclusion is consistent with the parameter estimates from the alternative solutions, which supported a lack of systematic associations between demographic variables and participants' membership to need fulfillment profiles.

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Table S1

Goodness-of-Fit Statistics for the Time-Specific Estimated Preliminary Models

	χ^2	df	CFI	TLI	RMSEA (90% CI)
Need Fulfillment					
Six-factor CFA (Time 1)	388.911*	137	.935	.919	.055 (.049, .061)
Six-factor ESEM (Time 1)	113.502*	72	.989	.974	.031 (.019, .041)
Bifactor CFA (Time 1)	459.045*	133	.916	.892	.063 (.057, .070)
Bifactor ESEM (Time 1)	95.626*	59	.991	.973	.032 (.020, .043)
Six-factor CFA (Time 2)	289.006*	137	.949	.936	.050 (.042, .058)
Six-factor ESEM (Time 2)	75.309	72	.999	.997	.010 (.000, .030)
Bifactor CFA (Time 2)	282.568*	133	.949	.935	.050 (.042, .058)
Bifactor ESEM (Time 2)	48.848	59	1.000	1.010	.000 (.000, .018)
Six-factor CFA (Time 3)	289.108*	137	.937	.922	.056 (.047, .064)
Six-factor ESEM (Time 3)	104.355*	72	.987	.968	.035 (.019, .050)
Bifactor CFA (Time 3)	276.823*	133	.941	.924	.055 (.046, .064)
Bifactor ESEM (Time 3)	67.866	59	.996	.989	.020 (.000, .040)
Predictors					
Six-factor CFA (Time 1)	1207.157*	237	.844	.818	.081 (.076, .085)
Six-factor ESEM (Time 1)	451.857*	147	.951	.908	.058 (.052, .064)
Six-factor CFA (Time 2)	898.290*	237	.859	.836	.078 (.073, .083)
Six-factor ESEM (Time 2)	361.850*	147	.954	.914	.056 (.046, .064)
Six-factor CFA (Time 3)	810.751 *	237	.861	.839	.081 (.075, .087)
Six-factor ESEM (Time 3)	285.882*	147	.966	.937	.051 (.042, .059)
Outcomes					
Six-factor CFA (Time 1)	791.396*	362	.942	.935	.044 (.040, .048)
Six-factor CFA (Time 2)	767.697*	362	.923	.914	.050 (.045, .055)
Six-factor CFA (Time 3)	676.458*	362	.941	.934	.049 (.044, .055)

Note. * $p < .01$; CFA: Confirmatory factor analysis; ESEM: Exploratory structural equation modeling; 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; 90% CI: 90% confidence interval of the RMSEA.

Table S2

Standardized Parameter Estimates from the Time 1 Measurement Models of Need Fulfillment

	CFA		ESEM							B-CFA			B-ESEM						
	F (λ)	δ	AS (λ)	CS (λ)	RS (λ)	AF (λ)	CF (λ)	RF (λ)	δ	G (λ)	S (λ)	δ	NF (λ)	AS (λ)	CS (λ)	RS (λ)	AF (λ)	CF (λ)	RF (λ)	δ
Autonomy satisfaction (AS)																				
Item 1	.645**	.584	**.141**	.219**	.356**	-.058	-.025	-.131*	.528	.681**	.073	.531	**.625****	**.065**	.161**	.218**	.029	.031	-.047	.528
Item 2	.636**	.595	**.455****	.103	.149*	-.080	-.024	.026	.599	.527**	.844**	.010	**.498****	**.393***	.103	.101	-.121	.011	.022	.561
Item 3	.721**	.480	**.827****	.013	-.019	-.092	-.065	.075	.210	.576**	.282**	.589	**.627****	**.518**	.009	-.102*	-.228**	.042	.172*	.245
ω	.707		.602								.560			.417						
Competence satisfaction (CS)																				
Item 1	.618**	.618	.007	**.609****	.056	-.122*	.062	.072	.606	.376**	.482**	.626	**.301****	.145	**.541****	.143	-.082	-.029	-.033	.567
Item 2	.829**	.313	-.049	**.731****	.148	-.039	-.135**	.080	.306	.554**	.589**	.347	**.508****	.014	**.629****	.142	.027	-.128**	.022	.309
Item 3	.744**	.446	.051	**.788****	-.109	.070	-.001	-.041	.416	.383**	.673**	.400	**.446****	-.093	**.652****	-.170	.122	.048	.103	.310
Item 4	.733**	.463	.079	**.783****	-.137*	.052	.043	-.091	.420	.400**	.640**	.430	**.398****	.046	**.625****	-.071	.065	.016	-.015	.439
ω	.823			.829							.759				.787					
Relatedness satisfaction (RS)																				
Item 1	.857**	.266	.171*	.019	**.537****	.040	-.006	-.303*	.317	.704**	.431**	.319	**.720****	.024	-.018	**.331****	.136**	.095*	-.152**	.320
Item 2	.759**	.423	.189	-.052	**.613****	.013	-.041	-.121	.403	.632**	.462**	.387	**.685****	.005	-.076	**.351****	.124**	.101	.013	.376
Item 3	.520**	.730	-.082	.064	**.687****	-.032	-.010	.115	.588	.395**	.385**	.696	**.379****	-.017	.090*	**.489****	.106	.036	.001	.596
ω	.763				.721						.538					.515				
Autonomy frustration (AF)																				
Item 1	.771**	.405	.069	-.068*	-.033	**.765****	.011	.056	.391	-.541**	.538**	.418	**-.519****	-.032	-.014	.007	**.576****	.090*	.049	.388
Item 2	.880**	.226	-.008	-.010	.027	**.875****	.035	-.025	.213	-.521**	.743**	.176	**-.523****	-.110*	.037	.067	**.690****	.116**	-.014	.219
Item 3	.743**	.448	-.215**	.087*	.076	**.634****	-.017	.048	.425	-.439**	.582**	.469	**-.497****	-.132	.142**	.170**	**.529****	-.009	-.073	.402
ω	.842					.834					.766						.762			
Competence frustration (CF)																				
Item 1	.822**	.325	-.032	-.109**	.103*	-.001	**.704****	.135*	.354	-.600**	.521**	.369	**-.559****	-.045	-.116**	.059	.080	**.557****	.138**	.333
Item 2	.773**	.402	-.022	.019	-.050	-.109**	**.929****	-.111**	.288	-.507**	.656**	.313	**-.520****	.013	-.042	.004	.004	**.642****	-.043	.314
Item 3	.743**	.448	.016	.077*	.026	.162*	**.661****	.062	.437	-.526**	.509**	.465	**-.555****	.095	.077	.102	.167**	**.479****	-.013	.409
ω	.823						.830				.713							.727		
Relatedness frustration (RF)																				
Item 1	.725**	.475	-.047	.004	-.078	.032	.038	**.634****	.467	-.589**	.373**	.514	**-.617****	.096	.083	-.012	-.038	-.017	**.357****	.474
Item 2	.667**	.555	.038	-.010	-.199**	.084	.121*	**.422****	.576	-.583**	.248**	.599	**-.571****	.103	.043	-.109	-.009	.060	**.256****	.580
Item 3	.710**	.497	.068	-.043	.016	.051	.045	**.727****	.432	-.540**	.641**	.298	**-.528****	.056	.021	-.022	-.006	.056	**.609****	.343
ω	.743							.683		.927	.530		.929						.517	

Note. *p < .05; **p < .01; CFA: confirmatory factor analysis; ESEM: exploratory structural equation modeling; NF: global need fulfillment; λ: Factor loading; δ: Item uniqueness; ω: model-based composite reliability; Target factor loadings are in bold.

Table S3

Standardized Parameter Estimates from the Time 2 Measurement Models of Need Fulfillment

	CFA		ESEM							B-CFA			B-ESEM						
	F (λ)	δ	AS (λ)	CS (λ)	RS (λ)	AF (λ)	CF (λ)	RF (λ)	δ	G (λ)	S (λ)	δ	NF (λ)	AS (λ)	CS (λ)	RS (λ)	AF (λ)	CF (λ)	RF (λ)	δ
Autonomy satisfaction (AS)																				
Item 1	.787**	.381	**.319****	.069	.351**	-.026	-.118*	-.134*	.386	-.777**	.095*	.388	**.694****	**.218****	.065	.279**	-.011	-.054	-.114*	.373
Item 2	.649**	.579	**.787****	-.069	.077	.058	-.092	.097	.412	-.536**	.837**	.013	**.561****	**.480****	-.007	.051	-.056	-.024	.137**	.430
Item 3	.647**	.582	**.686****	.110	-.129	-.151	.069	-.018	.407	-.545**	.312**	.605	**.587****	**.439****	.084	-.144*	-.172**	.074	.101	.390
ω	.707		.602								.560			.417						
Competence satisfaction (CS)																				
Item 1	.569**	.676	.101	**.512****	.079	-.062	.031	.095	.661	-.389**	.403**	.686	**.440****	.005	**.372****	-.007	.007	.048	.161**	.640
Item 2	.839**	.296	-.126*	**.843****	.063	-.036	-.063	.016	.281	-.512**	.656**	.308	**.529****	-.075	**.650****	.026	.038	-.074*	.041	.282
Item 3	.804**	.353	-.036	**.839****	-.023	.040	-.001	-.031	.341	-.444**	.695**	.320	**.452****	.009	**.672****	.008	.057	-.051	-.011	.338
Item 4	.752**	.435	.137	**.720****	-.082	.058	-.007	-.024	.427	-.458**	.593**	.439	**.445****	.147*	**.605****	-.022	.023	-.059	-.014	.410
ω	.823			.829							.759				.787					
Relatedness satisfaction (RS)																				
Item 1	.861**	.259	.146*	.033	**.495****	-.031	-.080	-.253**	.311	-.774**	.285**	.319	**.731****	.039	-.015	**.333****	.065*	.021	-.181**	.315
Item 2	.750**	.437	.093	.067	**.582****	-.061	.086*	-.186	.401	-.649**	.452**	.374	**.664****	-.041	-.030	**.370****	.096*	.175**	-.094	.371
Item 3	.464**	.785	.018	.041	**.659****	.021	-.018	.173**	.641	-.349**	.445**	.680	**.331****	.050	.047	**.484****	.099*	.022	.020	.641
ω	.763				.721						.538					.515				
Autonomy frustration (AF)																				
Item 1	.784**	.385	-.114	.083*	.025	**.646****	.092*	.059	.409	.538**	.520**	.441	**-.556****	-.126*	.101**	.093	**.449****	.093*	.023	.445
Item 2	.866**	.249	.069	.004	-.078	**.986****	-.040	-.081	.172	.529**	.766**	.134	**-.527****	-.071*	.024	-.043	**.840****	.052	.000	.007
Item 3	.707**	.500	-.058	-.080	.101	**.635****	.022	.045	.492	.471**	.500**	.528	**-.575****	.027	.034	.244**	**.407****	-.017	-.105	.431
ω	.842					.834					.766						.762			
Competence frustration (CF)																				
Item 1	.824**	.321	-.010	-.075	.009	.050	**.675****	.102*	.361	.628**	.489**	.367	**-.623****	.003	-.093*	.027	.066*	**.479****	.071	.363
Item 2	.758**	.425	-.007	-.014	.034	-.059	**.911****	-.098	.291	.486**	.685**	.295	**-.506****	-.020	-.094**	.036	.030	**.663****	-.044	.291
Item 3	.760**	.423	-.062	.001	.019	.105	**.622****	.070	.440	.587**	.460**	.443	**-.645****	.053	.018	.113*	.068	**.401****	-.038	.401
ω	.823						.830				.713							.727		
Relatedness frustration (RF)																				
Item 1	.787**	.381	-.078	-.061	-.038	-.020	-.063	**.759****	.354	.627**	.460**	.395	**-.619****	.057	.032	-.056	-.060	-.103**	**.470****	.375
Item 2	.654**	.572	.049	-.026	-.213*	.114	.157*	**.360****	.577	.609**	.198**	.589	**-.574****	.074	.027	-.131*	.012	.068	**.249****	.581
Item 3	.810**	.344	.031	.030	.001	.019	.081	**.821****	.285	.620**	.617**	.234	**-.592****	.063	.077	-.043	-.012	.033	**.630****	.240
ω	.743							.683		.927	.530		.929						.517	

Note. *p < .05; **p < .01; CFA: confirmatory factor analysis; ESEM: exploratory structural equation modeling; NF: global need fulfillment; λ: Factor loading; δ: Item uniqueness; ω: model-based composite reliability; Target factor loadings are in bold.

Table S4

Standardized Parameter Estimates from the Time 3 Measurement Models of Need Fulfillment

	CFA		ESEM							B-CFA			B-ESEM						
	F (λ)	δ	AS (λ)	CS (λ)	RS (λ)	AF (λ)	CF (λ)	RF (λ)	δ	G (λ)	S (λ)	δ	NF (λ)	AS (λ)	CS (λ)	RS (λ)	AF (λ)	CF (λ)	RF (λ)	δ
Autonomy satisfaction (AS)																				
Item 1	.830**	.311	**.117**	.155**	.411**	-.174**	-.124*	-.191**	.324	.861**	-.031	.257	**.759****	**.113**	.075	.246**	-.079*	-.023	-.112*	.326
Item 2	.588**	.654	**.220**	.173**	.253**	-.244**	-.066	.096	.619	.547**	.262**	.633	**.524****	**.487***	.097	.034	-.076	.032	.078	.465
Item 3	.679**	.540	**.122**	.130*	.216**	-.427**	-.125	.084	.499	.639**	.763**	.010	**.638****	**.396***	.003	-.035	-.205**	.004	.119*	.379
ω	.745		.127								.553			.459						
Competence satisfaction (CS)																				
Item 1	.636**	.596	.401**	**.623****	-.053	.070	-.011	.066	.411	.408**	.474**	.608	**.286****	.180**	**.740****	.223**	-.116*	-.122**	-.048	.258
Item 2	.823**	.322	.203*	**.777****	-.045	.049	-.012	-.103	.263	.578**	.569**	.342	**.576****	.077	**.596****	.009	.036	-.023	-.072	.300
Item 3	.840**	.294	-.061	**.811****	.020	.041	-.054	.031	.340	.528**	.668**	.274	**.604****	-.051	**.530****	-.090	.119*	.016	.101	.319
Item 4	.841**	.293	-.356**	**.997****	.003	-.046	.037	.010	.067	.538**	.658**	.278	**.692****	-.186*	**.512****	-.199**	.141**	.096	.154**	.132
ω	.868			.905							.789				.849					
Relatedness satisfaction (RS)																				
Item 1	.859**	.263	.139	.061	**.630****	-.016	.018	-.267**	.290	.731**	.337**	.352	**.687****	.084	.016	**.437****	.042	.083	-.174**	.291
Item 2	.778**	.395	.064	.053	**.688****	.023	-.021	-.124*	.379	.644**	.556**	.275	**.640****	.051	-.010	**.439****	.089	.085	-.047	.377
Item 3	.501**	.749	.021	.078	**.580****	.134*	-.061	.083	.668	.389**	.385**	.701	**.397****	-.068	.044	**.418****	.119*	.042	.121*	.631
ω	.765				.729						.552					.563				
Autonomy frustration (AF)																				
Item 1	.766**	.413	-.054	-.012	.181**	**.712****	.112	.105*	.411	-.487**	.557**	.452	**-.477****	-.021	.009	.097*	**.588****	.119**	.045	.401
Item 2	.862**	.257	-.055	.004	.071	**.864****	-.016	.059	.265	-.530**	.737**	.175	**-.533****	-.057	.055	.055	**.686****	.003	-.019	.235
Item 3	.714**	.490	-.045	-.014	-.073	**.703****	.004	-.045	.453	-.506**	.481**	.513	**-.512****	-.156*	.058	.026	**.485****	-.021	-.100	.464
ω	.825					.821					.734						.738			
Competence frustration (CF)																				
Item 1	.786**	.382	.006	-.066	.095	-.047	**.763****	.108	.369	-.549**	.575**	.368	**-.586****	.026	-.053	.091	.002	**.514****	.109	.369
Item 2	.763**	.418	.026	.020	-.031	-.058	**.906****	-.128**	.324	-.526**	.594**	.371	**-.578****	.025	.000	.024	.006	**.578****	-.092*	.322
Item 3	.848**	.282	-.055	-.009	.087	.071	**.747****	.116*	.318	-.625**	.532**	.326	**-.619****	-.026	-.038	.059	.109**	**.516****	.119**	.319
ω	.842						.852				.731							.719		
Relatedness frustration (RF)																				
Item 1	.785**	.384	.032	-.041	-.039	.066	-.014	**.778****	.327	-.556**	.664**	.251	**-.557****	.087	.045	-.040	-.004	.012	**.573****	.350
Item 2	.636**	.595	.076	.093	-.350**	.111	.263**	**.239****	.535	-.607**	.167*	.604	**-.612****	.077	.147**	-.183*	.032	.113	**.131**	.534
Item 3	.760**	.422	-.017	-.043	.011	-.018	.060	**.778****	.331	-.536**	.553**	.408	**-.527****	.020	.014	.001	-.058	.066	**.644****	.300
ω	.772							.730		.942	.603		.945						.605	

Note. $*p < .05$; $**p < .01$; CFA: confirmatory factor analysis; ESEM: exploratory structural equation modeling; NF: global need fulfillment; λ: Factor loading; δ: Item uniqueness; ω: model-based composite reliability; Target factor loadings are in bold.

Table S5

Latent Factor Correlations from the First-order CFA (below the diagonal) and ESEM (above the diagonal) Solutions for Need Fulfillment

	Time 1					
	AS	CS	RS	AF	CF	RF
Autonomy satisfaction (AS)	—	.376**	.386**	-.624**	-.389**	-.334**
Competence satisfaction (CS)	.605**	—	.421**	-.234**	-.413**	-.302**
Relatedness satisfaction (RS)	.743**	.483**	—	-.218**	-.352**	-.540**
Autonomy frustration (AF)	-.726**	-.279**	-.360**	—	.544**	.372**
Competence frustration (CF)	-.587**	-.472**	-.466**	.586**	—	.487**
Relatedness frustration (RF)	-.590**	-.396**	-.784**	.473**	.620**	—
	Time 2					
	AS	CS	RS	AF	CF	RF
Autonomy satisfaction (AS)	—	.504**	.459**	-.632**	-.499**	-.400**
Competence satisfaction (CS)	.602**	—	.381**	-.332**	-.505**	-.336**
Relatedness satisfaction (RS)	.820**	.507**	—	-.254**	-.363**	-.587**
Autonomy frustration (AF)	-.690**	-.331**	-.456**	—	.539**	.418**
Competence frustration (CF)	-.676**	-.560**	-.546**	.605**	—	.456**
Relatedness frustration (RF)	-.649**	-.403**	-.814**	.475**	.570**	—
	Time 3					
	AS	CS	RS	AF	CF	RF
Autonomy satisfaction (AS)	—	.249	.144	-.178	-.127	-.133
Competence satisfaction (CS)	.679**	—	.460**	-.360**	-.531**	-.333**
Relatedness satisfaction (RS)	.854**	.548**	—	-.395**	-.435**	-.403**
Autonomy frustration (AF)	-.711**	-.355**	-.408**	—	.525**	.279**
Competence frustration (CF)	-.688**	-.547**	-.495**	.547**	—	.488**
Relatedness frustration (RF)	-.675**	-.444**	-.715**	.441**	.642**	—

Note. *$p < .05$; **$p < .01$; CFA: Confirmatory factor analysis; ESEM: Exploratory structural equation modeling.

Table S6

Goodness-of-Fit Statistics for the Longitudinal Measurement Invariance Measurement Models

	χ^2	df	CFI	TLI	RMSEA (90% CI)	$\Delta\chi^2$	Δdf	ΔCFI	ΔTLI	ΔRMSEA
Need Fulfillment										
Configural invariance	1366.572*	1056	.975	.961	.021 (.017, .024)					
Weak invariance	1546.171*	1224	.974	.966	.020 (.016, .023)	189.264	168	-.001	.005	-.001
Strong invariance	1584.325*	1248	.972	.965	.020 (.017, .023)	42.689	24	-.002	-.001	.000
Strict invariance	1619.461*	1286	.973	.966	.019 (.016, .022)	42.358	38	.001	.001	-.001
Latent variance-covariance invariance	1651.456*	1342	.975	.970	.018 (.015, .021)	44.541	56	.002	.004	-.001
Latent mean invariance	1691.400*	1356	.972	.968	.019 (.016, .022)	43.632*	14	-.003	-.002	.001
Predictors										
Configural invariance	3069.585*	1989	.945	.929	.028 (.026, .030)					
Weak invariance	3270.194*	2205	.945	.937	.026 (.024, .028)	221.814	216	.000	.008	-.002
Strong invariance	3328.255*	2241	.944	.937	.026 (.025, .028)	58.410	36	-.001	.000	.000
Strict invariance	3365.681*	2289	.945	.938	.026 (.024, .028)	49.491	48	.001	.001	.000
Latent variance-covariance invariance	3425.517*	2331	.944	.939	.026 (.024, .028)	59.868	42	-.001	.001	.000
Latent mean invariance	3468.159	2343	.942	.937	.026 (.024, .028)	45.625*	12	-.002	-.002	.000
Outcomes										
Configural invariance	5342.421*	3414	.920	.912	.029 (.027, .030)					
Weak invariance	5395.920*	3460	.920	.913	.029 (.027, .030)	55.806	46	.000	.001	.000
Strong invariance	5464.093*	3506	.919	.913	.029 (.027, .030)	67.802	46	-.001	.000	.000
Strict invariance	5560.062*	3564	.917	.913	.029 (.027, .030)	93.891*	58	-.002	.000	.000
Latent variance-covariance invariance	5613.994*	3606	.917	.914	.029 (.027, .030)	55.641	42	.000	.001	.000
Latent mean invariance	5652.464*	3618	.916	.913	.029 (.027, .030)	39.617*	12	-.001	-.001	.000

Note. * $p < .01$; Na: not applicable; CFA: Confirmatory factor analysis; ESEM: Exploratory structural equation modeling; 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; 90% CI: 90% confidence interval of the RMSEA; $\Delta\chi^2$: Robust (Satorra-Bentler) chi-square difference test (calculated from loglikelihood for greater precision); Δ: change in model fit in relation to the comparison model.

Table S7

Standardized Parameter Estimates from the Latent Mean Invariant Measurement Models of Need Fulfillment

	NF (λ)	AS (λ)	CS (λ)	RS (λ)	AF (λ)	CF (λ)	RF (λ)	δ
Autonomy satisfaction (AS)								
Item 1	**.688****	**.116****	.050	.229**	-.005	-.020	-.083	.451
Item 2	**.526****	**.400****	.012	.070	-.113**	-.004	.079	.539
Item 3	**.583****	**.486****	.013	-.048	-.260**	.000	.086**	.346
ω		.429						
Competence satisfaction (CS)								
Item 1	**.446****	.023	**.405****	.048	.024	.026	.214**	.587
Item 2	**.618****	-.046	**.530****	.046	.094**	-.068*	.125*	.304
Item 3	**.509****	.032	**.615****	-.049	.126**	-.030	-.013	.342
Item 4	**.520****	.067	**.568****	-.054	.093**	-.019	.002	.391
ω			.734					
Relatedness satisfaction (RS)								
Item 1	**.725****	.035	-.099**	**.350****	.087**	.057*	-.123**	.315
Item 2	**.625****	.090*	-.082*	**.392****	.070**	.068*	-.113	.419
Item 3	**.343****	-.018	.062*	**.541****	.062**	.003	.016	.581
ω				.556				
Autonomy frustration (AF)								
Item 1	**-.508****	-.035	.030	.062	**.545****	.108**	.049	.424
Item 2	**-.517****	-.039	.032	.029	**.733****	.076**	-.026	.185
Item 3	**-.458****	-.165**	.050	.063	**.529****	.056*	-.004	.474
ω					.751			
Competence frustration (CF)								
Item 1	**-.598****	.043	-.034	.064*	.053*	**.534****	.038	.346
Item 2	**-.484****	-.033	-.050*	-.031	.052*	**.659****	.013	.324
Item 3	**-.553****	-.004	.054	.045	.146**	**.511****	.027	.405
ω						.730		
Relatedness frustration (RF)								
Item 1	**-.684****	.192**	.210**	.055	-.079**	-.053	**.211**	.394
Item 2	**-.541****	.035	.054	-.158*	.043	.119**	**.432****	.476
Item 3	**-.671****	.268**	.226**	.102	-.103*	-.005	**.221**	.357
ω	.936						.375	

Note. *$p < .05$; **$p < .01$; NF: global need fulfillment; λ: Factor loading; δ: Item uniqueness; ω: model-based composite reliability; Target factor loadings are in bold.

Table S8

Standardized Parameter Estimates from the Time 1 Measurement Models of Job Demands and Resources

	CFA							ESEM						
	CD (λ)	ED (λ)	PD (λ)	ER (λ)	PR (λ)	CR (λ)	δ	CD (λ)	ED (λ)	PD (λ)	ER (λ)	PR (λ)	CR (λ)	δ
Cognitive demands (CD)														
Item 1	.638**						.593	**.688****	-.127**	.110**	-.009	-.050	.036	.532
Item 2	.700**						.509	**.698****	.076*	-.039	-.011	-.027	-.041	.483
Item 3	.794**						.370	**.742****	.089*	.002	-.080*	-.030	-.005	.409
Item 4	.819**						.330	**.763****	.143**	.021	-.007	-.050	.048	.336
ω	.829							.826						
Emotional demands (ED)														
Item 1		.580**					.664	.034	**.568****	.010	.017	-.031	-.094*	.631
Item 2		.874**					.236	.071	**.843****	-.007	.030	.012	-.022	.260
Item 3		.804**					.354	.121**	**.737****	.070*	.061	-.029	.068*	.354
Item 4		.549**					.698	-.093**	**.581****	.080*	-.150**	.095	-.016	.622
ω		.801						.800						
Physical demands (PD)														
Item 1			.767**				.412	.024	.215**	**.668****	.033	-.022	-.032	.372
Item 2			.857**				.265	-.008	-.099**	**.942****	-.062**	.104**	.028	.213
Item 3			.929**				.136	-.006	-.029	**.931****	.020	-.077**	.041*	.140
Item 4			.709**				.497	.017	.061	**.669****	.063	-.024	-.022	.498
ω			.890							.894				
Emotional resources (ER)														
Item 1				.597**			.644	.127**	-.162**	.031	**.522****	.033	.057	.606
Item 2				.814**			.338	-.025	-.032	.018	**.829****	.001	-.036	.327
Item 3				.893**			.203	-.100**	.052	.012	**.910****	-.013	.025	.207
Item 4				.906**			.179	-.049*	.058*	-.026	**.942****	-.043	.011	.173
ω				.883							.887			
Physical resources (PR)														
Item 1					.692**		.521	-.058	.059	-.146**	.060	**.648****	.045	.458
Item 2					.595**		.646	-.011	.000	-.012	-.079	**.796****	-.038	.442
Item 3					.769**		.408	-.136**	.044	-.082**	.028	**.251****	.610**	.333
Item 4					.506**		.744	-.053	-.092*	.113**	.072	**.580****	-.022	.623
ω					.739							.736		
Cognitive resources (CR)														
Item 1						.772**	.404	-.025	-.047*	-.062**	.039	-.019	**.953****	.025
Item 2						.718**	.484	-.059	.002	.011	.018	.298**	**.464****	.555
Item 3						.582**	.662	.135**	-.041	-.043	.308**	.316**	**.108***	.593
Item 4						.431**	.814	.395**	-.088	-.016	.171**	.279**	**.106***	.612
ω						.726							.598	

Note. *$p < .05$; **$p < .01$; CFA: confirmatory factor analysis; ESEM: exploratory structural equation modeling; λ: Factor loading; δ: Item uniqueness; ω: model-based composite reliability; Target factor loadings are in bold.

Table S9

Standardized Parameter Estimates from the Time 2 Measurement Models of Job Demands and Resources

	CFA							ESEM						
	CD (λ)	ED (λ)	PD (λ)	ER (λ)	PR (λ)	CR (λ)	δ	CD (λ)	ED (λ)	PD (λ)	ER (λ)	PR (λ)	CR (λ)	δ
Cognitive demands (CD)														
Item 1	.708**						.499	**.781****	-.100*	.045	-.086*	.030	.018	.459
Item 2	.716**						.488	**.633****	.142**	.006	.015	.039	.011	.482
Item 3	.830**						.312	**.819****	-.004	.038	-.029	-.055	.003	.318
Item 4	.834**						.305	**.787****	.076	-.013	.039	-.120**	-.011	.299
ω	.856							.854						
Emotional demands (ED)														
Item 1		.598**					.643	.111	**.505****	.055	-.050	-.047	.035	.634
Item 2		.897**					.196	.045	**.872****	-.033	.014	.029	-.049	.214
Item 3		.802**					.357	-.002	**.814****	.030	.048	-.012	.033	.334
Item 4		.456**					.792	-.075	**.491****	.054	-.115*	.063	.002	.756
ω		.792						.788						
Physical demands (PD)														
Item 1			.771**				.405	.049	.215**	**.688****	.022	-.070	.055	.344
Item 2			.869**				.245	.001	-.066*	**.911****	.010	.121**	-.058*	.212
Item 3			.901**				.188	-.006	.002	**.900****	.021	-.023	.014	.194
Item 4			.694**				.518	.020	-.071	**.721****	-.001	.051	-.014	.510
ω			.885					.892						
Emotional resources (ER)														
Item 1				.662**			.561	.091	-.103	.047	**.585****	.103	.006	.546
Item 2				.880**			.225	-.021	.018	.016	**.869****	.022	.003	.236
Item 3				.890**			.208	-.036	.004	-.043	**.915****	-.046	.010	.193
Item 4				.864**			.253	-.047	-.008	.024	**.891****	-.056	.034	.246
ω				.897				.897						
Physical resources (PR)														
Item 1					.655**		.571	-.045	.009	-.082*	.036	**.787****	-.042	.348
Item 2					.585**		.658	-.048	.014	.067*	-.103*	**.843****	-.024	.404
Item 3					.802**		.357	-.085	-.046	-.045	.009	**.267****	.633**	.300
Item 4					.580**		.664	.031	-.054	.102*	.222**	**.442****	.099	.599
ω					.753							.768		
Cognitive resources (CR)														
Item 1						.811**	.342	-.055	-.048	-.054	.077**	.034	**.880****	.068
Item 2						.726**	.474	-.042	-.019	-.116**	.010	.300**	**.439****	.523
Item 3						.532**	.717	.065	.046	-.090	.344**	.277**	**.088**	.632
Item 4						.373**	.861	.285**	-.015	-.125**	.127	.320**	**.037**	.715
ω						.714							.518	

Note. *$p < .05$; **$p < .01$; CFA: confirmatory factor analysis; ESEM: exploratory structural equation modeling; λ: Factor loading; δ: Item uniqueness; ω: model-based composite reliability; Target factor loadings are in bold.

Table S10

Standardized Parameter Estimates from the Time 3 Measurement Models of Job Demands and Resources

	CFA							ESEM						
	CD (λ)	ED (λ)	PD (λ)	ER (λ)	PR (λ)	CR (λ)	δ	CD (λ)	ED (λ)	PD (λ)	ER (λ)	PR (λ)	CR (λ)	δ
Cognitive demands (CD)														
Item 1	.702**						.507	**.687****	.007	.038	.036	-.030	-.021	.496
Item 2	.740**						.452	**.705****	.040	.045	-.032	.018	-.057	.442
Item 3	.839**						.297	**.730****	.117*	.085*	-.002	-.004	-.031	.318
Item 4	.809**						.346	**.799****	.089	-.032	-.007	-.058	.025	.325
ω	.856													
Emotional demands (ED)														
Item 1		.564**					.681	.037	**.542****	.043	-.039	.049	.001	.666
Item 2		.893**					.202	.075	**.848****	.010	-.029	.106	-.032	.219
Item 3		.785**					.385	.143**	**.728****	-.006	.110**	-.051	.032	.379
Item 4		.512**					.738	-.129**	**.625****	-.020	-.018	.030	.029	.676
ω		.791												
Physical demands (PD)														
Item 1			.848**				.281	.025	.130**	**.794****	.014	.034	.013	.271
Item 2			.886**				.215	-.053	-.041	**.937****	.000	.088	-.025	.183
Item 3			.939**				.118	.055	-.043	**.950****	.024	-.129**	.099**	.102
Item 4			.729**				.469	.010	-.026	**.746****	.015	.072	-.008	.463
ω			.914											
Emotional resources (ER)														
Item 1				.646**			.583	.214**	-.074	.032	**.604****	.006	-.016	.529
Item 2				.843**			.289	.054	-.061	.076*	**.804****	.065	-.016	.263
Item 3				.921**			.152	-.074	.034	-.021	**.981****	-.095	.041	.150
Item 4				.927**			.141	-.116**	.051	-.040	**.998****	-.079	-.003	.126
ω				.905										
Physical resources (PR)														
Item 1					.624**		.610	-.048	.028	-.103*	.100	**.472****	.130	.626
Item 2					.646**		.582	.032	-.003	.022	-.020	**.685****	.063	.509
Item 3					.750**		.437	.031	-.046	-.099**	.010	**.260****	.706**	.227
Item 4					.650**		.578	-.008	-.020	-.001	.129	**.690****	-.032	.418
ω					.764									
Cognitive resources (CR)														
Item 1						.747**	.443	-.036	-.064	-.091*	.093**	.163	**.776****	.140
Item 2						.722**	.479	-.105	-.071	.008	.070	.431**	**.387****	.464
Item 3						.596**	.644	-.003	-.022	-.033	.326**	.513**	**-.098**	.462
Item 4						.450**	.797	.382**	-.136*	-.099*	.179**	.370**	**-.073**	.542
ω						.728								

Note. **p* < .05; ***p* < .01; CFA: confirmatory factor analysis; ESEM: exploratory structural equation modeling; λ: Factor loading; δ: Item uniqueness; ω: model-based composite reliability; Target factor loadings are in bold.

Table S11

Latent Factor Correlations from the First-order CFA (below the diagonal) and ESEM (above the diagonal) Solutions for Job Demands and Resources

	Time 1					
	CD	ED	PD	ER	PR	CR
Cognitive demands (CD)	—	.293**	.277**	.171**	.061	-.174**
Emotional demands (ED)	.477**	—	.362**	-.175**	-.224**	-.112**
Physical demands (PD)	.331**	.401**	—	-.058	-.235**	-.269**
Emotional resources (ER)	.043	-.126*	-.059	—	.496**	.296**
Physical resources (PR)	-.210**	-.259**	-.381**	.498**	—	.450**
Cognitive resources (CR)	-.157	-.208**	-.324**	.526**	.899**	—
	Time 2					
	CD	ED	PD	ER	PR	CR
Cognitive demands (CD)	—	.523**	.282**	.122*	.036	-.226**
Emotional demands (ED)	.598**	—	.356**	-.144*	-.179**	-.159**
Physical demands (PD)	.340**	.370**	—	-.126*	-.208**	-.283**
Emotional resources (ER)	.039	-.146**	-.107	—	.511**	.312**
Physical resources (PR)	-.223*	-.276**	-.296**	.553**	—	.429**
Cognitive resources (CR)	-.275**	-.271**	-.402**	.542**	.935**	—
	Time 3					
	CD	ED	PD	ER	PR	CR
Cognitive demands (CD)	—	.428**	.295**	.192**	.146*	-.146**
Emotional demands (ED)	.602**	—	.401**	-.202**	-.191**	-.176**
Physical demands (PD)	.382**	.407**	—	-.119*	-.161**	-.275**
Emotional resources (ER)	.085	-.149*	-.123*	—	.562**	.141
Physical resources (PR)	-.043	-.201**	-.301**	.523**	—	.351**
Cognitive resources (CR)	-.127	-.303**	-.353**	.588**	.990**	—

Note. *$p < .05$; **$p < .01$; CFA: Confirmatory factor analysis; ESEM: Exploratory structural equation modeling.

Table S12

Standardized Parameter Estimates from the Latent Mean Invariant Measurement Models of Job Demands and Resources

	CD (λ)	ED (λ)	PD (λ)	ER (λ)	PR (λ)	CR (λ)	δ
Cognitive demands (CD)							
Item 1	**.719****	-.069*	.071**	-.039	-.012	.028	.504
Item 2	**.688****	.088**	.004	-.022	.002	.000	.470
Item 3	**.780****	.054	.036	-.064**	-.048	.024	.350
Item 4	**.770****	.118**	-.006	-.005	-.083**	.038	.330
ω	.841						
Emotional demands (ED)							
Item 1	.052	**.547****	.016	-.028	-.007	-.048	.646
Item 2	.042	**.876****	-.021	.029	.026	-.023	.225
Item 3	.070*	**.764****	.029	.078**	-.041	.057*	.361
Item 4	-.088**	**.547****	.052	-.108**	.056	-.002	.691
ω		.795					
Physical demands (PD)							
Item 1	.022	.197**	**.700****	.025	-.019	-.005	.343
Item 2	-.009	-.085**	**.930****	-.028	.088**	-.013	.212
Item 3	.002	-.030	**.929****	.009	-.074**	.048**	.150
Item 4	.000	.000	**.710****	.030	.013	.002	.502
ω			.899				
Emotional resources (ER)							
Item 1	.159**	-.137**	.056*	**.535****	.054	.029	.593
Item 2	.020**	-.030	.038*	**.828****	.026	-.019	.291
Item 3	-.059	.028	-.014	**.924****	-.031	.010	.190
Item 4	-.053	.029	-.012	**.935****	-.048*	.007	.186
ω				.892			
Physical resources (PR)							
Item 1	-.032	.026	-.103**	.050	**.682****	-.008	.471
Item 2	-.003	.003	.038	-.080**	**.834****	-.074*	.424
Item 3	-.075**	-.008	-.067**	.023	**.278****	.608**	.320
Item 4	.018	-.075*	.077*	.145**	**.555****	-.001	.582
ω					.754		
Cognitive resources (CR)							
Item 1	-.027	-.053**	-.061**	.066**	.055*	**.893****	.046
Item 2	-.047	-.014	-.029	.041	.355**	**.409****	.523
Item 3	.111**	-.023	-.051	.324**	.349**	**.041**	.596
Item 4	-.370**	-.084*	-.062*	.157**	.327**	**.031**	.640
ω						.511	

Note. **p* < .05; ***p* < .01; λ: Factor loading; δ: Item uniqueness; ω: model-based composite reliability; Target factor loadings are in bold.

Table S13

Standardized Parameter Estimates from the Time-Specific and Latent Mean Invariant Measurement Models of the Outcomes

	Time 1		Time 2		Time 3		Latent mean invariant	
	Factor(λ)	δ	Factor(λ)	δ	Factor(λ)	δ	Factor(λ)	δ
Vigor								
Item 1	.710**	.496	.694**	.518	.731**	.465	.690**	.523
Item 2	.917**	.159	.921**	.152	.962**	.074	.927**	.141
Item 3	.951**	.095	.952**	.093	.969**	.061	.955**	.088
ω	.899		.896		.922		.898	
Dedication								
Item 1	.915**	.163	.920**	.153	.938**	.119	.921**	.151
Item 2	.943**	.111	.940**	.116	.965**	.069	.947**	.103
Item 3	.766**	.413	.769**	.409	.798**	.363	.774**	.401
ω	.909		.911		.930		.914	
Work satisfaction								
Item 1	.797**	.365	.842**	.290	.770**	.407	.805**	.351
Item 2	.718**	.485	.589**	.653	.621**	.614	.657**	.569
Item 3	.858**	.264	.879**	.227	.872**	.239	.867**	.248
Item 4	.828**	.315	.788**	.379	.838**	.298	.818**	.330
Item 5	.753**	.433	.757**	.427	.783**	.387	.760**	.422
ω	.894		.883		.886		.888	
Quality of care								
Item 1	.708**	.498	.636**	.595	.759**	.423	.708**	.499
Item 2	.814**	.337	.795**	.368	.775**	.399	.798**	.363
Item 3	.776**	.397	.671**	.549	.648**	.580	.710**	.496
Item 4	.708**	.499	.690**	.524	.795**	.368	.729**	.469
ω	.839		.793		.834		.826	
Distress								
Item 1	.592**	.650	.673**	.547	.553**	.694	.587**	.656
Item 2	.797**	.365	.849**	.278	.854**	.270	.826**	.317
Item 3	.560**	.686	.495**	.755	.610**	.627	.547**	.701
Item 4	.775**	.400	.757**	.427	.849**	.280	.795**	.368
Item 5	.834**	.305	.786**	.382	.846**	.285	.828**	.315
Item 6	.738**	.455	.758**	.426	.783**	.387	.750**	.437
ω	.866		.869		.888		.870	
Somatization								
Item 1	.447**	.800	.429**	.816	.520**	.729	.454**	.794
Item 2	.571**	.674	.560**	.687	.653**	.574	.578**	.666
Item 3	.526**	.724	.575**	.669	.611**	.627	.543**	.705
Item 4	.544**	.704	.537**	.711	.573**	.671	.549**	.698
Item 5	.602**	.638	.607**	.631	.650**	.577	.621**	.615
Item 6	.732**	.465	.746**	.443	.714**	.491	.730**	.467
Item 7	.623**	.612	.572**	.673	.575**	.670	.599**	.641
Item 8	.600**	.640	.608**	.630	.589**	.653	.594**	.647
ω	.804		.803		.827		.806	

Note. *$p < .05$; **$p < .01$; λ: Factor loading; δ: Item uniqueness; ω: model-based composite reliability.

Table S14

Correlations Among the Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. NF (T1)	—																		
2. AS (T1)	0	—																	
3. CS (T1)	0	0	—																
4. RS (T1)	0	0	0	—															
5. AF (T1)	0	0	0	0	—														
6. CF (T1)	0	0	0	0	0	—													
7. RF (T1)	0	0	0	0	0	0	—												
8. NF (T2)	.809**	-.068	.073	.129**	-.129**	.013	.042	—											
9. AS (T2)	.029	.488**	.318**	.176**	.052	.215**	.310**	0	—										
10. CS (T2)	.065	-.147**	.539**	-.008	.180**	-.112**	.368**	0	0	—									
11. RS (T2)	.153**	-.065	-.292**	.744**	.061	-.012	-.228**	0	0	0	—								
12. AF (T2)	-.054	.095*	.189**	.074	.498**	-.028	-.219**	0	0	0	0	—							
13. CF (T2)	-.245**	-.027	.100**	-.042	-.025	.591**	.154**	0	0	0	0	0	—						
14. RF (T2)	.053	.159**	-.156**	-.277**	-.366**	.085*	.455**	0	0	0	0	0	0	—					
15. NF (T3)	.698**	-.009	.080*	.165**	-.018	-.012	-.129**	.778**	-.023	.219**	.245**	.020	-.320**	-.105**	—				
16. AS (T3)	.061	.510**	.178**	.029	-.178**	.037	.415**	.062	.583**	-.145**	-.058	-.244**	.120**	.417**	0	—			
17. CS (T3)	.319**	-.111**	.318**	-.171**	.157**	-.032	.361**	.263**	.157**	.580**	-.202**	-.056	.149**	-.060	0	0	—		
18. RS (T3)	.271**	-.063	-.240**	.637**	.084*	.074	-.039	.361**	.048	-.235**	.628**	-.118**	.040	-.016	0	0	0	—	
19. AF (T3)	.003	.058	.054	.205**	.513**	-.104**	-.183**	-.036	.158**	.063	.225**	.760**	-.111**	-.176**	0	0	0	0	—

Note. *$p < .05$; **$p < .01$; NF: need fulfillment; AS: autonomy satisfaction; CS: competence satisfaction; RS: relatedness satisfaction; AF: autonomy frustration; CF: competence frustration; RF: relatedness frustration; CD: cognitive demands; ED: emotional demands; PD: physical demands; ER: emotional resources; PR: physical resources; CR: cognitive resources; VI: vigor; DE: dedication; WS: work satisfaction; QC: quality of care; DI: distress; SO: somatization; T: time. All variables are factor scores saved from the latent mean invariant measurement models with a mean of 0 and a standard deviation of 1.

Table S14 (continued 1)

Correlations Among the Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
20. CF (T3)	-.244**	-.047	.140**	.105**	.150**	.721**	-.027	-.082*	.114**	-.052	.136**	.047	.728**	-.031	0	0	0	0	0
21. RF (T3)	-.117**	-.062	-.210**	-.061	-.138**	.161**	.483**	.052	.039	-.019	.056	.102**	-.068	.515**	0	0	0	0	0
22. CD (T1)	.054	.013	.137**	.038	.099**	.124**	.132**	.072	.081*	.128**	.003	.089*	.092*	.054	.064	.047	.154**	.041	.093*
23. ED (T1)	-.360**	-.042	.033	.005	.164**	.140**	.090*	-.265**	.004	.090*	-.025	.095*	.125**	-.055	-.169**	-.078*	-.032	-.109**	.087*
24. PD (T1)	-.188**	-.052	.031	.064	.123**	.146**	.086*	-.133**	.001	.000	.008	.097*	.121**	.015	-.125**	-.012	-.027	-.008	.084*
25. ER (T1)	.594**	.097*	-.061	.293**	-.016	.035	-.057	.496**	.083*	-.034	.290**	-.014	-.103**	.017	.437**	.093*	.107**	.320**	.037
26. PR (T1)	.405**	.161**	.067	.089*	-.065	.011	.105**	.351**	.143**	.046	.050	.001	-.006	.084*	.269**	.176**	.208**	.100**	.004
27. CR (T1)	.266**	.145**	.049	.055	-.156**	-.028	.111**	.253**	.079*	.011	.006	-.060	-.032	.097*	.173**	.147**	.089*	.028	-.067
28. CD (T2)	.047	.023	.053	.069	.067	.066	.094*	.078*	.039	.090*	.068	.127**	.162**	.032	.054	.034	.140**	.078*	.138**
29. ED (T2)	-.310**	-.013	.011	.025	.104**	.069	.073	-.316**	-.052	.048	.016	.161**	.202**	.004	-.283**	-.076*	-.031	-.108**	.107**
30. PD (T2)	-.137**	-.027	-.004	.063	.090*	.097*	.082*	-.145**	-.064	-.007	.068	.148**	.170**	.051	-.168**	-.055	-.015	.012	.117**
31. ER (T2)	.513**	.038	.024	.238**	-.074	.044	-.011	.631**	.084*	-.024	.270**	-.048	.008	-.031	.505**	.115**	.121**	.361**	.016
32. PR (T2)	.336**	.079*	.142**	.056	-.032	.025	.136**	.415**	.181**	.100**	.017	-.022	.021	.066	.307**	.186**	.196**	.144**	-.009
33. CR (T2)	.213**	.087*	.049	-.006	-.105**	-.041	.058	.268**	.112**	.010	-.020	-.077*	-.031	.048	.204**	.140**	.066	.039	-.060
34. CD (T3)	.147**	-.006	.043	.118**	.070	.096*	.114**	.168**	.057	.097*	.111**	.086*	.090*	.054	.148**	.048	.179**	.151**	.135**
35. ED (T3)	-.265**	-.076*	.010	.032	.142**	.091*	.111**	-.223**	-.007	.044	.025	.135**	.185**	.021	-.258**	-.074	.035	-.015	.158**
36. PD (T3)	-.056	-.041	-.026	.079*	.119**	.121**	.053	-.060	-.011	-.047	.088*	.152**	.127**	.063	-.100**	-.040	.025	.071	.151**
37. ER (T3)	.399**	.011	.008	.177**	.031	.041	-.077*	.492**	.040	.080*	.277**	-.039	-.082*	-.042	.625**	.119**	.066	.289**	.030
38. PR (T3)	.299**	.084*	.091*	.020	-.039	.019	.108**	.355**	.129**	.118**	.042	-.039	-.020	.071	.394**	.214**	.220**	.076*	-.011

Note. *$p < .05$; **$p < .01$; NF: need fulfillment; AS: autonomy satisfaction; CS: competence satisfaction; RS: relatedness satisfaction; AF: autonomy frustration; CF: competence frustration; RF: relatedness frustration; CD: cognitive demands; ED: emotional demands; PD: physical demands; ER: emotional resources; PR: physical resources; CR: cognitive resources; VI: vigor; DE: dedication; WS: work satisfaction; QC: quality of care; DI: distress; SO: somatization; T: time. All variables are factor scores saved from the latent mean invariant measurement models with a mean of 0 and a standard deviation of 1.

Table S14 (continued 2)

Correlations Among the Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
39. CR (T3)	.210**	.098*	.041	-.038	-.139**	-.039	.060	.227**	.062	.060	-.022	-.063	-.042	.110**	.249**	.163**	.084*	-.049	-.084*
40. VI (T1)	.547**	.199**	.126**	.160**	-.006	-.019	-.014	.474**	.163**	.041	.112**	.049	-.094*	-.022	.376**	.126**	.176**	.197**	.093*
41. DE (T1)	.527**	.246**	.117**	.153**	-.051	-.021	.062	.441**	.220**	.027	.116**	.005	-.067	.077*	.325**	.217**	.176**	.194**	.048
42. WS (T1)	.541**	.259**	.092*	.139**	-.077*	-.064	.115**	.470**	.223**	.034	.109**	.011	-.109**	.098*	.355**	.215**	.170**	.172**	.046
43. QC (T1)	.422**	.140**	.132**	.044	-.119**	-.062	.108**	.424**	.128**	.088*	.030	-.034	-.061	.088*	.339**	.170**	.149**	.099*	-.020
44. DI (T1)	-.590**	-.062	.020	-.016	.077*	.243**	.121**	-.489**	.023	.068	-.031	.007	.322**	.028	-.423**	-.014	-.093*	-.135**	-.006
45. SO (T1)	-.422**	-.040	.011	.007	.077*	.231**	.120**	-.359**	.032	.053	-.010	.037	.271**	.089*	-.298**	.027	-.041	-.079*	.006
46. VI (T2)	.522**	.128**	.146**	.150**	-.019	-.010	.015	.575**	.174**	.085*	.080*	.009	-.153**	-.049	.476**	.104**	.192**	.214**	.072
47. DE (T2)	.523**	.147**	.154**	.166**	-.062	.015	.107**	.595**	.268**	.084*	.109**	-.064	-.060	.015	.467**	.219**	.217**	.247**	.023
48. WS (T2)	.521**	.150**	.128**	.163**	-.055	.013	.102**	.630**	.295**	.048	.114**	-.042	-.071	.028	.497**	.261**	.172**	.252**	.049
49. QC (T2)	.368**	.082*	.123**	.062	-.096*	-.013	.130**	.448**	.164**	.121**	.030	-.084*	-.065	.074	.370**	.170**	.146**	.141**	-.048
50. DI (T2)	-.525**	-.005	-.009	-.015	.051	.136**	.041	-.572**	-.028	.027	.016	.096*	.293**	.063	-.499**	-.069	-.097*	-.182**	.055
51. SO (T2)	-.362**	-.004	-.001	.003	.023	.173**	.095*	-.364**	.013	.011	.005	.059	.269**	.122**	-.354**	-.005	-.049	-.079*	.025
52. VI (T3)	.436**	.108**	.178**	.135**	.027	.020	.063	.489**	.196**	.168**	.080*	-.013	-.115**	-.036	.524**	.208**	.206**	.168**	.050
53. DE (T3)	.444**	.145**	.177**	.127**	-.042	.012	.118**	.492**	.258**	.151**	.089*	-.048	-.092*	.054	.513**	.306**	.214**	.157**	.020
54. WS (T3)	.480**	.174**	.134**	.131**	-.070	-.012	.137**	.553**	.266**	.103**	.113**	-.108**	-.125**	.079*	.566**	.363**	.184**	.197**	-.042
55. QC (T3)	.380**	.102**	.153**	.035	-.078*	-.047	.086*	.423**	.127**	.119**	.016	-.034	-.059	.025	.404**	.175**	.184**	.085*	-.024
56. DI (T3)	-.492**	-.045	-.032	-.022	.066	.145**	.072	-.486**	-.022	-.083*	-.034	.079*	.345**	.094*	-.611**	-.048	-.095*	-.077*	.055
57. SO (T3)	-.415**	-.035	-.014	-.006	.057	.178**	.104**	-.401**	.001	-.036	-.024	.055	.293**	.114**	-.442**	.008	-.046	-.045	.021

Note. *$p < .05$; **$p < .01$; NF: need fulfillment; AS: autonomy satisfaction; CS: competence satisfaction; RS: relatedness satisfaction; AF: autonomy frustration; CF: competence frustration; RF: relatedness frustration; CD: cognitive demands; ED: emotional demands; PD: physical demands; ER: emotional resources; PR: physical resources; CR: cognitive resources; VI: vigor; DE: dedication; WS: work satisfaction; QC: quality of care; DI: distress; SO: somatization; T: time. All variables are factor scores saved from the latent mean invariant measurement models with a mean of 0 and a standard deviation of 1.

Table S14 (continued 3)

Correlations Among the Study Variables

	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
20. CF (T3)	—																		
21. RF (T3)	0	—																	
22. CD (T1)	.131**	.066	—																
23. ED (T1)	.183**	.090*	.425**	—															
24. PD (T1)	.171**	.114**	.318**	.420**	—														
25. ER (T1)	-.065	-.027	.173**	-.179**	-.074	—													
26. PR (T1)	-.047	.015	.032	-.254**	-.279**	.556**	—												
27. CR (T1)	-.074	.013	-.207**	-.141**	-.282**	.293**	.516**	—											
28. CD (T2)	.144**	.027	.736**	.335**	.175**	.176**	.092*	-.149**	—										
29. ED (T2)	.150**	.047	.355**	.699**	.323**	-.135**	-.227**	-.124**	.532**	—									
30. PD (T2)	.159**	.107**	.313**	.307**	.787**	.006	-.187**	-.244**	.354**	.442**	—								
31. ER (T2)	.038	.001	.097*	-.173**	-.125**	.694**	.513**	.330**	.168**	-.212**	-.107**	—							
32. PR (T2)	.026	.026	.107**	-.200**	-.114**	.369**	.642**	.366**	.025	-.276**	-.232**	.588**	—						
33. CR (T2)	-.043	-.031	-.180**	-.128**	-.170**	.188**	.256**	.606**	-.267**	-.214**	-.323**	.338**	.523**	—					
34. CD (T3)	.120**	.079*	.772**	.282**	.221**	.273**	.072	-.085*	.851**	.424**	.353**	.229**	.023	-.240**	—				
35. ED (T3)	.203**	.116**	.432**	.709**	.417**	-.137**	-.227**	-.129**	.488**	.793**	.461**	-.115**	-.203**	-.150**	.524**	—			
36. PD (T3)	.180**	.137**	.264**	.229**	.791**	.024	-.169**	-.214**	.318**	.338**	.862**	-.029	-.183**	-.271**	.374**	.457**	—		
37. ER (T3)	.055	-.062	.096*	-.061	-.154**	.541**	.382**	.168**	.140**	-.262**	-.174**	.669**	.437**	.248**	.207**	-.204**	-.121**	—	
38. PR (T3)	-.004	.015	.042	-.098**	-.256**	.370**	.763**	.388**	.019	-.298**	-.289**	.475**	.719**	.338**	.056	-.235**	-.261**	.593**	—

Note. *$p < .05$; **$p < .01$; NF: need fulfillment; AS: autonomy satisfaction; CS: competence satisfaction; RS: relatedness satisfaction; AF: autonomy frustration; CF: competence frustration; RF: relatedness frustration; CD: cognitive demands; ED: emotional demands; PD: physical demands; ER: emotional resources; PR: physical resources; CR: cognitive resources; VI: vigor; DE: dedication; WS: work satisfaction; QC: quality of care; DI: distress; SO: somatization; T: time. All variables are factor scores saved from the latent mean invariant measurement models with a mean of 0 and a standard deviation of 1

Table S14 (continued 4)

Correlations Among the Study Variables

	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
39. CR (T3)	-.073	-.025	-.181**	-.123**	-.273**	.247**	.382**	.715**	-.186**	-.200**	-.345**	.221**	.358**	.739**	-.201**	-.209**	-.324**	.278**	.523**
40. VI (T1)	-.118**	-.116**	.117**	-.266**	-.161**	.377**	.280**	.212**	.104**	-.179**	-.092*	.337**	.223**	.158**	.156**	-.176**	-.042	.235**	.161**
41. DE (T1)	-.088*	-.069	.176**	-.240**	-.122**	.390**	.293**	.164**	.178**	-.118**	-.022	.329**	.210**	.097*	.219**	-.113**	.021	.200**	.158**
42. WS (T1)	-.123**	.003	.060	-.273**	-.210**	.413**	.374**	.263**	.096*	-.163**	-.121**	.347**	.253**	.160**	.132**	-.161**	-.089*	.244**	.246**
43. QC (T1)	-.072	-.010	.067	-.194**	-.129**	.327**	.312**	.219**	.094*	-.138**	-.121**	.323**	.254**	.196**	.108**	-.148**	-.073	.257**	.250**
44. DI (T1)	.344**	.121**	.127**	.435**	.312**	-.365**	-.299**	-.242**	.092*	.333**	.224**	-.330**	-.227**	-.204**	.044	.340**	.183**	-.254**	-.200**
45. SO (T1)	.291**	.114**	.124**	.326**	.321**	-.211**	-.214**	-.153**	.097*	.266**	.259**	-.248**	-.227**	-.190**	.086*	.277**	.249**	-.205**	-.194**
46. VI (T2)	-.123**	-.044	.086*	-.202**	-.144**	.353**	.273**	.221**	.088*	-.209**	-.152**	.418**	.308**	.215**	.151**	-.173**	-.074	.321**	.227**
47. DE (T2)	-.045	-.023	.141**	-.201**	-.126**	.378**	.310**	.193**	.177**	-.169**	-.102**	.445**	.334**	.206**	.223**	-.131**	-.030	.330**	.270**
48. WS (T2)	-.055	.030	.044	-.234**	-.167**	.382**	.364**	.266**	.057	-.269**	-.210**	.477**	.413**	.314**	.108**	-.188**	-.111**	.389**	.345**
49. QC (T2)	-.016	.051	.035	-.161**	-.108**	.276**	.270**	.209**	.046	-.200**	-.178**	.336**	.301**	.228**	.085*	-.133**	-.087*	.274**	.260**
50. DI (T2)	.272**	.025	.115**	.331**	.241**	-.266**	-.249**	-.204**	.136**	.386**	.254**	-.315**	-.286**	-.248**	.081*	.351**	.198**	-.314**	-.266**
51. SO (T2)	.251**	.068	.128**	.261**	.283**	-.141**	-.172**	-.142**	.137**	.307**	.295**	-.207**	-.240**	-.218**	.120**	.307**	.277**	-.262**	-.249**
52. VI (T3)	-.065	-.061	.136**	-.128**	-.108**	.306**	.288**	.187**	.130**	-.174**	-.126**	.343**	.293**	.191**	.199**	-.170**	-.087*	.431**	.340**
53. DE (T3)	-.048	-.021	.154**	-.145**	-.109**	.337**	.322**	.178**	.186**	-.141**	-.105**	.380**	.304**	.175**	.248**	-.142**	-.049	.441**	.363**
54. WS (T3)	-.081*	.013	.071	-.210**	-.183**	.363**	.374**	.280**	.083*	-.255**	-.225**	.427**	.377**	.303**	.135**	-.237**	-.152**	.491**	.436**
55. QC (T3)	-.053	-.036	.078*	-.210**	-.119**	.294**	.289**	.220**	.109**	-.158**	-.151**	.320**	.258**	.206**	.154**	-.148**	-.074	.303**	.281**
56. DI (T3)	.293**	.106**	.039	.267**	.226**	-.287**	-.244**	-.162**	.042	.336**	.249**	-.320**	-.241**	-.198**	-.001	.369**	.215**	-.448**	-.333**
57. SO (T3)	.268**	.103**	.098*	.276**	.292**	-.218**	-.233**	-.145**	.102**	.300**	.291**	-.277**	-.266**	-.216**	.080*	.319**	.277**	-.360**	-.302**

Note. *$p < .05$; **$p < .01$; NF: need fulfillment; AS: autonomy satisfaction; CS: competence satisfaction; RS: relatedness satisfaction; AF: autonomy frustration; CF: competence frustration; RF: relatedness frustration; CD: cognitive demands; ED: emotional demands; PD: physical demands; ER: emotional resources; PR: physical resources; CR: cognitive resources; VI: vigor; DE: dedication; WS: work satisfaction; QC: quality of care; DI: distress; SO: somatization; T: time. All variables are factor scores saved from the latent mean invariant measurement models with a mean of 0 and a standard deviation of 1.

Table S14 (continued 5)

Correlations Among the Study Variables

	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
39. CR (T3)	—																		
40. VI (T1)	.148**	—																	
41. DE (T1)	.093*	.828**	—																
42. WS (T1)	.191**	.628**	.729**	—															
43. QC (T1)	.221**	.391**	.406**	.524**	—														
44. DI (T1)	-.194**	-.524**	-.474**	-.517**	-.293**	—													
45. SO (T1)	-.142**	-.354**	-.283**	-.330**	-.183**	.731**	—												
46. VI (T2)	.153**	.769**	.607**	.519**	.417**	-.514**	-.433**	—											
47. DE (T2)	.149**	.691**	.745**	.589**	.478**	-.438**	-.368**	.831**	—										
48. WS (T2)	.247**	.618**	.605**	.677**	.474**	-.441**	-.356**	.709**	.804**	—									
49. QC (T2)	.209**	.277**	.249**	.388**	.789**	-.201**	-.178**	.416**	.440**	.570**	—								
50. DI (T2)	-.216**	-.420**	-.291**	-.396**	-.324**	.748**	.599**	-.551**	-.488**	-.548**	-.316**	—							
51. SO (T2)	-.194**	-.295**	-.136**	-.258**	-.171**	.582**	.859**	-.408**	-.317**	-.364**	-.200**	.721**	—						
52. VI (T3)	.199**	.638**	.511**	.481**	.405**	-.341**	-.253**	.762**	.722**	.651**	.385**	-.454**	-.362**	—					
53. DE (T3)	.197**	.517**	.632**	.538**	.440**	-.358**	-.233**	.635**	.818**	.695**	.382**	-.400**	-.253**	.845**	—				
54. WS (T3)	.341**	.502**	.540**	.641**	.515**	-.407**	-.255**	.568**	.695**	.820**	.544**	-.497**	-.322**	.705**	.807**	—			
55. QC (T3)	.261**	.404**	.358**	.437**	.768**	-.274**	-.101**	.433**	.462**	.498**	.755**	-.302**	-.165**	.480**	.479**	.578**	—		
56. DI (T3)	-.240**	-.423**	-.344**	-.355**	-.301**	.711**	.586**	-.549**	-.474**	-.482**	-.291**	.725**	.613**	-.575**	-.535**	-.589**	-.341**	—	
57. SO (T3)	-.201**	-.372**	-.235**	-.360**	-.241**	.646**	.878**	-.472**	-.383**	-.460**	-.238**	.660**	.882**	-.439**	-.365**	-.415**	-.230**	.755**	—

Note. *$p < .05$; **$p < .01$; NF: need fulfillment; AS: autonomy satisfaction; CS: competence satisfaction; RS: relatedness satisfaction; AF: autonomy frustration; CF: competence frustration; RF: relatedness frustration; CD: cognitive demands; ED: emotional demands; PD: physical demands; ER: emotional resources; PR: physical resources; CR: cognitive resources; VI: vigor; DE: dedication; WS: work satisfaction; QC: quality of care; DI: distress; SO: somatization; T: time. All variables are factor scores saved from the latent mean invariant measurement models with a mean of 0 and a standard deviation of 1.

Table S15

Exact Within-Profile Means, Variances and 95% Confidence Intervals (95% CI) from the Final Five-Profile Solution

	Profile 1 Mean [95% CI]	Profile 2 Mean [95% CI]	Profile 3 Mean [95% CI]	Profile 4 Mean [95% CI]	Profile 5 Mean [95% CI]
Global need fulfillment	1.223	.247	.061	-.740	.718
	[1.173, 1.274]	[.167, .326]	[-.109, .232]	[-.875, -.605]	[.627, .808]
Specific autonomy satisfaction	.450	-.065	.007	-.038	-.057
	[.291, .610]	[-.155, .025]	[-.064, .078]	[-.137, .061]	[-.164, .051]
Specific competence satisfaction	.494	-.479	-.048	.035	.633
	[.421, .597]	[-.546, -.413]	[-.149, .052]	[-.076, .147]	[.537, .728]
Specific relatedness satisfaction	.163	.118	.005	-.183	.136
	[.063, .264]	[.035, .201]	[-.084, .094]	[-.284, -.082]	[.006, .267]
Specific autonomy frustration	-.492	-.049	-.068	.014	.312
	[-.595, -.388]	[-.148, .050]	[-.136, -.001]	[-.088, .115]	[.172, .453]
Specific competence frustration	-.185	-.021	.007	.119	-.072
	[-.352, -.019]	[-.130, .088]	[-.113, .128]	[.012, .227]	[-.235, .090]
Specific relatedness frustration	.113	-.020	.066	.064	-.142
	[-.024, .250]	[-.102, .063]	[-.025, .157]	[-.037, .164]	[-.219, -.065]
	Profile 1 Variance [95% CI]	Profile 2 Variance [95% CI]	Profile 3 Variance [95% CI]	Profile 4 Variance [95% CI]	Profile 5 Variance [95% CI]
Global need fulfillment	.019	.143	.295	.855	.078
	[.013, .025]	[.108, .177]	[.204, .386]	[.726, .984]	[.057, .098]
Specific autonomy satisfaction	.132	.290	.118	.820	.300
	[.044, .219]	[.222, .357]	[.073, .162]	[.704, .936]	[.200, .400]
Specific competence satisfaction	.082	.096	.098	1.148	.100
	[.052, .112]	[.058, .134]	[.070, .125]	[.965, 1.332]	[.077, 122]
Specific relatedness satisfaction	.116	.339	.183	.830	.271
	[.066, .165]	[.283, .394]	[.121, .245]	[.713, .9488]	[.167, .375]
Specific autonomy frustration	.107	.628	.101	.888	.533
	[.062, .153]	[.525, .731]	[.063, .138]	[.767, 1.009]	[.403, .662]
Specific competence frustration	.232	.536	.200	.920	.400
	[.073, .391]	[.440, .633]	[.129, .272]	[.795, 1.044]	[.219, .580]
Specific relatedness frustration	.231	.363	.110	.846	.173
	[.081, .382]	[.298, .428]	[.055, .165]	[.722, .970]	[.126, .221]

Note. Factors were estimated from factor scores with a mean of 0 and a standard deviation of 1.

Table S16

Results from the Predictor Analyses Pertaining to Demographic Variables (Tenure, Age and Employment Type)

Model	LL	fp	Scaling	AIC	CAIC	BIC	SSABIC	Entropy
Effects free across time and profiles	-6411.064	209	.836	13240.127	14412.481	14203.481	13539.830	.786
Effects free across time	-6479.085	89	1.344	13136.170	13635.402	13546.402	13263.795	.783
Predictive similarity	-6499.541	56	1.587	13111.082	13425.206	13369.206	13191.385	.773
Null effects	-6503.483	53	1.630	13112.966	13410.261	13357.261	13188.967	.773

Note. LL: loglikelihood; fp: number of free parameters; AIC: Akaike Information Criterion; CAIC: constant AIC; BIC: Bayesian Information Criterion; SSABIC: Sample-Size Adjusted BIC.

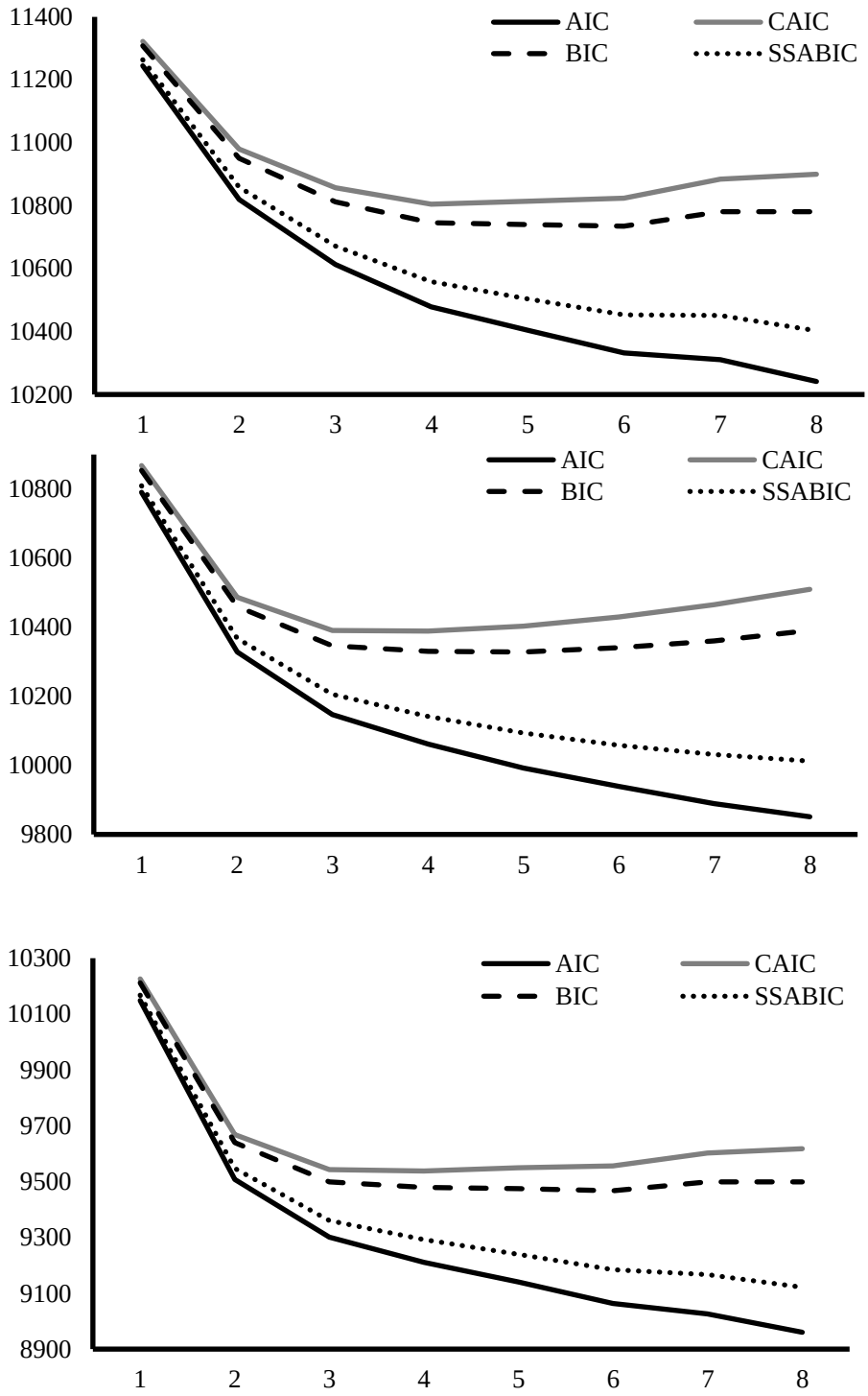

Figure S1
Elbow Plots of the Information Criteria for Time 1 (Top), Time 2 (Middle) and Time 3 (Bottom) Latent Profile Analyses

Note. AIC: Akaike Information Criterion; BIC: Bayesian Information Criterion; CAIC: Consistent AIC; SSABIC: Sample-Size-Adjusted BIC.

Data Transparency Appendix

Variables in the dataset	**Current paper**			**Published paper #1**				**Published paper #2**	**Published paper #3**	**Published paper #4**	
Time points	Time-1	Time-2	Time-3	Time-1	Time-2	Time-3	Time-4	Time-1	Time-1	Time-1	Time-2
Leadership behaviors											
Transformational				X	X	X	X	X			
Abusive				X	X	X	X	X			
Socialization											
Task-level				X	X	X	X				
Team-level				X	X	X	X				
Organization-level				X	X	X	X				
Job characteristics											
Job demands	X	X	X							X	X
Job resources	X	X	X							X	X
Need Satisfaction	X	X	X						X		
Need Frustration	X	X	X								
Work Motivation											
Global self-determination				X	X	X	X		X	X	X
Specific Intrinsic motivation									X	X	X
Specific Identified regulation									X	X	X
Specific Introjected regulation									X	X	X
Specific External regulation									X	X	X
Specific Amotivation									X	X	X
Occupational Commitment											
Affective				X	X	X	X				
Continuance				X	X	X	X				
Organizational Commitment											
Affective				X	X	X	X				
Continuance				X	X	X	X				
Intention to leave											
Occupation				X	X	X	X	X		X	X
Organization				X	X	X	X	X	X	X	X
Job Burnout											
Emotional exhaustion									X	X	X
Job Performance											
In-role behaviors										X	X
Quality of care	X	X	X					X			
Work Satisfaction	X	X	X						X		
Work Engagement	X	X	X								
Psychological Distress	X	X	X								
Somatization	X	X	X								