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Running Head: Psychological Need States Profiles

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Abstract

This study addressed the lack, in the work context, of a comprehensive time-lagged examination of the core constructs (interpersonal behaviors, psychological need states, and motivation) underlying Self-Determination Theory (SDT). Specifically, this research relied on person-centered analyses to gain a better understanding of how the distinct components of psychological need states (satisfaction, frustration, and unfulfillment of the needs for autonomy, competence, and relatedness) combine to produce distinct profiles of employees. We also documented the stability of these profiles over time and their associations with theoretically-relevant predictors (supervisors' supportive, thwarting, and indifferent behaviors) and outcomes (work motivation). Questionnaire surveys were completed twice over the course of three months by a sample of 590 French employees. Six profiles characterized by distinct configurations of global and specific need constructs were identified and found to be stable over time. Supervisors' supportive, thwarting, and indifferent behaviors showed well-differentiated patterns of association with these profiles. Finally, employees' global levels of self-determination and specific levels of motivational regulations differed as a function of profile membership. Altogether, results from this research suggest that SDT's explanatory framework may be expanded to encompass the key role played by need indifferent behaviors and employees' experiences of need unfulfillment.

Keywords: Interpersonal behaviors; Need indifferent behaviors; Psychological needs; Need unfulfillment; Work motivation; Self-Determination Theory.

"My friends, remember this: There are no bad weeds, no bad men, there are only bad cultivators" (Victor Hugo, 1862). In "Les Misérables", Victor Hugo eloquently illustrated what would, more than a century later, become one of the key tenets of Self-Determination Theory (SDT; Ryan & Deci, 2017): individuals' dysfunctional (or adaptive) functioning can regularly be traced back to thwarting (or supportive) socio-environmental conditions. Specifically, research based on SDT has consistently shown the key role played by those in position of authority or expertise (e.g., supervisors, teachers, coaches) in supporting or thwarting the psychological needs of those they guide and manage (e.g., subordinates, students, athletes). More precisely, need support predicts need satisfaction and individuals' adaptive (autonomous) motivation, while need thwarting leads to need frustration and maladaptive (controlled) motivation or lack of motivation (amotivation) (Bartholomew et al., 2011). Empirical evidence has provided support for these associations in various life domains, including the work context (e.g., Gillet et al., 2012; Olafsen et al., 2018; Trépanier et al. 2015).

Yet, the rare studies examining this dual motivational process at work did so either by looking into the relations between supervisory behaviors (supportive and thwarting) and psychological need states (satisfaction and frustration; e.g., Gillet et al., 2012), or by investigating the associations between need states and autonomous and controlled motivation (e.g., Trépanier et al. 2015). In the work context, research has long failed to simultaneously examine supportive and thwarting supervisory behaviors alongside the bright and dark sides of employees' psychological needs and the different facets of motivation. As such, prior research has failed to provide a complete picture of the bright and dark sides of motivational processes at work, which has important theoretical and practical implications. Indeed, we do not know whether these motivational processes unfold at work as they do in other life contexts (e.g., Amoura et al., 2015; Burgueño et al., 2021), and, thus, whether the same practical recommendations should be followed. Moreover, such incomplete examinations do not allow to understand how each interpersonal behavior and/or need state provides incremental predictive value, once the role of other behaviors and need states are considered, and, thus, to identify the most adequate levers for intervention. Only one very recent research did examine the complete picture of this dual motivational process among Chinese employees (Wu et al., 2022), yet this research relied on a cross-sectional design. Therefore, Wu et al. (2022) called for future research to use time-lagged designs to better document how supervisory behaviors relate to motivational processes over time. Indeed, past research has heavily relied on cross-sectional designs that do not allow conclusions regarding the temporal nature of this dual process. One study did use a longitudinal design, and showed managerial need support to be associated with need satisfaction, and, in turn, work motivation over time (Olafsen et al., 2018). Unfortunately, this study explored the bright side only of SDT's dual motivational process. Yet, the effects of negative interpersonal relations are greater and last longer than those of positive relationships (Baumeister et al., 2001). Therefore, our research's first goal is to provide a first-in-the-literature comprehensive time-lagged examination of the core constructs (interpersonal behaviors, psychological need states, and work motivation) and of the full motivational processes (positive and negative) proposed by SDT, in the work context.

Importantly, the dual nature of SDT's explanatory framework (e.g., Gillet et al., 2012; Trépanier et al., 2015) has been questioned by recent research. Indeed, recent findings suggest that tripartite conceptualizations of interpersonal styles and psychological needs could extend our understanding of the "dim light colors" (alongside the bright and dark sides) of motivational processes (see Ntoumanis, in press). For instance, research conducted in the sport domain (Bhavsar et al., 2019) showed the existence of a third and distinct type of interpersonal behaviors alongside need supportive and thwarting behaviors, in the form of indifferent behaviors (i.e., leaders are inattentive to the basic psychological needs of those they guide). Interestingly, these behaviors (i.e., need-supportive, -thwarting, and -indifferent behaviors) echo the three core leadership styles (democratic, authoritarian, and laissez-faire) originally introduced by Lewin et al. (1939), thus suggesting that such a tripartite conceptualization of interpersonal behaviors might also be relevant in the work area. However, in the work-related SDT-based research, supportive (for a review see Slemp et al., 2018) and, to a lesser extent, thwarting (or controlling) behaviors (e.g., Richer & Vallerand, 1995; Gillet et al., 2012), have attracted the most attention. Despite the connection between need indifferent behaviors and *laissez-faire* leadership (Avolio et al., 1999; Lewin et al., 1939), a type of leadership known to have detrimental consequences (Skogstad et al., 2007), no research conducted in the work domain has yet explored how supervisors' indifferent behaviors relate to subordinates' psychological needs and motivation. Yet, showing that

indifferent behaviors contribute to explaining need states beyond what can be explained by the supportive and thwarting styles would provide further support for the distinctiveness of this construct and open new theoretical and practical avenues. Indeed, this grey zone of interpersonal behaviors could enrich our understanding of the missed opportunities for optimal motivational functioning, at the socio-contextual level (Ntoumanis, in press). Therefore, the second goal of the present research is to address researchers' (Huyghebaert-Zouaghi et al., 2022) call to offer an examination of supervisors' need indifferent behaviors, while jointly considering need supportive and thwarting behaviors.

Recent advances in SDT research also showed that individuals' psychological needs are not experienced in a dichotomous manner, through the beneficial and adverse experiences of need satisfaction and frustration, respectively (Huyghebaert-Zouaghi et al., 2021). Rather, this recent research showed the existence of a third need state, when tested alongside need satisfaction and frustration. More specifically, authors showed that employees may also undergo a more nuanced and less actively negative psychological experience, in the form of need unfulfillment (i.e., a negative psychological need experience of deactivation, where one feels that their psychological needs are in a state of negligence). Interestingly, this research showed need unfulfillment, need frustration, and need satisfaction to predict outcomes that differ in nature, and, thus, reinforced the importance of simultaneously considering the full range of employees' psychological need states. Yet, research has not yet investigated the motivational antecedents and consequences of these distinct psychological need states, despite the connection made in SDT between interpersonal behaviors, psychological need states, and motivation (e.g., Olafsen et al., 2018). Therefore, showing that need unfulfillment independently (relative to need satisfaction and frustration) relates to interpersonal behaviors and work motivation would provide further support for its distinctiveness, contributing to this construct putting down roots in the SDT literature. Indeed, shedding more light on the insipid colors of psychological need state could contribute to a better understanding of the "missed opportunities" for optimal motivational functioning, at the personal level (Ntoumanis, in press).

Because the only study examining need unfulfillment has relied on a variable-centered approach, its authors have advocated for future research to resort to person-centered analyses (Huyghebaert-Zouaghi et al., 2021). Indeed, the variable-centered approach mostly used in past research on psychological needs (e.g., Gillet et al., 2012, 2020; Huyghebaert et al., 2018, 2021; Trépanier et al., 2015, 2016) focuses on average relations observed between variables within a specific sample, and, thus, ignores the possibility that need satisfaction, frustration, and unfulfillment are qualitatively distinct types of experiential psychological need states. Indeed, these need states are not mutually exclusive but may co-occur in different combinations in the lives of employees (Huyghebaert-Zouaghi et al., 2021). For instance, Rouse et al. (2020) showed that workers could simultaneously experience high competence satisfaction and high competence frustration (e.g., one could experience mastery in some areas of their job but also have feelings of inadequacy in other areas). The person-centered approach allows for the identification of qualitatively different subpopulations of employees experiencing such specific configurations of psychological need states. Moreover, person-centered analyses have important practical implications, for they appear to be a representative reflection of managers' and human resources/occupational health professionals' tendency to think of workers as falling into different types or categories of individuals. Therefore, our third goal is to offer an investigation of employees' psychological need states profiles, while examining their antecedents (supervisors' need supportive, indifferent, and thwarting behaviors) and consequences in terms of work motivation, based on a two-wave time-lagged design.

In sum, our theoretical perspective and empirical findings could contribute to the literature by providing, in the work context, the first comprehensive examination of the core SDT constructs (interpersonal behaviors, psychological need states, and work motivation), studying both positive and negative processes, and using a time-lagged design. We also advance past research by incorporating conceptual advances in the SDT literature (i.e., identification of need indifferent behaviors and need unfulfillment states; Bhavsar et al., 2019; Huyghebaert-Zouaghi et al., 2021) and using state-of-the-art statistical approaches to examine psychological need states profiles in the workplace.

Psychological Need States in the Workplace

Research based on SDT has largely documented the prominence of the basic psychological needs for autonomy (feeling ownership of one's actions), competence (feeling efficient in accomplishing personally important tasks), and relatedness (feeling secure and accepted in one's relationships) in

enhancing individuals' well-being (Ryan & Deci, 2017). Need satisfaction refers to the positive state where one experiences a fulfillment of these psychological needs (i.e., feeling volitional, competent, and affiliated), whereas need frustration reflects a negative state where one experiences undermining of these psychological needs (i.e., feeling coerced, useless, and rejected). The distinctiveness and differentiated effects of both these need states have been demonstrated through a large body of research conducted within various life contexts (Bartholomew et al., 2011; Vansteenkiste et al., 2020), including work (e.g., Huyghebaert et al., 2018a; Trépanier et al., 2015).

From Two to Three Need States: Need Unfulfillment

Recently, scholars argued that a third psychological need state (i.e., need unfulfillment) could contribute to a better and richer understanding of the motivational mechanisms resulting from individuals' socio-environmental conditions (e.g., Bhavsar et al., 2020; Cheon et al., 2019; Costa et al., 2015). Huyghebaert-Zouaghi et al. (2021) provided support for these postulates in the work domain, by demonstrating the existence and distinctiveness (when tested alongside need satisfaction and frustration) of need unfulfillment. Indeed, unlike prior research failing to consider the experience of unfulfillment across all three needs (Cheon et al., 2019), to assert its criterion validity relative to need frustration (Costa et al., 2015), or to model need unfulfillment as a distinct need state when tested alongside need satisfaction and frustration (Bhavsar et al., 2019), Huyghebaert-Zouaghi et al. (2021) showed need unfulfillment factors to be distinct from need satisfaction and frustration factors (even after accounting for their shared commonalities) and to hold unique relations with predictors and outcomes. Need unfulfillment is defined as the negative experiential state where one feels that their psychological needs are in state of neglect (i.e., feeling uncertain, dull, and disconnected). Thus, Huyghebaert-Zouaghi et al. (2021) provided support for a 3 x 3 model of the distinct experiential states of satisfaction, frustration, and unfulfillment pertaining to each of the needs for autonomy, competence, and relatedness. Yet, these authors examined these psychological need states from a variable-centered approach, therefore ignoring the possibility that need satisfaction, frustration, and unfulfillment are qualitatively distinct psychological experiences that are not mutually exclusive but may co-occur. For instance, one could feel cared for and appreciated by others at work (i.e., high relatedness satisfaction) and simultaneously feel like they do not have much in common with their peers and experience a sense of not fitting in (i.e., high relatedness unfulfillment). Although Huyghebaert-Zouaghi et al. (2021) showed the distinctiveness of these experiential psychological need states, it is only through the identification of different configurations of psychological need states that their co-existence could be asserted.

Profiles of Psychological Need States

In a recent review of Basic Psychological Need Theory (Vansteenkiste et al., 2020), SDT scholars called for future research to shed light on need profiles to reach a better understanding of within-person combinations of psychological need states. Indeed, the person-centered approach is of particular interest as it reflects the idea that individuals seldom experience a single psychological experience (e.g., Tóth-Király et al., 2018; Rouse et al., 2020). Vansteenkiste et al. (2020) also emphasized the practical value of this approach, explaining that it allows to "provide a more overarching perspective on individuals' configuration of need-based functioning instead of "slicing" an individual into different need-relevant dimensions" (p. 12). As such, person-centered results allow practitioners for more tailored interventions simultaneously targeting several need states. Despite the intuitive appeal of this approach, no study has yet utilized it to examine different combinations of need satisfaction, unfulfillment, and frustration. Considering these important implications, our first goal was, thus, to address this gap in the literature.

Given the absence of prior relevant research, we could propose a tentative only hypothesis in relation to the number of profiles expected to be found in our study. Based on prior research on employees' need satisfaction (i.e., four profiles: Gillet et al., 2019; Huyghebaert-Zouaghi et al., 2020) and need satisfaction/frustration (i.e., five profiles; Rouse et al., 2020) profiles, we expected to identify a fairly similar (i.e., 4-5) number of profiles (*Hypothesis 1*). As to the nature of these profiles, based on prior person-centered research jointly examining need satisfaction and frustration in a general population of Hungarian adults (Tóth-Király et al., 2018) and in a sample of British firefighters (Rouse et al., 2020), and on research solely examining employees' need satisfaction profiles (Gillet et al., 2019; Huyghebaert-Zouaghi et al., 2020), we expected to identify (*Hypothesis 2*): 1) a predominantly positive

profile (characterized by very high positive experiential need states and very low negative experiential need states), 2) a predominantly negative profile (high negative experiential need states and very low positive experiential need states), and 3) a normative profile (close to average levels across all experiential need states). Additionally, we expected to identify 4) a profile in which one of the three needs would be more dominant than the others, across all three experiential states (e.g., the need for competence; Rouse et al., 2020). Finally, based on prior person-centered research showing that positive and negative experiential need states could co-occur (Rouse et al., 2020), we expected to identify 5) a profile characterized by mixed experiential need states (e.g., low levels of need unfulfillment coupled with high levels of need satisfaction and frustration).

Supervisors' Interpersonal Behaviors as Predictors of Need States Profiles

The second goal of this research was to assess the extent to which supervisors' interpersonal behaviors predict subordinates' membership of psychological need states profiles. Autonomy-supportive behaviors (e.g., Olafsen et al., 2018) and, to a lesser extent, autonomy-thwarting (i.e., controlling) behaviors (e.g., Gillet et al., 2012), have attracted the most attention in the work-related SDT research. However, recent research has emphasized the importance of considering how social agents in a position of authority or expertise may support or thwart all three psychological needs of those they interact with (Bhavsar et al., 2019; Huyghebaert-Zouaghi et al., 2021; Rocchi et al., 2017a, 2017b; Tóth-Kiraly et al., 2020). As such, need supportive managers promote their subordinates' psychological needs by displaying behaviors based on understanding, encouragement, and appreciation. Conversely, need thwarting managers threaten their subordinates' psychological needs when they adopt behaviors based on pressure, non-constructive criticism, and rejection.

In the work domain, only one study has considered supervisors' need supportive and need thwarting behaviors in relation to all three psychological needs (Huyghebaert-Zouaghi et al., 2021). Yet, this research did not include the third form of interpersonal behaviors (i.e., need indifferent behaviors), which was identified in a recent study conducted in the sport domain (Bhavsar et al., 2019).

A Third Type of Interpersonal Behaviors: Need Indifferent Behaviors

Based on Bhavsar et al. (2019), we propose that supervisors are need indifferent when they neglect their subordinates' psychological needs. Specifically, autonomy-indifferent supervisors may show a disinterest in their subordinates' opinions, needs, and perspectives, and fail to give clear directions and rationale for task engagement. Competence-indifferent supervisors are absent when needed, do not provide their subordinates with enough structure to reach their professional goals, are chaotic or disorganized, and neglect employees' skills development by setting activities that are not optimally challenging for them. Finally, relatedness-indifferent supervisors may be inattentive to their subordinates' well-being and to the quality of their relationship with their subordinates, leaving employees unsure as to whether their supervisors appreciate them or not. Importantly, need indifferent behaviors have never been examined in the work context, and their relations to psychological need states remain uncharted territory. Hence, supervisors' indifferent behaviors are important to document.

Interestingly, this tripartite conceptualization echoes the "full-range leadership theory" (Avolio & Bass, 1991), which has dominated leadership research up to this day by offering an integration of three distinct leadership styles (laissez-faire, transactional, and transformational). However, research anchored in this framework has mostly ignored the motivational processes associated with these distinct leadership behaviors (Inceoglu et al., 2018). Indeed, most of the existing leadership research has treated leadership as a way to influence subordinates' behaviors and performance (see Inceoglu et al., 2018) and, in doing so, has failed to document the differentiated effects of distinct supervisory behaviors on employees' motivation and well-being. In contrast, SDT (Ryan & Deci, 2000, 2017) conceptualizes leadership as a way to promote subordinates' self-determined motivation and well-being. As such, rather than adding one more highly specific type of behavior to the already long list of behaviors considered in leadership research (DeRue et al., 2011), we take a step back to approach leaders' behaviors in terms of how they relate to subordinates' basic psychological needs. Our perspective might not replace classical leadership theories (e.g., Avolio & Bass, 1991) when organizational outcomes are considered, but, being anchored in the currently dominant theoretical framework on employee motivation and well-being (i.e., SDT; Ryan & Deci, 2017), it may provide clearer guidance regarding the motivational implications of leaders' behaviors for subordinates.

Moreover, existing leadership studies have typically focused on the role played by isolated leadership behaviors (e.g., Tepper, 2000). In doing so, these studies have failed to consider how much

of employees' functioning can be explained by other behaviors, or how each specific type of behavior provides incremental predictive value, once the role of other types of behaviors has been accounted for (Judge & Piccolo, 2004). Therefore, the ability to jointly consider the relative contribution of distinct behaviors has important theoretical and practical implications, especially when it comes to distinguishing between less desirable types of leadership behaviors. For instance, it remains unclear whether the actively negative (e.g., need thwarting behaviors) and more passive supervisory styles (e.g., need indifferent behaviors) have clearly differentiated consequences in terms of employees' functioning (Judge & Piccolo, 2004; Skogstad et al., 2007). On one hand, one could theoretically argue that need indifferent behaviors may not be as adversely experienced by those at the receiving end, compared to need thwarting behaviors (Bhavsar et al., 2019). Some evidence indicates that the consequences of these two types of behaviors may even differ in nature. For instance, Cheon et al. (2019) made the case that need indifferent behaviors are more likely to lead to negative psychological experiences characterized by deactivation (e.g., need unfulfillment), whereas need thwarting behaviors are more likely to lead to more intense negative outcomes (e.g., need frustration). On the other hand, scholars have previously argued that managerial behaviors characterized by neglect and absence (e.g., need indifferent behaviors) could be as destructive as more actively negative types of interpersonal behaviors such as need thwarting ones (Skogstad et al., 2007). Yet, more research is needed on these passive forms of leaders' interpersonal behaviors (Judge & Piccolo, 2004) to document their differentiated effects.

Interestingly, Huyghebaert-Zouaghi et al. (2021) showed supervisors' thwarting behaviors to most strongly lead to more need frustration and –though to a lesser extent– more need unfulfillment and less need satisfaction in subordinates. Similarly, Bhavsar et al. (2019) found athletes who perceived their coach as need indifferent to experience more need frustration. In sum, prior research does not allow to assert that need thwarting and need indifferent behaviors have differentiated consequences in terms of psychological need states. Therefore, we expected supervisors' need thwarting and need indifferent behaviors to both predict a greater likelihood of membership of the most negative need state profile (*Hypothesis 3a*). An opposite pattern of association was expected for need supportive behaviors, based on prior findings showing supportive behaviors from one's supervisor to most strongly relate to higher levels of need satisfaction and, to a lesser extent, to lower levels of need unfulfillment (Huyghebaert-Zouaghi et al., 2021). Hence, we hypothesized that supervisors' need supportive behaviors would predict a greater likelihood of membership of the most positive need state profile (*Hypothesis 3b*).

Work Motivation as an Outcome of Need States Profiles

Our third goal was to assess the extent to which membership into different need states profiles would be associated to distinct motivational consequences. Work motivation is conceptualized as the key outcome of psychological need states (Vallerand, 1997). Moreover, motivation is much sought and prized by employees, organizations and managers, for it is a core determinant of workers' well-being (e.g., Trépanier et al., 2015) and performance (e.g., Gagné et al., 2015). When autonomously motivated, workers engage in their professional tasks out of choice and pleasure, or because they find them intrinsically enjoyable and interesting (intrinsic motivation), or valuable (identified regulation). Conversely, when workers are motivated in a controlled manner, they put effort in their work because of internal pressures (i.e., to boost their ego or to avoid feelings of guilt and shame; introjected regulation), or because of external pressures of a social (i.e., to get praise and avoid disapproval; external social regulation) or material (i.e., to get material rewards and avoid material losses; external material regulation) nature. Contrastingly, when amotivated, workers do not see the point of putting effort into work and lack the motivation to engage in their work.

The relations between workers' need satisfaction and frustration and their work motivation has been rather well documented, with need satisfaction resulting in autonomous forms of work motivation (e.g., De Cooman et al., 2013; Olafsen et al., 2018; Trépanier et al., 2015) and controlled forms of work motivation relating more strongly to need frustration (e.g., Trépanier et al., 2015). In line with prior variable-centered results, we can thus expect members of the predominantly positive profile to experience higher levels of autonomous motivation (*Hypothesis 4a*) and members of the predominantly negative profile to experience higher levels of controlled forms of motivation (*Hypothesis 4b*). It should be noted that research has never explored the relation between need unfulfillment and work motivation. Nonetheless, Ryan and Deci (2000) argue that amotivation results from one not valuing an activity, not feeling competent at it, or not expecting it to lead to desired consequences. These characteristics clearly

echo the definition of need unfulfillment (Huyghebaert-Zouaghi et al., 2021). As such, we can expect feelings of confusion, dullness, and disconnection (experienced by members of the predominantly negative profile) to be associated with higher levels of specific amotivation (*Hypothesis 4c*).

Methodological Considerations

First, when considering employees' psychological need states, one should keep in mind that recent research has shown that psychological need states ratings could be disaggregated into two independent components through bifactor modeling (e.g., Gillet et al., 2020; Huyghebaert-Zouaghi et al., 2020, 2021; Myers et al., 2014). The first component (G-factor) reflects employees' global need state experience across all three needs and experiential states. The second component (S-factor) reflects employees' specific levels of need satisfaction, unfulfillment, and frustration of each need, that are left unexplained by their global need state experience (see Figure 1 and online supplements for more details). Similarly, recent research has shown that work motivation may be disaggregated into two components (e.g., Fernet et al., 2020; Howard et al., 2016), with the G-factor reflecting employees' global levels of self-determination and S-factors reflecting what is unique to employees' specific levels of motivational regulations, once global levels of self-determination have been taken into account. Importantly, overlooking such construct-related multidimensionality is likely to result in an inaccurate assessment of the psychometric properties of the measure under investigation, and of the reality underpinning the constructs assessed via this measure. We thus address these multidimensionality issues in the present research.

Second, past research on psychological needs profiles has heavily relied on cross-sectional designs that do not allow conclusions regarding the temporal stability of these profiles. To our knowledge, there is one time-lagged person-centered examination of the components of employees' need satisfaction only (Huyghebaert-Zouaghi et al., 2020), but no research has yet examined how profiles of need frustration and/or unfulfillment evolve over time in the work setting. Yet, in a recent review of Basic Psychological Need Theory, SDT scholars called for future research to offer longitudinal evidence shedding light on how experiential need states combinations evolve over time (Vansteenkiste et al., 2020). Indeed, demonstrating that person-centered results tap into relatively stable inter-individual differences that will remain unchanged in the absence of intervention reinforces practitioners' ability to design interventions tailored at these otherwise stable profiles. A final goal of this research was, thus, to provide a first exploration of the temporal stability of profiles of all three psychological need states. Specifically, we examined the extent to which the identified need states profiles (within-sample stability) would remain similar, and to which workers' membership in these profiles (within-person stability) would remain stable, over the course of three months. We chose this timeline based on prior research on psychological needs (Huyghebaert et al., 2018a, Huyghebaert-Zouaghi et al., 2020). Indeed, this three-month time lag allows to go beyond daily fluctuations (Hewett et al., 2017) but it is still short enough to capture changes that may not be observed through longer time spans (e.g., Trépanier et al., 2016).

Method

Participants and Procedure

This research was exempt from ethical review, according to local regulations. Participants recruited for this study had to be employed in France, and to work under a supervisor. They were recruited by Masters students through network and snowball sampling procedures and were not compensated for their participation. Prior to data collection, potential participants received an email clarifying the general goal of the research and its time-lagged nature and were offered to take part in an online survey. Data were collected at two time points separated by three months. At each data collection time, participants were assured of the voluntary and anonymous (through an identification code) nature of their participation, and were invited to provide a written informed consent. Given our data collection method, it was impossible to determine exactly how many people originally had access to the questionnaire and, thus, to establish a return rate. A total of 590 French employees (M_{age} = 36.90 years; *SD* = 12.21; 62.50% women) completed the survey at Time 1. A majority of participants (71.4%) had a college degree (undergraduate degree: 42.4%; graduate degree: 29.0%), worked under a permanent contract (67.80%) and in the private sector (57.10%). To reassure participants regarding the anonymous and confidential nature of their participation, we chose to only include a limited set of demographics so that they would not fear of being identified. As such, we did not ask which organization they worked for and are, thus, unable to report how many different organizations were represented in the study or to control for their

dependency. We, however, know that a majority of participants (83.1%) worked in the service industry (market services: 49.7%; non-market services: 33.4%). Most of the participants worked full-time (79.2%) for an average of 35.53 hours a week (*SD* = 10.84) and had been working under their current supervisor for an average of 3.22 years (*SD* = 4.47). Of the 590 participants who completed the questionnaire at Time 1, 178 (30.17 %) also took part in the survey at Time 2. Attrition analyses were conducted in line with Goodman and Blums' (1996) recommendations and revealed no statistically significant association between attrition and any of the demographics and variables of interest included in our study. Thus, these analyses suggest that we can be reasonably confident that our time-lagged data are not biased by attrition.

Measures

Supervisor Interpersonal Behaviors were measured with the 22-item scale TMIB-S (Tripartite Measure of Interpersonal Behaviors-Supervisor; Huyghebaert-Zouaghi et al., 2022) which was adapted from the Tripartite Measure of Interpersonal Behaviors-Coach (TMIB-C; Bhavsar et al., 2019). Workers were requested to think of their interactions with their ongoing supervisor in order to report how much they agreed with each statement (1–*strongly disagree*; 7–*strongly agree*). Eight items measured need-supportive behaviors (α_{T1} = .94; α_{T2} = .96; e.g., autonomy support: "Encourages me to take my own initiative"; competence support: “Recognizes my efforts and accomplishments”; relatedness support: "Shows care and concern"), eight items assessed need-thwarting behaviors (α_{T1} = .93; α_{T2} = .93; e.g., autonomy thwarting: "Uses guilt tactics to control what I do"; competence thwarting: "Blames me when things don't go well"; relatedness thwarting: “Deliberately ignores me”), and six items measured need-indifferent behaviors (α_{T1} = .89; α_{T2} = .86; e.g., autonomy indifference: “Is unresponsive to my opinions”; competence indifference: "Sets tasks that aren’t challenging enough "; relatedness indifference: "Is indifferent to how I feel").

Psychological Need States were measured with the validated French version of the Psychological Need States at Work Scale (i.e., PNSW-S; Huyghebaert-Zouaghi et al., 2021). Before completing this 37-item scale, workers were asked to consider their general experience in their current job to indicate the extent to which they agreed with each statement (1–*strongly disagree* to 7–*strongly agree*). Need satisfaction was measured by three items for autonomy (e.g., “I have a say in how things are done”; α_{T1} = .86; α_{T2} = .88), three for competence (e.g., “I feel that I am capable”; α_{T1} = .81; α_{T2} = .81), and six for relatedness (e.g., “I feel cared for”; α_{T1} = .90; α_{T2} = .94). Need frustration was assessed via four items for autonomy (e.g., “I feel forced to follow decisions about my work”; α_{T1} = .84; α_{T2} = .82), four for competence (e.g., “I feel like a failure”; α_{T1} = .89; α_{T2} = .88), and five for relatedness (e.g., “I feel excluded”; α_{T1} = .89; α_{T2} = .91). Need unfulfillment was measured through four items for autonomy (e.g., “I am confused as to when I can make decisions”; α_{T1} = .82; α_{T2} = .83), three for competence (e.g., “I feel like I have improved less than I would have liked to”; α_{T1} = .70; α_{T2} = .70), and five for relatedness (e.g., “I feel I don’t quite fit in with others”; α_{T1} = .81; α_{T2} = .83).

Work motivation. The original French version of the Multidimensional Work Motivation Scale (Gagné et al., 2015) was used. Employees indicated how much (1–*not at all*; 7–*completely*) each statement reflected a reason for which they devoted effort to their job. This 19-item instrument included six subscales: Amotivation (3 items; α_{T1} = .84; α_{T2} = .77; e.g., “I don’t know why I’m doing this job, it’s pointless work”), external material regulation (3 items; α_{T1} = .68; α_{T2} = .66; e.g., “Because I risk losing my job if I don’t put enough effort in it”), external social regulation (3 items; α_{T1} = .71; α_{T2} = .74; e.g., “To get others’ approval [e.g., supervisor, colleagues, family, clients...]”), introjected regulation (4 items; α_{T1} = .68; α_{T2} = .71; e.g., “Because otherwise I will feel bad about myself”), identified regulation (3 items; α_{T1} = .67; α_{T2} = .65; e.g., “Because I personally consider it important to put efforts in this job”), and intrinsic motivation (3 items; α_{T1} = .89; α_{T2} = .88; e.g., “Because I have fun doing my job”).

Analyses

Preliminary Analyses

The psychometric properties of all multi-item measures used in this research were verified as part of preliminary factor analyses. Details on these analyses (factor structure, measurement invariance over time, composite reliability, and correlations) are reported in the online supplements (Tables S1 to S8). The main analyses relied on factor scores taken from these preliminary analyses (Meyer & Morin, 2016; Morin et al., 2016b). To ensure comparability over time, factor scores were obtained from models specified as invariant across time-lags (Millsap, 2011), and estimated in standardized units (*SD* = 1; *M* = 0). Factor scores provide partial control for unreliability (Skrondal & Laake, 2001) and preserve the

structure of the measurement model (e.g., invariance; Morin et al., 2016a).

Model Estimation

Analyses were conducted using the maximum likelihood robust (MLR) estimator implemented in Mplus 8.6 (Muthén & Muthén, 2021). Missing responses were handled using full information maximum likelihood procedures (FIML), allowing us to estimate time-lagged models using all the participants who responded to at least one data collection time (n = 590). We used all of the available information to estimate each model parameter without having to rely on a suboptimal listwise deletion strategy which would include only participants who completed both measurements (n = 178).

Latent Profile Analyses (LPA)

Time-specific LPA models were first estimated using all need states as indicators. LPA models are designed to identify a finite set of latent subpopulations (profiles) of participants characterized by distinct configurations on a set of indicators, while allowing for within profile variability on all indicators (McLachlan & Peel, 2000). Each participant is assigned a probability of membership of each of the latent profiles, which provides a way to assess the LPA model while controlling for classification errors. At each time point, solutions including one to eight profiles were estimated, allowing the means and variances of the indicators to be freely estimated (Morin & Litalien, 2019).

Model Comparison and Selection

We examined how many profiles to retain at each time point while relying on a consideration of whether the profiles themselves are meaningful, aligned with theory, and statistically adequate (Marsh et al., 2009; Morin, 2016). Statistical indicators (McLachlan & Peel, 2000) were also consulted. Specifically, statistical research has shown that lower values on the Bayesian Information Criterion (BIC), Consistent AIC (CAIC), sample-size Adjusted BIC (ABIC), and statistically significant p-values on the Bootstrap Likelihood Ratio Test (BLRT) indicate better fitting models and are efficient at helping to identify the number of latent profiles (e.g., Diallo et al., 2016, 2017). Yet, the Akaïke Information Criterion (AIC) and the adjusted Lo, Mendell and Rubin's (2001) Likelihood Ratio Test (aLMR) should not be used for purposes of model comparison and selection (e.g., Diallo et al., 2016, 2017) but are reported for purposes of transparency. Because these tests all suffer from strong sample size dependency (Marsh et al., 2009), they often fail to converge on a specific number of profiles. Thus, we also relied on a graphical display of these indicators (i.e., elbow plot), in which the observation of a plateau in the decrease in the value of these indicators helps to pinpoint the optimal solution (Morin et al., 2011). Finally, we estimated the classification accuracy (from 0 to 1) by looking at the entropy value, which, however, should not be used to select the optimal number of profiles (Lubke & Muthén, 2007).

Time-Lagged Tests of Profile Similarity

After selecting the best model, we looked at whether each measurement occasion resulted in the estimation of the same number of profiles. To assess within-sample profile similarity, we then followed Morin and Litalien's (2017) recommendations and combined the two time-specific LPA solutions in a model of *configural* similarity. Equality constraints were then imposed on the within-profile means (*structural* similarity), variances (*dispersion* similarity), and size (*distributional* similarity). The CAIC, BIC, and ABIC were used to contrast these models so that each form of profile similarity could be supported as long as at least two of these indices decreased following the integration of equality constraints (Morin et al., 2016b).

Latent Transition Analyses (LTA)

The most similar time-lagged LPA solution was re-expressed as a LTA to investigate within-person stability and transitions in profile membership (Collins & Lanza, 2010). This LTA solution, and all following analyses, were specified using the manual three-step approach (Asparouhov & Muthén, 2014) outlined by Morin and Litalien (2017). Readers interested in a detailed coverage of the technical and practical aspects involved in the estimation of LPA and LTA are referred to Morin and Litalien (2019).

Predictors and Outcomes of Profile Membership

We assessed the extent to which the relations between profiles, predictors (*predictive* similarity), and outcomes (*explanatory* similarity) remained the same over time. Demographics (sex, age, sector, contract type, weekly work hours, and supervisor-subordinate dyad tenure) were first considered across a series of four models in which their association with profile membership was specified using a multinomial logistic regression link function. First, we estimated a null effects model assuming no relations between these variables and the profiles. Second, the effects of these demographic variables were freely estimated, and allowed to vary over time and as a function of T1 profile membership (to

assess the effects on specific profile transitions). Third, predictions were allowed to differ over time only. Finally, a model of *predictive* similarity was estimated by constraining these associations to be equal over time. Relations between the predictors (need supportive, thwarting, and indifferent interpersonal behaviors) and profile membership were then assessed in the same sequence.

Time-specific outcomes (global self-determination, specific intrinsic motivation, specific identified regulation, specific introjected regulation, specific external material regulation, specific external social regulation, and specific amotivation) were directly included to the final LTA and allowed to vary as a function of participants' profile membership at the same time point. Outcome measures at T2 were controlled for what they share with their T1 counterparts (i.e., stability) due to their joint inclusion in the model. *Explanatory* similarity was then assessed by constraining these associations to be equal over time. The multivariate delta method was used to test the statistical significance of between-profile differences in outcome levels (Raykov & Marcoulides, 2004).

Results

Preliminary Analyses

These analyses are presented in detail in the online supplements (Tables S1 to S6). Altogether, these analyses provided support for a bifactor-Exploratory Structural Equation Modeling (ESEM) representation of psychological need states including one G-factor (global psychological need experience) and nine S-factors (autonomy, competence, and relatedness satisfaction, autonomy, competence, and relatedness unfulfillment, and autonomy, competence, and relatedness frustration). Given that the G-factor was defined by positive loadings from need frustration and unfulfillment items, and negative loadings from the need satisfaction items, we hereafter refer to it as reflecting employees' negative global psychological need experience. Results also provided support for a bifactor-ESEM representation of work motivation including one G-factor (global self-determination) and six S-factors (intrinsic motivation, identified regulation, introjected regulation, external social regulation, external material regulation, and amotivation). Contrastingly, results showed the superiority of a three-factor (need supportive, need indifferent, and need thwarting behaviors) ESEM representation of supervisors' interpersonal behaviors, when compared to bifactor-ESEM solutions.

Latent Profile Analyses (LPA)

The statistical indicators associated with each of the time-specific LPA solutions are reported in Table S9 of the online supplements, and are graphically illustrated in Figures S1 and S2 of the same supplements. These indicators failed to pinpoint a clearly dominant solution at both time points. However, both elbow plots revealed inflexion points corresponding to the four- and six-profile solutions. Solutions including three to seven profiles were thus carefully examined. This examination revealed that all of these solutions were highly similar across time points and that adding profiles resulted in a meaningful contribution to the solution, up to six profiles (i.e., each additional profile presented a well-differentiated and meaningful shape). However, adding a seventh profile only resulted in the splitting of one profile into two smaller ones with a comparable configuration. Based on this observation, we chose to retain the six-profile solution at both time points for further analyses.

The fit indices from all time-lagged models are reported in Table 1. Starting with a model of *configural* similarity including six profiles per time point, equality constraints were progressively integrated. The second model of *structural* similarity was supported by the data as it resulted in lower BIC, ABIC, and CAIC values. The *dispersion* and *distributional* similarity of the solution was also supported by the data, resulting in lower BIC and CAIC values. The model of *distributional* similarity was thus retained for interpretation and further analyses. This model is graphically represented in Figure 2, and detailed parameter estimates from this model are reported in Tables S10 and S11 of the online supplements. This solution displayed a high level of classification accuracy, ranging from 83.6% to 94.1% across T1 profiles, from 78.8% to 94.7% at T2, and summarized in a high entropy value of .874.

Profile 1 displayed low levels of negative global psychological need experience and average-to-moderately low levels of specific need states. This *Globally Positive and Average Specific* profile characterized 19.61% of the participants (N = 116). Members of Profile 2 reported moderately high levels of negative global psychological need experience, high levels of specific autonomy unfulfillment, and low levels of specific autonomy satisfaction, competence frustration, and relatedness frustration, while all other specific need states were characterized by average levels. This *Globally Average and Mixed Specific* profile characterized 15.25% of the participants (N = 90). Profile 3 displayed moderately high levels of negative global psychological need experience, high levels of specific relatedness

satisfaction, moderately high levels of specific competence frustration and competence unfulfillment and moderately low levels of specific competence need satisfaction, while all other indicators were characterized by average levels. This *Globally Negative and Mixed Specific* profile characterized 23.24% of the participants (*N* = 137). Members of Profile 4 reported very low levels of negative global psychological need experience, and average-to-moderately high or low levels of specific need states. This *Globally Very Positive and Average Specific* profile characterized 14.84% of the participants (*N* = 88). Profile 5 displayed very low levels of negative global psychological need experience and specific relatedness unfulfillment, low levels of specific competence unfulfillment, moderately low levels of specific autonomy unfulfillment, moderately high levels of specific competence and relatedness satisfaction, high levels of specific competence frustration, and very high levels of specific relatedness frustration, while specific autonomy satisfaction and autonomy frustration displayed average levels. This *Globally Very Positive and Mixed Specific* profile characterized 6.15% of the participants (*N* = 36). Finally, members of Profile 6 reported very high levels of negative global psychological need experience, high levels of specific competence satisfaction, relatedness unfulfillment, competence frustration, and relatedness frustration, low levels of specific relatedness satisfaction, and average levels of all other specific need states. This *Globally Very Negative and Mixed Specific* profile characterized 20.91% of the participants (*N* = 123).

Latent Transitions Analyses (LTA)

Membership of Profiles 1 (*Globally Positive and Average Specific*: Stability of 95.4%), 3 (*Globally Negative and Mixed Specific*: Stability of 97.8%), and 4 (*Globally Very Positive and Average Specific*: Stability of 98.9%) was highly stable over time. Membership of Profiles 2 (*Globally Average and Mixed Specific*: Stability of 69.7%), 5 (*Globally Very Positive and Mixed Specific*: Stability of 78.4%), and 6 (*Globally Very Negative and Mixed Specific*: Stability of 80.9%) was also stable over time. Our results thus revealed a high level of profile stability. The transition probabilities estimated as part of the LTA are reported in Table 2 and indicate the profiles to which members were most inclined to transition, in the rare cases where transitions occurred between T1 and T2. Members of Profile 2 (*Globally Average and Mixed Specific*) at T1 only transitioned to Profile 1 (*Globally Positive and Average Specific*) at T2 (30.3%). Members of Profile 5 (*Globally Very Positive and Mixed Specific*) at T1 mostly transitioned to Profile 4 (*Globally Very Positive and Average Specific*) at T2 (21.0%). Finally, members of Profile 6 (*Globally Very Negative and Mixed Specific*) at T1 mostly transitioned to Profiles 2 (*Globally Average and Mixed Specific*; 8.7%) and 3 (*Globally Negative and Mixed Specific*; 9.7%) at T2.

Predictors of Profile Membership

As shown in Table 1, the lowest values on all information criteria were associated with the null effects model, consistent with a lack of associations between profile membership and demographic variables. As a result, demographic predictors were excluded from further analyses. The next set of results indicated that the associations between the theoretical predictors and the profiles generalized over time (i.e., supporting the model of *predictive* similarity).

Results detailed in Table 3 revealed that need thwarting behaviors predicted a decreased likelihood of membership into the *Globally Positive and Average Specific* (1) and *Globally Average and Mixed Specific* (2) profiles relative to the *Globally Very Negative and Mixed Specific* (6) profile. Need thwarting behaviors also predicted a decreased likelihood of membership into the *Globally Positive and Average Specific* (1) and *Globally Average and Mixed Specific* (2) profiles relative to the *Globally Very Positive and Mixed Specific* (5) profile. Moreover, need thwarting behaviors predicted a decreased likelihood of membership into the *Globally Positive and Average Specific* (1) and *Globally Average and Mixed Specific* (2) profiles relative to the *Globally Negative and Mixed Specific* (3) profile. Contrastingly, need supportive behaviors predicted an increased likelihood of membership into the *Globally Negative and Mixed Specific* (3) and *Globally Very Positive and Mixed Specific* (5) profiles relative to the *Globally Very Negative and Mixed Specific* (6) profile. Need supportive behaviors also predicted a decreased likelihood of membership into the *Globally Positive and Average Specific* (1), *Globally Average and Mixed Specific* (2), *Globally Negative and Mixed Specific* (3), and *Globally Very Positive and Average Specific* (4) profiles relative to the *Globally Very Positive and Mixed Specific* (5) profile. Need indifferent behaviors predicted a decreased likelihood of membership into the *Globally Very Positive and Average Specific* (4) and *Globally Very Positive and Mixed Specific* (5) profiles relative to the *Globally Very Negative and Mixed Specific* (6) profile. Need indifferent behaviors also predicted an increased likelihood of membership into the *Globally Average and Mixed Specific* (2) and

Globally Negative and Mixed Specific (3) profiles relative to the *Globally Very Positive and Mixed Specific* (5) profile. Finally, need indifferent behaviors predicted an increased likelihood of membership into the *Globally Average and Mixed Specific* (2) profile relative to the *Globally Very Positive and Average Specific* (4) profile.

Outcomes of Profile Membership

The model of *explanatory* similarity resulted in the lowest values on the information criteria and was, thus, supported by the data (see Table 1). Mean levels of the outcomes in each of the profiles are reported in Table 4 and illustrated in Figure 3. A very rich pattern of profile-outcomes associations that differ across outcomes, and generally support the distinctiveness of the profiles at the outcome level was revealed and is also detailed in Table 4.

Results detailed in Table 4 (see main manuscript) showed that the highest levels of global self-determination were observed in Profile 5 (*Globally Very Positive and Mixed Specific*), followed by Profile 1 (*Globally Positive and Average Specific*), which was itself followed equally by Profiles 3 (*Globally Negative and Mixed Specific*) and 4 (*Globally Very Positive and Average Specific*), then by Profile 2 (*Globally Average and Mixed Specific*), and finally by Profile 6 (*Globally Very Negative and Mixed Specific*), although not all differences between these profiles were statistically significant (i.e., Profile 2 did not differ from Profile 3). The highest levels of specific intrinsic motivation were observed in Profile 4 (*Globally Very Positive and Average Specific*), followed equally by Profiles 1 (*Globally Positive and Average Specific*), 2 (*Globally Average and Mixed Specific*), 3 (*Globally Negative and Mixed Specific*), 5 (*Globally Very Positive and Mixed Specific*), and 6 (*Globally Very Negative and Mixed Specific*), although not all differences between these profiles were statistically significant (i.e., Profile 1 did not differ from 3, Profile 2 did not differ from Profile 4, and Profile 5 did not differ from Profile 6). The highest levels of specific identified regulation were observed in Profiles 3 (*Globally Negative and Mixed Specific*) and 5 (*Globally Very Positive and Mixed Specific*) which did not differ between them, followed by Profile 1 (*Globally Positive and Average Specific*), then equally by Profiles 4 (*Globally Very Positive and Average Specific*) and 6 (*Globally Very Negative and Mixed Specific*), and finally by Profile 2 (*Globally Average and Mixed Specific*), although not all differences between these profiles were statistically significant (i.e., Profile 1 did not differ from Profile 3, Profile 2 did not differ from Profile 4, and Profile 3 did not differ from Profile 6).

The highest levels of specific introjected regulation were observed in Profiles 1 (*Globally Positive and Average Specific*), 2 (*Globally Average and Mixed Specific*), and 6 (*Globally Very Negative and Mixed Specific*), followed equally by Profiles 3 (*Globally Negative and Mixed Specific*) and 5 (*Globally Very Positive and Mixed Specific*), and finally by Profile 4 (*Globally Very Positive and Average Specific*), although not all differences between these profiles were statistically significant (i.e., Profiles 1 and 2 did not differ from Profiles 3 and 5, and Profile 4 did not differ from Profile 5). The highest levels of specific external social regulation were observed in Profile 6 (*Globally Very Negative and Mixed Specific*), followed equally by Profiles 1 (*Globally Positive and Average Specific*), 2 (*Globally Average and Mixed Specific*), 3 (*Globally Negative and Mixed Specific*), and 5 (*Globally Very Positive and Mixed Specific*), and finally by Profile 4 (*Globally Very Positive and Average Specific*), although not all differences between these profiles were statistically significant (i.e., Profiles 2 and 3 did not differ from Profile 6, and Profile 4 did not differ from Profile 5). The highest levels of specific external material regulation were observed in Profile 6 (*Globally Very Negative and Mixed Specific*), followed equally by Profiles 2 (*Globally Average and Mixed Specific*) and 3 (*Globally Negative and Mixed Specific*), and finally by Profiles 1 (*Globally Positive and Average Specific*), 4 (*Globally Very Positive and Average Specific*), and 5 (*Globally Very Positive and Mixed Specific*), although not all differences between these profiles were statistically significant (i.e., Profiles 2 and 3 did not differ from Profile 6, Profiles 1 and 5 did not differ from Profiles 2 and 3, and Profile 2 did not differ from Profile 4).

Finally, the highest levels of specific amotivation were observed in Profile 6 (*Globally Very Negative and Mixed Specific*), followed by Profiles 3 (*Globally Negative and Mixed Specific*), 4 (*Globally Very Positive and Average Specific*), and 5 (*Globally Very Positive and Mixed Specific*) which did not differ from one another, and equally by Profiles 1 (*Globally Positive and Average Specific*) and 2 (*Globally Average and Mixed Specific*), although not all differences between these profiles were statistically significant (i.e., Profile 3 did not differ from Profile 6, and Profile 1 did not differ from Profile 4).

Discussion

By examining workers' psychological need states profiles, their contextual predictors and

motivational outcomes, this research offers the first comprehensive time-lagged examination of the core constructs and motivational processes underlying SDT (Ryan & Deci, 2017) in the work context.

Theoretical and Practical Contributions

Our findings contribute to the literature in several ways. First, extending past research in the workplace (Gillet et al., 2019; Huyghebaert-Zouaghi et al., 2020; Rouse et al. 2020; Tóth-Király et al., 2018), we document for the first time the role of need unfulfillment (alongside need satisfaction and frustration) in employees' need states profiles. Our findings reinforce the importance of considering this third and distinctive need state (Huyghebaert-Zouaghi et al., 2021). Second, by documenting the motivational outcomes of these need states combinations, this research emphasizes the central role played by both global need states experiences and by specific need unfulfillment states in predicting (sub)optimal functioning. Third, by examining predictors of need states profiles, we provide a new perspective for SDT and organizational research, by showing that supervisors' need indifferent behaviors are more consistently deleterious for their subordinates than need thwarting behaviors. We further discuss these contributions and their practical implications in the following sections.

Psychological Need States Profiles Over Time

Our research provides the first time-lagged evidence for the combinations of need satisfaction, frustration, and unfulfillment. Specifically, results revealed the presence of six psychological need states profiles, thus going beyond our expectation to identify four or five profiles (Hypothesis 1). It is possible that the inclusion of need unfulfillment alongside need satisfaction and frustration may have contributed to the presence of additional profiles.

The six identified profiles provided partial support for Hypothesis 2. As hypothesized, we identified a predominantly negative profile (Profile 6 – *Globally Very Negative and Mixed Specific*), and not just one but two predominantly positive profiles (Profile 4 – *Globally Very Positive and Average Specific* and Profile 5 – *Globally Very Positive and Mixed Specific*). Interestingly, the *Globally Very Positive and Mixed Specific* profile displayed contrasted levels of specific need states, which corresponded to our expectation for a mixed profile. This result is consistent with prior findings suggesting that profiles characterized by lower levels of global need experience tend to show more imbalance in specific levels of experiential need states (Gillet et al., 2019; Huyghebaert-Zouaghi et al., 2020). In line with our expectations, we also identified a profile dominated by one psychological need (i.e., competence) across experiential states (Profile 3 – *Globally Negative and Mixed Specific*). This result adds up to prior findings showing the salience of the need for competence for employees' psychological need experiences (Huyghebaert-Zouaghi et al., 2020; Rouse et al., 2020).

Unexpectedly, we did not identify the hypothesized normative profile, which contrasts with prior person-centered research on psychological need states (Gillet et al., 2019; Huyghebaert-Zouaghi et al., 2020; Rouse et al. 2020; Tóth-Király et al., 2018). Moreover, we identified two profiles that we did not hypothesize. First, we identified a moderately positive profile (Profile 1 – *Globally Positive and Average Specific*), which shows that one's positive global psychological need experience can be experienced in a more temperate manner by some individuals (close to 20% in this sample). Second, we identified a profile characterized by the salience of high levels of specific autonomy unfulfillment (Profile 2 – *Globally Average and Mixed Specific*). This result thus corroborates the importance of considering this distinct need experience (i.e., need unfulfillment states, Huyghebaert-Zouaghi et al., 2021), as it reflects a reality that may be predominant in the professional life of some individuals (over 15% in this sample).

Altogether, these results show the importance of disentangling the global and specific components of psychological need states when examining how these components combine among specific subpopulations of employees. Indeed, relying on bifactor modeling allows to avoid the erroneous and artificial identification of profiles characterized by similar levels across indicators (Rouse et al., 2020; Tóth Király et al., 2018). In doing so, we were able to confirm that the various psychological need states are distinctive and not mutually exclusive psychological experiences that may co-occur in the work lives of some individuals. For instance, members of Profile 5 seemed to have a very positive general impression of their work experience, while also having specific experiences that deviate from this general perception in relation to their needs for autonomy and relatedness. Indeed, although this profile was the smallest, about 6% of the participants seemed to simultaneously experience above average levels of autonomy and relatedness satisfaction and frustration. In practical terms, these participants both experienced a sense of ownership of their actions at work (autonomy satisfaction) while also

feeling coerced into acting in certain ways at work (autonomy frustration), and experienced both mastery (competence satisfaction) and inadequacy (competence frustration) in their work environment. It is possible that these distinct specific experiences stem from different aspects of the job. For instance, a worker could feel autonomous because they are able to take initiative in terms of work content and planification (e.g., Fernet et al., 2013) while also feeling coerced by red tape and emotional display rules (e.g., Huyghebaert et al., 2018a). This explanation seems particularly consistent with our highly educated sample of service industry workers. It is also possible, and not mutually exclusive with the previous idea, that workers fluctuate between these different specific need states on a daily basis (e.g., Hancox et al., 2017). More research into the predictors, the temporal dynamics and the inter- and intra-individual variations of psychological need states is needed to test these possibilities.

Finally, results showed that membership of all the identified profiles was very stable over time (i.e., stability > 70%). We believe that the stability of the profiles is not due to the time lag we chose since prior person-centered research based on the same time-lag (i.e., three months) found some highly instable need satisfaction profiles (e.g., stability of 12.2%; Huyghebaert-Zouaghi et al., 2020). Moreover, emerging research relying on shorter time-lags shows that psychological need states at work even fluctuate on a daily basis (Hewett et al., 2017; van Hoof & Geurts, 2015). More research is needed to examine whether this high stability is specific to our sample or whether profiles based on the distinct need states (satisfaction, frustration, unfulfillment of the needs for autonomy, competence, and relatedness) are stable across occupations and socio-cultural contexts. Nonetheless, our results provide preliminary evidence that the identified psychological need states profiles reflect a rather stable phenomenon that can be relied upon to guide interventions (Meyer & Morin, 2016).

Motivational Outcomes of Profile Membership

This research offered a first-in-the literature examination of the relations between all nine of employees' psychological need states (satisfaction, unfulfillment, and frustration of the needs for autonomy, competence, and relatedness; Huyghebaert-Zouaghi et al., 2021) and their work motivation. In doing so, we provided valuable information regarding the most desirable and deleterious profiles in terms of motivational consequences. Indeed, we provided support for Hypothesis 4a by showing that higher levels of global self-determination and of autonomous forms of work motivation are indeed found in the most positive need states profiles (i.e., *Globally Very Positive and Mixed Specific* and *Globally Very Positive and Average Specific*). Interestingly, both these profiles were very positive in terms of global psychological need experience and characterized by above average levels of specific need satisfaction and frustration, and by low levels of specific need unfulfillment. The presence of need satisfaction combined with the absence of need unfulfillment thus appears to be key in predicting the most optimal work motivation, even in the presence of need frustration.

Conversely, results provided partial support for Hypotheses 4b and 4c by showing that members of the predominantly negative profile (i.e., *Globally Very Negative and Mixed Specific* profile) experienced higher levels of most controlled forms of motivation and of amotivation. Moreover, they had the lowest levels of global self-determination. Contrastingly, and contradicting Hypothesis 4b, the highest levels of specific introjected regulation were identified in the *Globally Average and Mixed Specific* profile. Interestingly, this profile was most notably characterized by the salience of high levels of specific autonomy unfulfillment and by average levels of global psychological need experience. This result thus indicates that feelings of confusion and uncertainty (i.e., specific autonomy unfulfillment), combined with a rather monotonous global need experience (the most average of all profiles), makes employees more inclined to engage in their work because of internal pressures (e.g., to avoid guilt or shame; introjected regulation), in the absence of a clear frame of reference (autonomy unfulfillment).

In sum, our results show that managers and human resources/occupational health professionals should focus on creating conditions for employees to experience very positive global psychological need experiences (only about 20% of this sample had such experiences) and to prevent them from very negative global psychological need experiences (evidenced in over 20% of this sample) or from psychological experiences dominated by need unfulfillment (reported by 15% of this sample).

Supervisors' Interpersonal Behaviors as Predictors of Profile Membership

We offered a first-in-the literature comprehensive examination of the three types of supervisors' interpersonal behaviors (need supportive, thwarting, and indifferent) in relation to all nine of employees' psychological need states (satisfaction, unfulfillment, and frustration of the needs for autonomy, competence, and relatedness; Huyghebaert-Zouaghi et al., 2021). Moreover, we provided

the first time-lagged investigation of need indifferent behaviors in the work context. When looking at key results, both need indifferent and need thwarting behaviors predicted a higher likelihood of membership in the profile that was the most detrimental for employees' motivation (*Globally Very Negative and Mixed Specific*). These findings provided preliminary support for Hypothesis 3a and more generally for SDT (Ryan & Deci, 2017). However, while need indifferent behaviors also predicted a lower likelihood of membership in the profile that was the most beneficial for employees' work motivation (*Globally Very Positive and Mixed Specific*), need thwarting behaviors predicted a greater likelihood of membership into this beneficial profile. Contradicting Hypothesis 3a, these results show the distinctive implications of exposure to need indifferent versus thwarting behaviors from supervisors: whereas the former clearly results in the most detrimental global psychological need experiences, the latter may result in more varied psychological experiences.

Indeed, on one hand, this result could suggest that, when facing a supervisor who obstructs and threatens their psychological needs, subordinates may engage in need crafting behaviors (De Bloom et al., 2020) by seeking need support from other sources (e.g., colleagues; Moreau & Mageau, 2012) as a way to experience positive need states. Indeed, such need-thwarting situations have a motivational force yielding behaviors which aim at restoring the deprived needs (e.g., Radel et al., 2013). In other words, we suggest that when subordinates are exposed to thwarting behaviors from their supervisors, their psychological experiences may depend on whether they yield to these actively adverse behaviors or engage in proactive behaviors to overcome them.

On the other hand, our results indicate that need indifferent behaviors may be more consistently deleterious than need thwarting behaviors, thus adding to the proposal that passive and neglectful forms of managerial behaviors may be more destructive than actively adverse ones (Skogstad et al., 2007). From a theoretical point of view, these results emphasize the value of considering this type of interpersonal behaviors from supervisors when seeking to understand the drivers of employees' psychological functioning. More generally, these results provide support for the theoretical suggestion (Bhavsar et al., 2019; Huyghebaert-Zouaghi et al., 2021) that SDT's motivational processes may be expanded from two to three. Indeed, our research indicates that SDT's dual motivational pathway (Bartholomew et al., 2011; Trépanier et al., 2015) may be complemented by a third pathway triggered by indifferent behaviors. From an applied point of view, though these neglectful supervisory behaviors may be trivialized in organizations, as they are not seen as actively adverse as need thwarting behaviors, and may be commonplace in what some refer to as a "leadership talent crisis" (DeRue & Myers, 2014), our results highlight the importance for organizations and managers to prevent them.

Finally, our results confirm Hypothesis 3b by showing that supervisors' need supportive behaviors promote the most positive and beneficial psychological need experience (higher likelihood of membership into the *Globally Very Positive and Mixed Specific* profile). Our results also go beyond Hypothesis 3b by showing that need supportive behaviors protect from the most the most detrimental psychological need experience (lower likelihood of membership into the *Globally Very Negative and Mixed Specific*). Our results are thus in line with prior variable-centered research (e.g., Gillet et al., 2012) and more generally with SDT (Ryan & Deci, 2017), and encourage organizations and human resources professionals to search for, nurture and promote such supportive managerial behaviors.

Limitations and Suggestions for Future Research

Although this research offered some theoretical contributions, it still presents some limitations. First, we relied on a convenience sample of French employees. Thus, it is unknown whether our results could generalize to other cultural groups. This question is of particular relevance, as the universality of need support and psychological need states is a key tenet of SDT (Vansteenkiste et al., 2020). In examining the generalizability of our findings, future research could explore whether employees from specific occupational groups experience more variation in relatedness and competence frustration than participants in the present study. Indeed, our study seems to have been characterized by a restriction of range in these two need states (see Table S8). Although this restriction of range may be considered a limitation of our study, this is likely to have resulted in an underestimation (rather than an overestimation) of the role played by these need states in the categorization of participants (i.e., profile membership) and in the prediction of their work motivation. Second, we relied on only one source of information (i.e., subordinates), which may have created biases in employees' ratings of their supervisors' interpersonal behaviors. The use of a dyadic approach and of self-report measures of interpersonal behaviors by supervisors themselves could allow to address this limitation (e.g., Jiang et

al., 2020). Third, this study was conducted over the course of three months with only two waves of data. Longitudinal designs conducted over longer time spans (e.g., a year; Trépanier et al., 2016) or even shorter ones (e.g., a daily diary study; Hewett et al., 2017) could allow for a more thorough examination of the temporal and dynamic nature of motivational processes in the workplace. Fourth, future research could look into how supervisors' interpersonal behaviors combine to predict employees' psychological need states and work motivation (e.g., Chénard-Poirier et al., 2021). Indeed, research has recently offered a more intertwined consideration of interpersonal behaviors, suggesting that different types of behaviors (e.g., supportive, thwarting, indifferent) could combine in a way that is more or less thwarting or supportive of individuals' psychological needs (e.g., Haerens et al., 2018).

Fifth, we approached supervisory behaviors through a SDT lens, yet this tripartite conceptualization clearly echoes the three leadership styles (laissez-faire, transactional, and transformational) conceptualized by the "full-range leadership theory" (Avolio & Bass, 1991), which has dominated leadership research up to this day. New research providing empirical evidence to disentangle the similarities and differences between these two conceptualizations could further demonstrate the added-value of this SDT-based conceptualization and measure, beyond that of well-established types of leadership behaviors (e.g., Huyghebaert-Zouaghi et al., 2022). Sixth, it would be fruitful for future research to consider the health-related consequences of the motivational processes examined in the present study. Indeed, SDT (Ryan & Deci, 2000, 2017) conceptualizes supervisors' behaviors as determinants of subordinates' motivation (through psychological needs) and, in turn, of their well- and ill-being (Vallerand, 1997). Yet, we did not assess indices of well- and ill-being in the present study. Therefore, more research is needed to understand the distinct health-related consequences of the bright, dark, and dim-light colors of motivational processes (Ntoumanis, 2022) for employees. Finally, in this research, we solely considered the outcomes of supervisory behaviors, yet, it would be interesting to explore their organizational antecedents. Indeed, scholars could examine how organizations may create the conditions for the most optimal forms of supervisory behaviors (need supportive) to develop and to prevent the deleterious ones (need thwarting and indifferent). Indeed, based on the trickle-down effect proposed by Eisenberger and Stinglhamber (2011), perceived organizational support may convey a norm according to which everyone within the organization is expected to be supportive of others (Frear et al., 2018) and spread in the form of need supportive supervisory behaviors. Conversely, organizational dehumanization (Nguyen & Stinglhamber, 2021) may convey a norm according to which dehumanizing mistreatments are acceptable and allow for thwarting and indifferent behaviors to occur.

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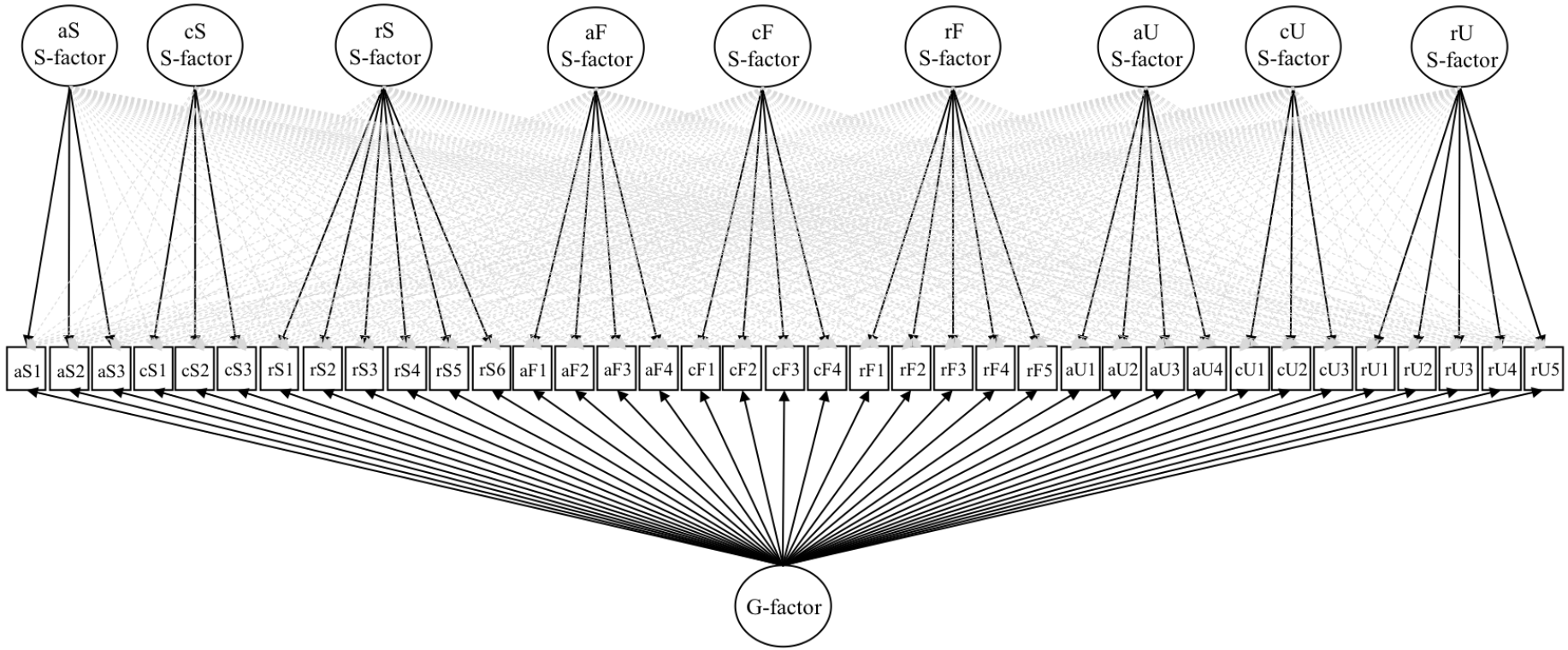
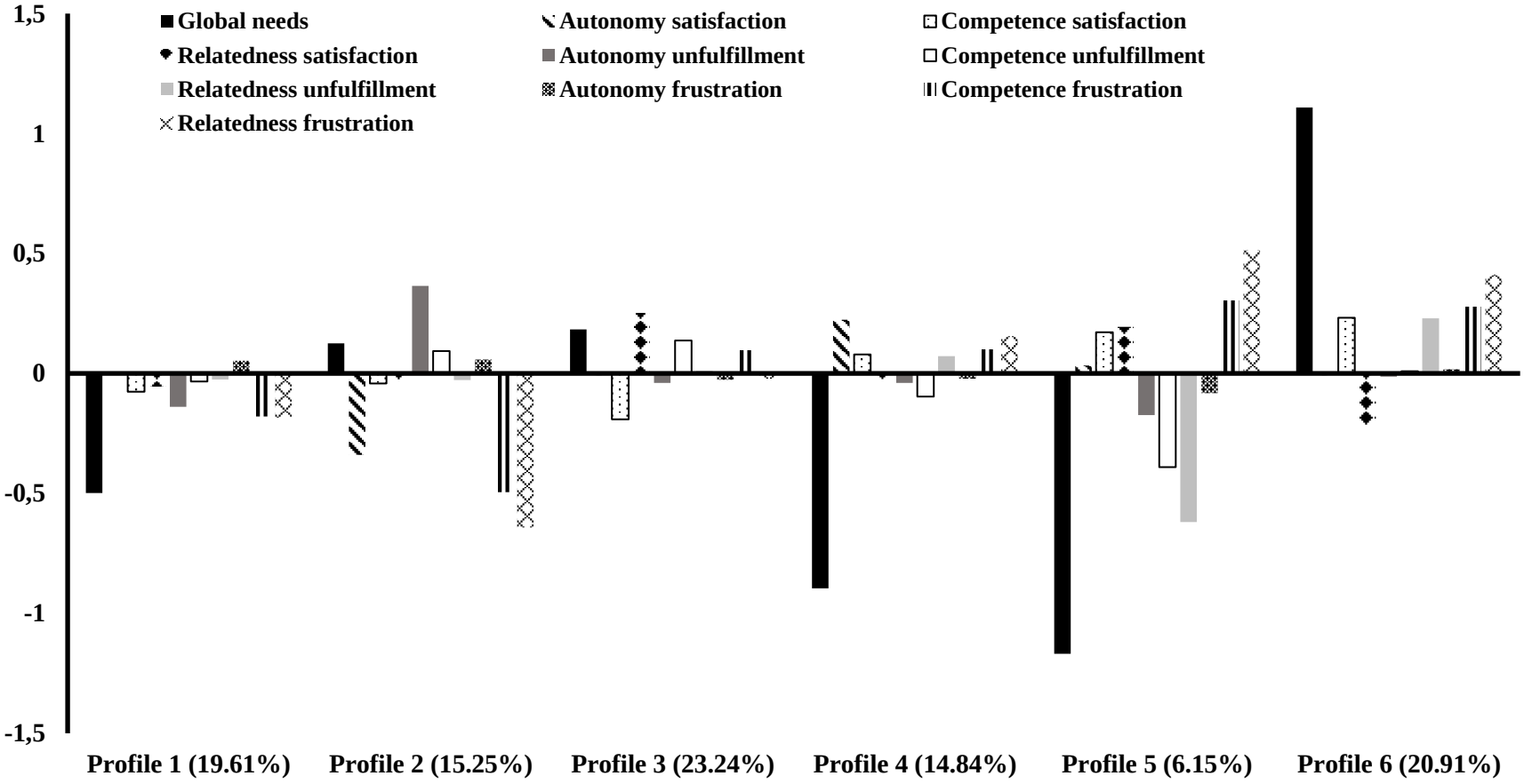
Figure 1

Graphical Illustration of a B-ESEM Representation of Ratings on the PNSW-S



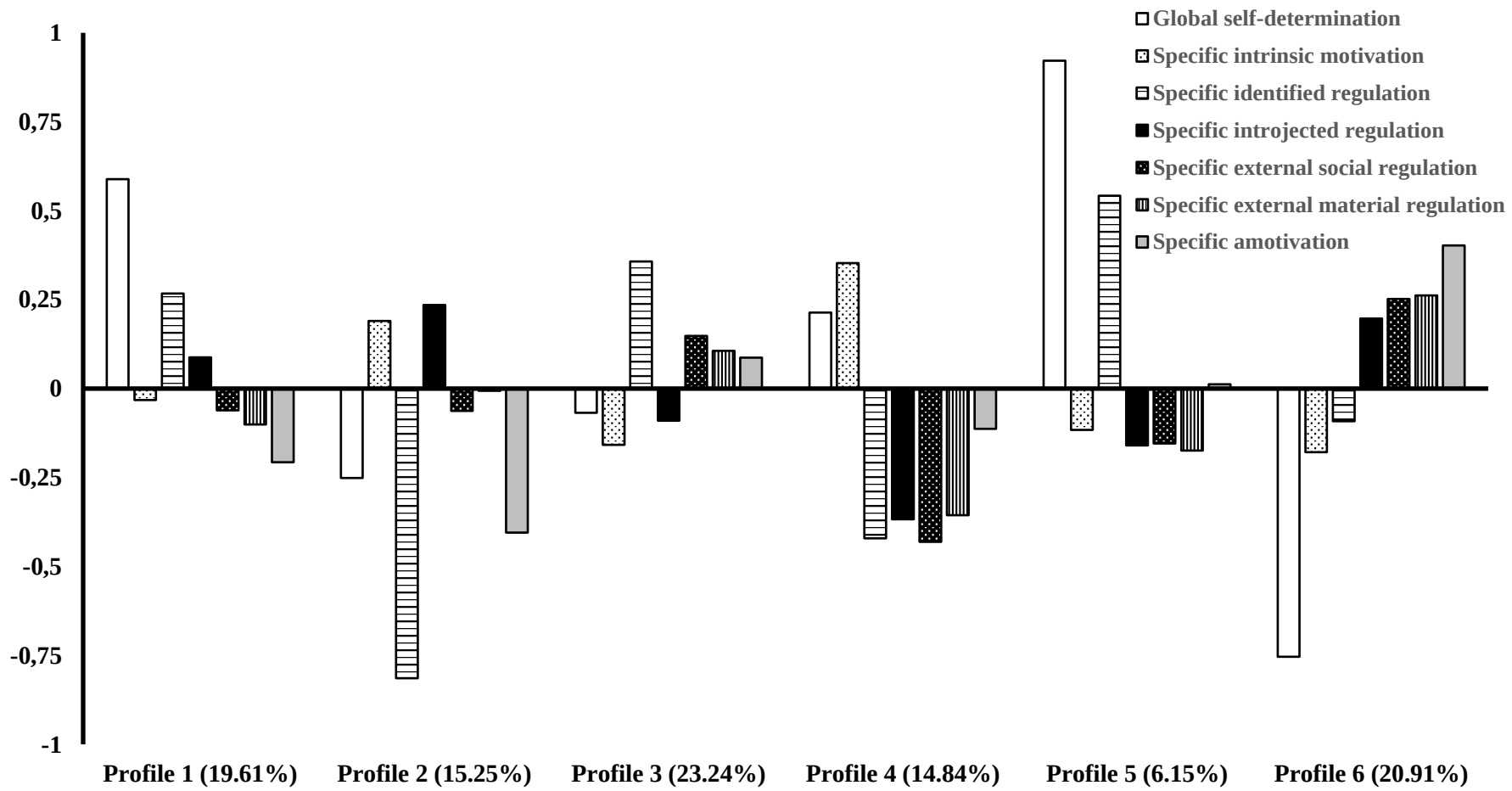
Note. Dashed lines indicate cross-loadings; B-ESEM: Bifactor Exploratory Structural Equation Modeling; PNSW-S: Psychological Need States at Work Scale; a: autonomy; c: competence; r: relatedness; S: satisfaction; F: frustration; U: unfulfillment; S-factor: specific factor; G-factor: global factor.

Figure 2
Final Six-Profile Solution



Note. Profile 1: *Globally Positive and Average Specific*; Profile 2: *Globally Average and Mixed Specific*; Profile 3: *Globally Negative and Mixed Specific*; Profile 4: *Globally Very Positive and Average Specific*; Profile 5: *Globally Very Positive and Mixed Specific*; and Profile 6: *Globally Very Negative and Mixed Specific.*

Figure 3
Motivation-Levels Observed in each Profile



Note. Indicators are estimated from factor scores with a mean of 0 and a standard deviation of 1; Profile 1: *Globally Positive and Average Specific*; Profile 2: *Globally Average and Mixed Specific*; Profile 3: *Globally Negative and Mixed Specific*; Profile 4: *Globally Very Positive and Average Specific*; Profile 5: *Globally Very Positive and Mixed Specific*; and Profile 6: *Globally Very Negative and Mixed Specific*.

Table 1

Results from the Time-Specific and Time-Lagged Models

Model	LL	#fp	Scaling	AIC	CAIC	BIC	ABIC	Entropy
Final Latent Profile Analyses								
Time 1	-6511.013	125	1.230	13272.026	13944.542	13819.542	13422.708	.834
Time 2	-5586.809	125	1.249	11423.618	12096.133	11971.133	11574.300	.781
Time-Lagged Latent Profile Analyses								
Configural Similarity	-12099.833	250	1.282	24699.665	26044.696	25794.696	25001.028	.807
Structural Similarity	-12166.670	190	1.457	24713.340	25735.563	25545.563	24942.376	.801
Dispersion Similarity	-12269.996	130	1.931	24799.993	25499.409	25369.409	24956.702	.782
Distributional Similarity	-12279.544	125	2.161	24809.088	25481.603	25356.603	24959.769	.782
Predictive Similarity: Demographics								
Null Effects Model	-5074.673	62	.828	10273.345	10606.913	10544.913	10348.083	.874
Profile-Specific Free Relations with Predictors	-4935.170	302	.540	10474.341	12099.138	11797.138	10838.388	.904
Free Relations with Predictors	-4992.676	122	.730	10229.352	10885.727	10763.727	10376.417	.917
Equal Relations with Predictors	-5040.610	92	.875	10265.220	10760.191	10668.191	10376.122	.874
Predictive Similarity: Predictors								
Null Effects Model	-3950.405	62	1.318	8024.810	8358.378	8296.378	8099.548	.874
Profile-Specific Free Relations with Predictors	-3684.543	182	.570	7733.087	8712.269	8530.269	7952.479	.901
Free Relations with Predictors	-3765.860	92	1.205	7715.720	8210.691	8118.691	7826.621	.887
Equal Relations with Predictors	-3788.857	77	1.283	7731.713	8145.983	8068.983	7824.533	.879
Explanatory Similarity								
Free Relations with Outcomes	-10282.872	203	1.276	20971.744	22063.909	21860.909	21216.451	.924
Equal Relations with Outcomes	-10308.300	161	1.458	20938.601	21804.800	21643.800	21132.678	.922

Note. LL: Model loglikelihood; #fp: Number of free parameters; Scaling: Scaling correction factor associated with robust maximum likelihood estimates; AIC: Akaïke information criteria; CAIC: Constant AIC; BIC: Bayesian information criteria; ABIC: Sample size adjusted BIC.

Table 2

Transitions Probabilities

	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6
Profile 1	.954	.000	.000	.008	.007	.031
Profile 2	.303	.697	.000	.000	.000	.000
Profile 3	.000	.000	.978	.006	.015	.000
Profile 4	.000	.009	.002	.989	.000	.000
Profile 5	.002	.000	.005	.210	.784	.000
Profile 6	.006	.087	.097	.000	.000	.809

Note. Profile 1: *Globally Positive and Average Specific*; Profile 2: *Globally Average and Mixed Specific*; Profile 3: *Globally Negative and Mixed Specific*; Profile 4: *Globally Very Positive and Average Specific*; Profile 5: *Globally Very Positive and Mixed Specific*; and Profile 6: *Globally Very Negative and Mixed Specific*.

Table 3

Results from the Predictive Analyses

	Profile 1 vs 6		Profile 2 vs 6		Profile 3 vs 6		Profile 4 vs 6		Profile 5 vs 6		Profile 1 vs 5	
Predictors	Coef. (SE)	OR	Coef. (SE)	OR	Coef. (SE)	OR	Coef. (SE)	OR	Coef. (SE)	OR	Coef. (SE)	OR
SB	.179 (.299)	1.196	.008 (.273)	1.008	.471 (.214)*	1.601	.119 (.464)	1.127	2.506 (.640)**	12.259	-2.327 (.643)**	.098
TB	-1.767 (.392)**	.171	-1.358 (.269)**	.257	-.267 (.173)	.766	-1.907 (1.070)	.148	.830 (.793)	2.293	-2.597 (.868)**	.074
IB	-.476 (.324)	.622	.055 (.286)	1.057	-.350 (.259)	.705	-1.061 (.484)*	.346	-2.265 (.987)*	.104	1.790 (.990)	5.987
	Profile 2 vs 5		Profile 3 vs 5		Profile 4 vs 5		Profile 1 vs 4		Profile 2 vs 4		Profile 3 vs 4	
Predictors	Coef. (SE)	OR	Coef. (SE)	OR	Coef. (SE)	OR	Coef. (SE)	OR	Coef. (SE)	OR	Coef. (SE)	OR
SB	-2.499 (.646)**	.082	-2.035 (.620)**	.131	-2.387 (.718)**	.092	.060 (.447)	1.062	-.112 (.469)	.894	.351 (.456)	1.421
TB	-2.188 (.828)**	.112	-1.097 (.784)	.334	-2.737 (1.428)	.065	.140 (1.075)	1.150	.549 (1.047)	1.732	1.640 (1.076)	5.157
IB	2.321 (.985)*	10.182	1.915 (.975)*	6.790	1.205 (1.138)	3.335	.585 (.499)	1.795	1.116 (.485)*	3.053	.711 (.466)	2.036
	Profile 1 vs 3		Profile 2 vs 3		Profile 1 vs 2							
Predictors	Coef. (SE)	OR	Coef. (SE)	OR	Coef. (SE)	OR						
SB	-.292 (.276)	.747	-.463 (.254)	.629	.171 (.294)	1.187						
TB	-1.500 (.401)**	.223	-1.091 (.282)**	.336	-.409 (.431)	.664						
IB	-.126 (.289)	.882	.405 (.238)	1.500	-.531 (.284)	.588						

Note. * $p < .05$; ** $p < .01$; SE: Standard error of the coefficient; OR: Odds ratio; SB: Supportive behaviors; TB: Thwarting behaviors; IB: Indifferent behaviors; the coefficients and OR reflect the effects of the predictors on the likelihood of membership into the first listed profile relative to the second listed profile; supportive, thwarting, and indifferent behaviors are estimated from factor scores with a standard deviation of 1 and a mean of 0; Profile 1: *Globally Positive and Average Specific*; Profile 2: *Globally Average and Mixed Specific*; Profile 3: *Globally Negative and Mixed Specific*; Profile 4: *Globally Very Positive and Average Specific*; Profile 5: *Globally Very Positive and Mixed Specific*; and Profile 6: *Globally Very Negative and Mixed Specific*.

Table 4

Associations between Profile Membership and the Outcomes Taken from the Model of Explanatory Similarity (Equal across Time Points)

	Profile 1 *M* [CI]	Profile 2 *M* [CI]	Profile 3 *M* [CI]	Profile 4 *M* [CI]	Profile 5 *M* [CI]	Profile 6 *M* [CI]	Summary of Statistically Significant Differences
Global self-determination	.589 [.474; .704]	-.251 [-.599; .097]	-.068 [-.330; .195]	.214 [-.039; .466]	.922 [.717; 1.128]	-.754 [-.979; -.530]	5 > 1 > 4 > 2 > 6; 5 > 1 > 2 = 3 > 6; 3 = 4
Specific intrinsic motivation	-.032 [-.150; .086]	.190 [-.126; .506]	-.158 [-.308; -.009]	.353 [.120; .585]	-.116 [-.320; .089]	-.179 [-.365; .006]	1 = 2 = 3 = 5 = 6; 4 > 1 = 3; 2 = 4; 4 > 5 = 6
Specific identified regulation	.267 [.086; .449]	-.814 [-1.437; -.191]	.357 [-.130; .845]	-.421 [-.845; .004]	.542 [.408; .677]	-.092 [-.382; .197]	5 > 1 > 6 > 2; 1 > 4; 1 = 3; 3 = 5 > 2 = 4; 3 = 6; 4 = 6
Specific introjected regulation	.088 [-.167; .343]	.235 [-.116; .586]	-.090 [-.272; .092]	-.367 [-.557; -.177]	-.160 [-.461; .141]	.197 [.025; .368]	1 = 2 = 3 > 4; 1 = 2 = 5; 1 = 2 = 6; 6 > 3 = 5; 6 > 4 = 5
Specific external social regulation	-.061 [-.296; .174]	-.063 [-.330; .203]	.148 [-.078; .375]	-.431 [-.596; -.265]	-.154 [-.487; .179]	.252 [.068; .435]	1 = 2 = 3 = 5; 2 = 3 = 6 > 4; 6 > 1 > 4; 6 > 4 = 5
Specific external material regulation	-.101 [-.269; .067]	-.006 [-.306; .295]	.106 [-.170; .382]	-.356 [-.535; -.177]	-.174 [-.520; .171]	.262 [.032; .491]	6 > 1 = 4 = 5; 3 > 4; 2 = 3 = 6; 1 = 2 = 3 = 5; 2 = 4
Specific amotivation	-.207 [-.314; -.101]	-.405 [-.573; -.237]	.087 [-.106; .279]	-.113 [-.274; .049]	.012 [-.136; .161]	.402 [.145; .658]	3 = 4 = 5 > 1 = 2; 3 = 6 > 1 = 2; 6 > 5; 6 > 1 = 4

Note. M: Mean; CI: 95% confidence interval; global self-determination, specific intrinsic motivation, specific identified regulation, specific introjected regulation, specific external social regulation, specific external material regulation, and specific amotivation are estimated from factor scores with a mean of 0 and a standard deviation of 1; Profile 1: *Globally Positive and Average Specific*; Profile 2: *Globally Average and Mixed Specific*; Profile 3: *Globally Negative and Mixed Specific*; Profile 4: *Globally Very Positive and Average Specific*; Profile 5: *Globally Very Positive and Mixed Specific*; and Profile 6: *Globally Very Negative and Mixed Specific*.

Online Supplements for:

Managerial Predictors and Motivational Outcomes of Workers' Psychological Need States Profiles: A Two-Wave Examination

Preliminary Measurement Models

Due to the complexity of the longitudinal models underlying all constructs assessed in the present study, preliminary analyses were conducted separately for the psychological need states, predictors (supportive, thwarting, and indifferent behaviors), and outcomes (global self-determination, specific intrinsic motivation, specific identified regulation, specific introjected regulation, specific external-material regulation, specific external-social regulation, and specific amotivation). These longitudinal measurement models were estimated using Mplus 8.6 (Muthén & Muthén, 2021) using the maximum likelihood robust (MLR) estimator, which provides parameter estimates, standard errors, and goodness-of-fit that are robust to the non-normality of the response scales used in the present study. These models were estimated using full information maximum likelihood (FIML; Enders, 2010) procedures to handle missing data. Given the known oversensitivity of the chi-square test of exact fit (χ^2) to sample size and minor model misspecifications (e.g., Marsh et al., 2005), we relied on sample-size independent goodness-of-fit indices to describe the fit of the models (Hu & Bentler, 1999): The comparative fit index (CFI), the Tucker-Lewis index (TLI), as well as the root mean square error of approximation (RMSEA) and its 90% confidence interval. Values greater than .90 for the CFI and TLI indicate adequate model fit, although values greater than .95 are preferable. Values smaller than .08 or .06 for the RMSEA respectively support acceptable and excellent model fit.

Psychological Need States

The goodness-of-fit results from all psychological need states models are reported in Table S1. In line with past studies (e.g., Bhavsar et al., 2020; Huyghebaert-Zouaghi et al., 2020, Tóth-Király et al., 2018), a series of confirmatory factor analyses (CFA) and exploratory structural equation modeling (ESEM) models were tested at both Time 1 (T1) and Time 2 (T2): (a) three-factor CFA (Model 1) and ESEM (Model 2) models (need satisfaction, frustration, and unfulfillment); (b) nine-factor CFA (Model 3) and ESEM (Model 4) models (autonomy satisfaction, relatedness satisfaction, competence satisfaction, autonomy frustration, relatedness frustration, competence frustration, autonomy unfulfillment, relatedness unfulfillment, and competence unfulfillment); (c) bifactor CFA (Model 5) and ESEM (Model 6) models with three specific (S)-factors (need satisfaction, frustration, and unfulfillment) and one global (G)-factor (global psychological need experience); and (d) bifactor CFA (Model 7) and ESEM (Model 8) models including nine S-factors (autonomy satisfaction, relatedness satisfaction, competence satisfaction, autonomy frustration, relatedness frustration, competence frustration, autonomy unfulfillment, relatedness unfulfillment, and competence unfulfillment) and one G-factor (global psychological need experience).

In the CFA models, items were only allowed to define their a priori factors, factors were allowed to correlate, and no cross-loadings were estimated. In the ESEM models, the factors were defined as in the CFA models, and all cross-loadings were freely estimated but assigned a target value of zero using an oblique target rotation procedure (Browne, 2001). In bifactor CFA models, items were allowed to define one a priori S-factor as well as one G-factor, and all factors were specified as orthogonal. Bifactor ESEM models were specified as their bifactor CFA counterparts, although all cross-loadings involving the S-factors were freely estimated but assigned a target value of zero using an orthogonal bifactor target rotation procedure (Reise, 2012).

As noted by Morin et al. (2016a, 2017), fit indices are not sufficient to guide the selection of the optimal model. An examination of the parameter estimates is also required to select the best alternative. When contrasting a CFA or an ESEM solution with a bifactor alternative, the key elements supporting a bifactor representation are: (1) an improved level of fit to the data; (2) a well-defined (i.e., presenting moderate to strong significant target loadings) as opposed to a weakly defined (i.e., weak target loadings) G-factor; and (3) at least some reasonably well-defined S-factors. It should be noted that there is no formal guideline regarding the exact values beyond which one can interpret factors to be well-defined and S-factors to retain enough specificity. Instead, target loadings and model-based coefficients of composite reliability (omega coefficient; ω) are typically interpreted in a more holistic manner. However, prior research on psychological need states within the bifactor ESEM framework (e.g., Gillet et al., 2020a; Huyghebaert-Zouaghi et al., 2020; Sánchez-Oliva et al., 2017; Tóth-Kiraly et al., 2018) seems to suggest that G-factors may be considered well-defined when they present target loadings approximating or exceeding .400 and a coefficient of composite reliability near or above .600. S-factors tend to be weaker in bifactor representations than in first-order models (CFA or ESEM) because bifactor models rely on two factors to explain the covariance present at the item level for each specific item

(Morin et al., 2016b). Hence, slightly lower loadings and composite reliability values on S-factors are seen as acceptable and reflecting sufficient remaining specificity beyond what is covered by the G-factor. In terms of cross-loadings, values greater than .100 or .200 in ESEM that are reduced in bifactor ESEM is a source of evidence in favor of the bifactor over the ESEM solution (Morin et al., 2016a).

Only two solutions were able to achieve an acceptable level of fit to the data (Models 4 and 8) at T1. The ESEM solution with nine factors (Model 4) resulted in a majority of well-defined factors and a minority of more weakly-defined factors. Turning our attention to the bifactor representations (Model 8), the critical question when interpreting such solutions is whether the G-factor taps into a meaningful amount of covariance shared among all items, and whether sufficient specificity remains at the subscale level, unexplained by the G-factor, to result in the estimation of meaningful S-factors. The bifactor ESEM solution with one G-factor and nine S-factors (Model 8) revealed a well-defined G-factor with negative factor loadings associated with the need satisfaction items, and positive factor loadings associated with the need frustration and unfulfillment items. Similarly, with the exception of few items which mainly reflected the global psychological need experience G-factor rather than their own a priori S-factors, the S-factors retained at least some degree of meaningful specificity over and above employees' global levels of psychological need experience. The S-factor with the lowest levels of specificity (competence unfulfillment) still displayed acceptable levels of specificity.

These results supported the adequacy of the bifactor ESEM solution with one G-factor and nine S-factors (Model 8). In this solution, given that the G-factor was defined by positive loadings from need frustration and unfulfillment items, and negative loadings from the need satisfaction items, we hereafter refer to it as reflecting negative global need experience. Although the fit indices of this bifactor solution were not adequate at T2 (this was also the case for the seven other models at T2), this solution was thus retained, as in Huyghebaert-Zouaghi et al. (2020), for sequential tests of measurement invariance (Millsap, 2011) focusing on: (1) configural invariance; (2) weak invariance (loadings); (3) strong invariance (loadings and intercepts); (4) strict invariance (loadings, intercepts, and uniquenesses); (5) invariance of the latent variance-covariance matrix (loadings, intercepts, uniquenesses, correlated uniquenesses, and latent variances-covariances); and (6) latent means invariance (loadings, intercepts, uniquenesses, correlated uniquenesses, latent variances-covariances, and latent means). However, although this solution seemed acceptable and superior to alternative solutions, results indicated that the psychometric properties of the Psychological Need States at Work-Scale (PNSW-S; Huyghebaert-Zouaghi et al., 2020) still had room for improvement. More specifically, as already demonstrated by Huyghebaert-Zouaghi et al. (2020) in their sample of French employees, one item (rS5) had a low factor loading at both T1 and T2 and was excluded from further analyses.

Tests of measurement invariance were conducted across measurement occasions (longitudinal invariance). Like the chi square, chi square difference tests are oversensitive to sample size and minor misspecifications. For this reason, invariance was assessed by considering changes in CFI and RMSEA (Chen, 2007; Cheung & Rensvold, 2002). A ΔCFI/TLI of .010 or less and a ΔRMSEA of .015 or less between a more restricted model and the previous one support the invariance hypothesis. The results from these tests, reported in Table S1, supported the configural, weak, strong, strict, latent variance-covariance, and latent means invariance of the model across time points. These results thus show that the measurement models underlying psychological need states ratings can be considered to be fully equivalent over time, leading to the estimation of similar constructs, and consistent with a lack of latent means differences over time. Factor scores used in the main analyses were extracted from the final longitudinal model of latent means invariance. Parameter estimates from this final longitudinal model of latent means invariance are reported in Table S2. Composite reliability coefficients associated with each of the a priori factors are calculated from the model standardized parameters using McDonald (1970) omega (ω) coefficient:

$$\omega = \frac{(\sum|\lambda_i|)^2}{[(\sum|\lambda_i|)^2 + \sum \delta_i]}$$

where $|\lambda_i|$ are the standardized factor loadings associated with a factor in absolute values, and δi, the item uniquenesses. The results from the final solution revealed well-defined negative global need experience ($|\lambda|$ = .371 to .723, ω = .971), specific autonomy need satisfaction (λ = .436 to .665, ω = .791), specific competence need satisfaction (λ = .396 to .650, ω = .712), specific relatedness need satisfaction (λ = .354 to .670, ω = .829), specific autonomy need unfulfillment (λ = .135 to .595, ω = .672), specific competence need unfulfillment (λ = .369 to .453, ω = .489), specific relatedness need unfulfillment (λ =

.340 to .664, ω = .719), specific autonomy need frustration (λ = .354 to .503, ω = .675), specific competence need frustration (λ = .297 to .673, ω = .807), and specific relatedness need frustration (λ = .252 to .608, ω = .816) factors over time.

Interpersonal Behaviors

Based on prior research (e.g., Bhavsar et al., 2019; Tóth-Király et al., 2018), a sequence of a priori CFA and ESEM were tested at both time points: (a) three-factor CFA (Model 1) and ESEM (Model 2) solutions (need indifferent, thwarting, and supportive behaviors); and (b) nine-factor CFA (Model 3) and ESEM (Model 4) solutions (autonomy, relatedness and competence supportive, thwarting, and indifferent behaviors).

Model fit is reported in Table S3. Most alternative CFA and ESEM solutions achieved acceptable levels of model fit at both time points, although the fit of the ESEM solutions was considerably higher. Moreover, the fit of the nine-factors ESEM and CFA solutions (Models 3 and 4) was also substantially higher than that of their three-factor counterparts (Models 1 and 2). Despite their higher level of fit, these two solutions resulted in factor correlations suggesting conceptual overlap among factors or in weakly defined factors (i.e., presenting low target loadings). These two solutions were thus excluded in favor of the more parsimonious three-factor solutions. The parameter estimates from the two three-factor solutions (i.e., Models 1 and 2) proved the ESEM solution to be superior (Model 2). First, factors appeared to be well-defined in both solutions. Second, even though the ESEM solution displayed several statistically significant cross-loadings, none of these was high enough to call into question the factor definitions. Moreover, ESEM factor correlations (e.g., |r| = .656 to .733, M|r| = .682 at T1) were substantially reduced relative to CFA correlations (e.g., |r| = .696 to .820, M|r| = .754 at T1). We thus retained an ESEM representation of ratings on the Tripartite Measure of Interpersonal Behaviors.

Tests of measurement invariance were conducted across measurement occasions (longitudinal invariance). The results from these tests, reported in Table S3, supported the configural, weak, strong, strict, latent variance-covariance, and latent means invariance of the model across time points. These results thus show that the measurement models underlying supervisory behaviors ratings can be considered to be fully equivalent over time, leading to the estimation of similar constructs, and consistent with a lack of latent means differences over time. Factor scores used in the main analyses were extracted from the final longitudinal model of latent means invariance. Parameter estimates from this final longitudinal model of latent means invariance are reported in Table S4. These results show that all factors are well-defined by satisfactory factor loadings (λ = .426 to .975), resulting in satisfactory composite reliability coefficients, ranging from ω = .877 to .945.

Work Motivation

The goodness-of-fit results from all motivation models are reported in Table S5. Neither the CFA nor the bifactor CFA solutions were able to achieve a satisfactory level of model fit at both time points. When looking at the ESEM and bifactor ESEM solutions, results showed the superiority of the bifactor ESEM model underlying the motivation measures (with all CFI ≥ .95, all TLI ≥ .95, and all RMSEA ≤ .05) relative to the ESEM model (ΔCFI = .010; ΔTLI = .020; ΔRMSEA = .011 at T1; and ΔCFI = .019; ΔTLI = .041; ΔRMSEA = .020 at T2). Even though these alternative models resulted in a rather similar level of model fit, a detailed examination of parameter estimates (Morin et al., 2016a) showed that the ESEM model had significant cross-loadings that were stronger than the loadings from the dimension's a priori items, and presented weakly defined factors (i.e., non-significant loadings for two out of the three a priori items defining the identified regulation factor). In contrast, the bifactor ESEM solution provided (1) an improved level of fit to the data when compared to the ESEM solution; (2) a well-defined (i.e., presenting moderate to strong significant target loadings) as opposed to a weakly defined (i.e., weak target loadings) G-factor; and (3) at least some reasonably well-defined S-factors (Morin et al., 2016a, 2017). It should be noted that some of the loadings from the introjected, external-social, and external-material regulations items on the G-factor were non-significant (see Table S6). Yet, prior research indicates that bifactor-ESEM representations of the motivation measure require strong and significant positive loadings from the intrinsic motivation and identified regulation items, and moderate and significant negative loadings from the amotivation items on the G-factor (Howard et al., 2018; 2020). However, weaker or non-significant loadings from the external and introjected regulations items on the G-factor are common (Gillet et al., 2020b; Howard et al., 2018; 2020). Therefore, the superiority of the bifactor-ESEM solution was obvious from the perspective of model fit and parameter estimates, and was fully aligned with the results from previous research. Indeed, this modeling decision is

consistent with recent evidence supporting the superiority of bifactor ESEM models for work motivation measures (Gillet et al., 2020b; Howard et al., 2018). These recent studies demonstrated that bifactor ESEM models make it possible to obtain a direct estimate of participants' self-determination level based on their ratings across all motivation subscales, together with equally direct estimates of the specificities remaining within each motivation facet. More specifically, all motivation items are used to define an overarching G-factor reflecting participants' global quantity of self-determination (with factor loadings ranging from negative to positive, depending on the position of that item on the hypothetical self-determination theory continuum of motivation). In addition, all subscale-specific items are used to define S-factors reflecting the unique quality associated with each type of motivation left unexplained by the G-factor. Therefore, this solution was retained for tests of measurement invariance.

Tests of measurement invariance were then conducted across measurement occasions (longitudinal invariance). The results from these tests, reported in Table S5, supported the configural, weak, strong, strict, latent variance-covariance, and latent means invariance of the model across time points. These results thus show that the measurement models underlying work motivation ratings can be considered to be fully equivalent over time, leading to the estimation of similar constructs, and consistent with a lack of latent means differences over time. Factor scores used in the main analyses were extracted from the final longitudinal model of latent means invariance. Parameter estimates from this final longitudinal model of latent means invariance are reported in Table S6.

The results from the bifactor-ESEM solution revealed a well-defined G-factor (ω = .657) that provides a clear representation of the hypothesized self-determination continuum with strong positive loadings from the intrinsic (λ = .762 to .810) items, moderately strong positive loadings from the identified (λ = .510 to .701) items, small to moderate or negative loadings from the introjection (λ = -.016 to .573) and external (λ = -.210 to .175) items, and moderate negative loadings from the amotivation (λ = -.496 to -.413) items. Over and above this G-factor, items associated with the amotivation (λ =.510 to .663, ω = .748), external-material (λ = .566 to .687, ω = .674), external-social (λ = .541 to .681, ω = .707), introjected (λ =.320 to .786, ω = .717), and intrinsic (λ =.273 to .427, ω = .579) S-factors retained a satisfactory level of specificity. In contrast, the identified regulation S-factor appeared to be more weakly defined (λ = -.068 to .766, ω = .480) suggesting that identified regulation ratings mainly served to define global levels of self-determination, and only retained a limited amount of specificity when these global levels were taken into account. The fact that this S-factor retained less specificity does not mean that it has no meaning, especially when modelled using an approach that explicitly controls for both measurement error and associations with the global self-determination construct, such as the approach taken in the present study. It is noteworthy that previous research using the same instrument reported virtually identical (Gillet et al., 2020b; Howard et al., 2018) or very similar (Gillet et al., 2018) bifactor-ESEM results.

The correlations between all variables are reported in Table S7. Upon request from a reviewer, for purposes of transparency and potential future meta-analyses, the correlations between our study variables based on scale scores are also provided (see Table S8). Yet, regarding the present study, attention should not be devoted to these correlations, since the identification of profiles and examination of their relations with predictors and outcomes are based on factor scores.

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Table S1

Goodness-of-Fit Statistics for the Estimated Models (Psychological Need States)

Description	χ^2 (*df*)	CFI	TLI	RMSEA	90% CI	CM	$\Delta\chi^2$ (*df*)	ΔCFI	ΔTLI	ΔRMSEA
Psychological Need States Time 1										
M1. Three-factor CFA	3940.680 (626)*	.679	.658	.095	[.092; .098]	-	-	-	-	-
M2. Three-factor ESEM	3355.571 (558)*	.729	.676	.092	[.089; .095]	-	-	-	-	-
M3. Nine-factor CFA	1731.288 (593)*	.890	.876	.057	[.054; .060]	-	-	-	-	-
M4. Nine-factor ESEM	763.044 (369)*	.962	.931	.043	[.038; .047]	-	-	-	-	-
M5. B-CFA: Three S-factors and one G-factor	3296.024 (592)*	.738	.705	.088	[.085; .091]	-	-	-	-	-
M6. B-ESEM: Three S-factors and one G-factor	2123.989 (524)*	.845	.803	.072	[.069; .075]	-	-	-	-	-
M7. B-CFA: Nine S-factors and one G-factor	2078.884 (592)*	.856	.838	.065	[.062; .068]	-	-	-	-	-
M8. B-ESEM: Nine S-factors and one G-factor	667.218 (341)*	.968	.938	.040	[.036; .045]	-	-	-	-	-
Psychological Need States Time 2										
M9. Three-factor CFA	2058.624 (626)*	.657	.635	.113	[.108; .119]	-	-	-	-	-
M10. Three-factor ESEM	1604.700 (558)*	.749	.701	.103	[.097; .109]	-	-	-	-	-
M11. Nine-factor CFA	1114.115 (593)*	.875	.860	.070	[.064; .077]	-	-	-	-	-
M12. Nine-factor ESEM	792.165 (369)*	.899	.817	.080	[.073; .088]	-	-	-	-	-
M13. B-CFA: Three S-factors and one G-factor	1714.473 (592)*	.731	.698	.103	[.098; .109]	-	-	-	-	-
M14. B-ESEM: Three S-factors and one G-factor	1221.405 (524)*	.833	.788	.086	[.080; .093]	-	-	-	-	-
M15. B-CFA: Nine S-factors and one G-factor	1199.578 (592)*	.855	.836	.076	[.070; .082]	-	-	-	-	-
M16. B-ESEM: Nine S-factors and one G-factor	591.366 (341)*	.940	.883	.064	[.055; .073]	-	-	-	-	-
M17. Model 8 without rS5 (Time 1)	606.396 (315)*	.971	.942	.040	[.035; .044]	-	-	-	-	-
M18. Model 16 without rS5 (Time 2)	896.374 (351)*	.869	.752	.093	[.086; .101]	-	-	-	-	-
Psychological Need States: Longitudinal Invariance										
M19. Configural invariance	4072.781 (1790)*	.873	.818	.046	[.045; .048]	-	-	-	-	-
M20. Weak invariance	3328.474 (2050)*	.929	.911	.033	[.030; .035]	M19	144.841* (260)	+.056	+.093	-.013
M21. Strong invariance	3365.428 (2076)*	.928	.911	.032	[.030; .034]	M20	37.038* (26)	-.001	.000	-.001
M22. Strict invariance	3408.927 (2112)*	.928	.912	.032	[.030; .034]	M21	50.767* (36)	.000	+.001	.000
M23. Variance-covariance invariance	3454.683 (2167)*	.928	.915	.032	[.030; .034]	M22	62.578 (55)	.000	+.003	.000
M24. Latent means invariance	3484.533 (2177)*	.927	.914	.032	[.030; .034]	M23	43.494* (10)	-.001	-.001	.000

Note. * $p < .05$; CFA: Confirmatory factor analysis; ESEM: Exploratory structural equation modeling; B: Bifactor; χ^2: Scaled 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; CM: Comparison model; and Δ: Change in fit relative to the CM.

Table S2

Standardized Factor Loadings (λ) and Uniquenesses (δ) for Model 24 (Psychological Need States, Longitudinal Latent Means Invariance)

Items	G- Negative Global Need Experience λ	S- Autonomy Satisfaction λ	S- Competence Satisfaction λ	S- Relatedness Satisfaction λ	S- Autonomy Unfulfillment λ	S- Competence Unfulfillment λ	S- Relatedness Unfulfillment λ	S- Autonomy Frustration λ	S- Competence Frustration λ	S- Relatedness Frustration λ	δ
Autonomy Satisfaction											
Item 1	**-.513**	**.656**	*.044*	.170	*.006*	*.030*	.067	*-.020*	*.043*	*.030*	.267
Item 2	**-.616**	**.436**	*.029*	.261	*.061*	*.086*	.072	*-.011*	.122	.074	.325
Item 3	**-.513**	**.665**	.082	.127	*.003*	.118	*.135*	*-.006*	*.011*	.120	.225
Competence Satisfaction											
Item 1	**-.464**	.079	**.600**	.094	.101	-.108	.085	.123	-.234	.159	.285
Item 2	**-.475**	.105	**.650**	.117	.080	*-.064*	*.063*	.203	-.126	.148	.233
Item 3	**-.414**	.141	**.396**	.133	*.087*	.038	*.059*	.158	-.140	*.022*	.577
Relatedness Satisfaction											
Item 1	**-.592**	.134	*-.041*	**.670**	-.098	*-.035*	*.011*	-.182	*.026*	-.066	.132
Item 2	**-.652**	.192	.055	**.542**	*-.029*	*.013*	*.044*	-.081	.071	*-.066*	.222
Item 3	**-.709**	.092	.174	**.400**	.080	.129	*.055*	.111	.063	*.022*	.255
Item 4	**-.723**	*.097*	*.089*	**.354**	.188	*.231*	*.023*	.208	.109	.114	.178
Item 5	**-.653**	.134	*.033*	**.384**	.097	.124	*.059*	.149	*.062*	*.044*	.350
Autonomy Unfulfillment											
Item 1	**.499**	.082	.050	*.026*	**.560**	*.050*	*.053*	*.040*	*-.027*	-.067	.415
Item 2	**.610**	-.153	.019	*.007*	**.135**	*.112*	*.049*	*.013*	*-.063*	-.106	.556
Item 3	**.620**	*.042*	-.021	*.004*	**.595**	.093	*-.012*	.084	*-.025*	*.033*	.242
Item 4	**.636**	*-.058*	.083	*.018*	**.478**	*.039*	-.061	.173	*-.002*	-.083	.315
Competence Unfulfillment											
Item 1	**.427**	.099	.031	*.040*	*.123*	**.397**	*.050*	*.089*	*-.049*	-.100	.610
Item 2	**.592**	*.049*	.007	*.043*	.046	**.453**	*.055*	*.040*	*.059*	*-.024*	.429
Item 3	**.485**	*.069*	-.158	.180	*.073*	**.369**	*-.033*	*-.013*	.209	*-.053*	.513
Relatedness Unfulfillment											
Item 1	**.490**	*.048*	.089	*.007*	.076	*.091*	**.664**	*-.021*	-.077	*.052*	.286
Item 2	**.525**	*.061*	.057	*.003*	*-.010*	*.011*	**.587**	*-.047*	-.069	*.038*	.364
Item 3	**.636**	*.062*	.022	*.047*	*.027*	*.003*	**.340**	-.134	.073	.242	.390
Item 4	**.371**	*.030*	-.070	*.076*	*-.096*	*-.036*	**.399**	*.063*	.116	*.056*	.661
Item 5	**.401**	*.055*	-.024	*-.002*	*.012*	*-.003*	**.449**	*-.064*	*-.021*	*.060*	.626
Autonomy Frustration											
Item 1	**.603**	*-.061*	*.017*	*.034*	*.019*	*.016*	.080	**.354**	-.090	*.048*	.489
Item 2	**.638**	*-.055*	.120	*-.011*	.080	*-.010*	-.102	**.503**	-.070	*-.045*	.299

Item 3	**.489**	*.028*	*-.025*	*-.021*	*.042*	*.067*	*-.015*	**.486**	.141	*.071*	.492
Item 4	**.656**	*.047*	.082	*-.013*	.110	*.030*	-.075	**.476**	*-.043*	*-.022*	.313
Competence Frustration											
Item 1	**.600**	.092	*-.043*	*.042*	*.017*	*.050*	*.052*	*-.004*	**.619**	.120	.225
Item 2	**.624**	*.005*	*-.018*	.082	*.021*	*.001*	*-.061*	*-.053*	**.297**	*.089*	.501
Item 3	**.628**	*.038*	-.205	.123	-.073	.126	*-.055*	*.009*	**.550**	*.055*	.216
Item 4	**.600**	.058	*-.062*	.074	-.068	*.061*	*.005*	*-.017*	**.673**	.113	.152
Relatedness Frustration											
Item 1	**.679**	*.046*	*-.023*	*-.010*	*-.042*	-.110	.091	*-.002*	.143	**.557**	.183
Item 2	**.705**	.052	.057	*.000*	-.101	*.002*	*.050*	*-.023*	*.018*	**.570**	.158
Item 3	**.520**	*.028*	*.098*	*.016*	*.008*	*-.112*	*.061*	*.061*	.164	**.523**	.399
Item 4	**.640**	*.049*	*.054*	*.023*	*-.034*	*-.083*	.140	*-.011*	*.052*	**.608**	.184
Item 5	**.586**	.121	*.068*	-.102	*-.019*	*.050*	.236	.104	*.021*	**.252**	.493
ω	.971	.791	.712	.829	.672	.489	.719	.675	.807	.816	

Note. G: Global factor estimated as part of a bifactor model; S: Specific factor estimated as part of a bifactor model; λ: Factor loading; δ: Item uniqueness; ω: Omega coefficient of composite reliability; target factor loadings are indicated in bold; non-significant parameters ($p \geq .05$) are marked in italics.

Table S3

Goodness-of-Fit Statistics for the Estimated Models (Supervisory Behaviors)

Description	χ^2 (*df*)	CFI	TLI	RMSEA	90% CI	CM	$\Delta\chi^2$ (*df*)	ΔCFI	ΔTLI	ΔRMSEA
Supervisors' Interpersonal Behaviors Time 1										
M1. Three-factor CFA	81.583 (206)*	.904	.892	.071	[.065; .076]	-	-	-	-	-
M2. Three-factor ESEM	604.126 (168)*	.930	.904	.066	[.061; .072]	-	-	-	-	-
M3. Nine-factor CFA	686.261 (178)*	.919	.895	.070	[.064; .075]	-	-	-	-	-
M4. Nine-factor ESEM	121.612 (69)*	.992	.972	.036	[.025; .046]	-	-	-	-	-
Supervisors' Interpersonal Behaviors Time 2										
M5. Three-factor CFA	398.002 (206)*	.918	.908	.072	[.062; .083]	-	-	-	-	-
M6. Three-factor ESEM	293.101 (168)*	.946	.926	.065	[.052; .077]	-	-	-	-	-
M7. Nine-factor CFA	342.288 (178)*	.930	.909	.072	[.060; .083]	-	-	-	-	-
M8. Nine-factor ESEM	105.566 (69)*	.984	.948	.055	[.032; .075]	-	-	-	-	-
Supervisors' Interpersonal Behaviors: Longitudinal Invariance										
M9. Configural invariance	1731.435 (789)*	.916	.899	.045	[.042; .048]	-	-	-	-	-
M10. Weak invariance	1790.734 (846)*	.916	.906	.044	[.041; .046]	M9	62.237 (57)	.000	+.007	-.001
M11. Strong invariance	1812.739 (865)*	.916	.908	.043	[.040; .046]	M10	17.444 (19)	.000	+.002	-.001
M12. Strict invariance	1819.081 (887)*	.917	.912	.042	[.039; .045]	M11	21.429 (22)	+.001	+.004	-.001
M13. Variance-covariance invariance	1824.503 (893)*	.917	.912	.042	[.039; .045]	M12	5.190 (6)	.000	.000	.000
M14. Latent means invariance	1828.539 (896)*	.917	.912	.042	[.039; .045]	M13	3.726 (3)	.000	.000	.000

Note. * $p < .01$; CFA: Confirmatory factor analysis; ESEM: Exploratory structural equation modeling; B: Bifactor; χ^2: Scaled 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; CM: Comparison model; and Δ: Change in fit relative to the CM.

Table S4

Standardized Factor Loadings (λ) and Uniquenesses (δ) from Model 14 (Supervisory Behaviors, Longitudinal Latent Means Invariance)

Items	Supportive Behaviors λ	Thwarting Behaviors λ	Indifferent Behaviors λ	δ
Supportive Behaviors				
Item 1	**.875**	*.020*	*.008*	.269
Item 2	**.688**	-.202	*.099*	.416
Item 3	**.897**	-*.012*	-*.043*	.121
Item 4	**.881**	-*.001*	*.005*	.230
Item 5	**.717**	-*.022*	-*.036*	.425
Item 6	**.736**	.089	-.170	.345
Item 7	**.778**	*.056*	-*.062*	.380
Item 8	**.858**	-.079	*.057*	.241
Thwarting Behaviors				
Item 1	-.151	**.633**	*.051*	.390
Item 2	*.027*	**.942**	-.135	.295
Item 3	*.094*	**.624**	.163	.538
Item 4	-.181	**.562**	.172	.308
Item 5	*.065*	**.872**	*.009*	.302
Item 6	-*.022*	**.815**	-*.017*	.329
Item 7	*.021*	**.831**	-*.027*	.361
Item 8	*.051*	**.953**	-*.045*	.208
Indifferent Behaviors				
Item 1	-*.067*	-.103	**.695**	.539
Item 2	-.306	.192	**.426**	.306
Item 3	-.159	.125	**.582**	.358
Item 4	.083	*.016*	**.881**	.307
Item 5	.129	-*.008*	**.975**	.228
Item 6	*.003*	*.060*	**.559**	.641
ω	.945	.934	.877	

Note. λ: Factor loading; δ: Item uniqueness; ω: Omega coefficient of model-based composite reliability; target factor loadings are indicated in bold; non-significant parameters ($p \geq .05$) are marked in italics.

Table S5

Goodness-of-Fit Statistics for the Estimated Models (Work Motivation)

Description	χ^2 (*df*)	CFI	TLI	RMSEA	90% CI	CM	$\Delta\chi^2$ (*df*)	ΔCFI	ΔTLI	ΔRMSEA
Motivation Time 1										
M1. CFA	635.620 (137)*	.862	.828	.079	[.072; .085]	-	-	-	-	-
M2. ESEM	137.478 (72)*	.982	.957	.039	[.029; .049]	-	-	-	-	-
M3. Bifactor-CFA	639.550 (133)*	.860	.820	.080	[.074; .087]	-	-	-	-	-
M4. Bifactor-ESEM	87.095 (59*)	.992	.977	.028	[.014; .041]	-	-	-	-	-
Motivation Time 2										
M5. CFA	306.821 (137)*	.838	.798	.083	[.071; .096]	-	-	-	-	-
M6. ESEM	98.967 (72)*	.974	.939	.046	[.019; .067]	-	-	-	-	-
M7. Bifactor-CFA	338.614 (134)*	.805	.751	.093	[.080; .105]	-	-	-	-	-
M8. Bifactor-ESEM	66.364 (59)*	.993	.980	.026	[.000; .055]	-	-	-	-	-
Motivation: Longitudinal Invariance										
M9. Configural invariance	587.898 (411)*	.969	.946	.027	[.022; .032]	-	-	-	-	-
M10. Weak invariance	656.365 (495)*	.971	.959	.024	[.018; .028]	M9	86.839 (84)	+.002	+.013	-.003
M11. Strong invariance	679.230 (507)*	.969	.958	.024	[.019; .029]	M10	24.751* (12)	-.002	-.001	.000
M12. Strict invariance	701.477 (525)*	.969	.958	.024	[.019; .028]	M11	21.827 (18)	.000	.000	.000
M13. Variance-covariance invariance	703.151 (553)*	.973	.966	.021	[.016; .026]	M12	17.120 (28)	+.004	+.008	-.003
M14. Latent means invariance	708.787 (560)*	.974	.967	.021	[.016; .026]	M13	6.102 (7)	+.001	+.001	.000

Note. * $p < .01$; CFA: Confirmatory factor analysis; ESEM: Exploratory structural equation modeling; χ^2: Scaled 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; CM: Comparison model; and Δ: Change in fit relative to the CM.

Table S6

Standardized Factor Loadings (λ) and Uniquenesses (δ) from Model 14 (Work Motivation, Longitudinal Latent Means Invariance)

Items	G λ	S-IM λ	S-IdR λ	S-InR Λ	S-ExSR	S-ExMR λ	S-Amo λ	δ
IM								
Item 1	**.810**	**.273**	*.016*	*-.041*	*-.006*	*-.009*	*-.009*	.268
Item 2	**.762**	**.427**	.053	*-.050*	*-.016*	.060	*.008*	.227
Item 3	**.801**	**.311**	.071	*-.034*	*-.046*	*.046*	*-.060*	.248
IdR								
Item 1	**.510**	-.141	***-.068***	.150	.226	*.046*	*-.086*	.632
Item 2	**.701**	.311	**.250**	*.024*	*.004*	-.102	*.028*	.338
Item 3	**.635**	-.042	**.766**	.059	*.024*	*.009*	.040	.003
InR								
Item 1	**.370**	-.271	-.164	**.320**	.241	.198	*.096*	.554
Item 2	**.573**	*.017*	*.089*	**.357**	*.093*	*.053*	*-.052*	.522
Item 3	***-.016***	.083	*.038*	**.715**	.165	.107	*-.011*	.442
Item 4	***.050***	*-.046*	*.040*	**.786**	.134	*.034*	*-.007*	.356
ExSR								
Item 1	**-.210**	*.109*	*.065*	.262	**.634**	.214	*.102*	.413
Item 2	**.175**	-.157	*-.023*	.123	**.541**	.236	*.064*	.577
Item 3	***.101***	*-.005*	*-.024*	.203	**.681**	.182	*.112*	.438
ExMR								
Item 1	***.044***	*-.006*	-.099	*-.010*	.116	**.566**	.148	.632
Item 2	***.025***	*.065*	*.004*	.193	.209	**.687**	*.055*	.439
Item 3	**-.144**	*-.025*	*.060*	.106	.272	**.580**	*.046*	.552
Amo								
Item 1	**-.424**	-.052	*.043*	*-.028*	.175	.119	**.663**	.331
Item 2	**-.413**	.058	*.049*	*.002*	.141	.153	**.645**	.364
Item 3	**-.496**	-.052	*.028*	*.034*	.204	.176	**.510**	.418
ω	.657	.579	.480	.717	.707	.674	.748	

Note. G: Global factor estimated as part of a bifactor model; S: Specific factor estimated as part of a bifactor model; λ: Factor loading; δ: Item uniqueness; ω: Omega coefficient of model-based composite reliability; IM: Intrinsic motivation; IdR: Identified regulation; InR: Introjected regulation; ExMR: External-material regulation ; ExSR: External-social regulation; Amo: Amotivation; target factor loadings are indicated in bold; non-significant parameters ($p \geq .05$) are marked in italics.

Table S7. *Correlations between Variables*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Sex	-														
2. Age	.035	-													
3. Sector	-.019	-.151**	-												
4. Contract type	-.016	.287**	.160**	-											
5. Weekly work hours	.150**	.170**	.015	.128**	-										
6. Supervisor-subordinate dyad tenure	-.017	.359**	.011	.152**	.041	-									
7. G-Negative global need experience (T1)†	-.078	-.133**	-.033	-.145**	-.041	-.087*	-								
8. S-Autonomy satisfaction (T1)†	.065	.152**	-.028	.147**	.217**	.063	-.052	-							
9. S-Competence satisfaction (T1)†	.015	.147**	.007	-.014	.045	.136**	-.047	.009	-						
10. S-Relatedness satisfaction (T1)†	.031	-.140**	.045	-.068	-.127**	-.100*	-.043	.031	.005	-					
11. S-Autonomy unfulfillment (T1)†	.093*	.046	-.048	.021	-.012	.017	.034	.040	.065	.012	-				
12. S-Competence unfulfillment (T1)†	.074	.045	.048	.080	.105*	.010	.032	.091*	-.061	.036	.100*	-			
13. S-Relatedness unfulfillment (T1)†	.063	-.057	.064	-.123**	-.034	-.062	.049	.078	.068	.029	-.021	.058	-		
14. S-Autonomy frustration (T1)†	.098*	.063	.003	-.016	.123**	.011	.042	.007	.165**	-.004	.053	.087*	-.070	-	
15. S-Competence frustration (T1)†	-.002	-.112**	.092*	-.011	-.009	-.029	.042	.059	-.049	.072	-.040	.056	-.038	-.001	-
16. S-Relatedness frustration (T1)†	.072	.122**	-.023	-.027	.010	.145**	.043	.059	.104*	.052	-.039	-.071	.026	.004	.031
17. Need-supportive supervisory behaviors (T1)†	.039	-.065	.035	.025	-.067	-.072	-.566**	.122**	-.032	.485**	-.117**	-.016	-.004	-.183**	.064
18. Need-indifferent supervisory behaviors (T1)†	.029	-.014	-.001	-.034	.044	.039	.599**	-.048	.090*	-.285**	.170**	.122**	.015	.267**	-.082*
19. Need-thwarting supervisory behaviors (T1)†	.042	-.010	-.010	-.096*	.011	.040	.605**	-.091*	.114**	-.182**	.157**	-.013	.023	.229**	.033
20. G-Global motivation (T1)†	-.078	.077	.005	.018	.094*	.045	-.490**	.134**	-.002	.166**	-.062	.098*	-.150**	.023	.046
21. S-Amotivation (T1)†	.181**	-.086*	-.001	-.098*	-.059	-.029	.225**	.035	.103*	.162**	.154**	.087*	-.022	-.048	.084*
22. S-External-material regulation (T1)†	.043	-.165**	.166**	-.099*	-.112**	-.009	.128**	-.074	.012	.196**	-.016	-.019	.119**	.020	.018
23. S-External-social regulation (T1)†	-.005	-.278**	.096*	-.110*	-.095*	-.077	.198**	-.044	-.083*	.113**	-.048	.039	.009	.057	.137**
24. S-Introjected regulation (T1)†	-.038	-.133**	-.005	.035	.004	-.055	.136**	-.049	-.093*	.036	.025	.066	.053	.054	.074
25. S-Identified regulation (T1)†	.065	.209**	-.088*	.013	-.058	.038	-.001	.029	.015	-.009	.050	.052	-.034	.098*	-.012
26. S-Intrinsic motivation (T1)†	.101*	.051	-.028	.109*	.087*	-.040	-.201**	.064	.002	.130**	-.038	.002	-.078	-.120**	.016
27. G-Negative global need experience (T2)†	-.068	-.147**	-.027	-.116**	-.050	-.071	.896**	-.046	-.088*	-.072	.110**	-.047	.056	.059	.276**
28. S-Autonomy satisfaction (T2)†	.027	.119**	-.043	.100*	.193**	.060	-.087*	.859**	-.120**	-.136**	.026	-.069	-.018	.004	.113**
29. S-Competence satisfaction (T2)†	.039	.195**	-.020	.038	.070	.179**	-.020	.188**	.795**	-.195**	.213**	.100*	.083*	.069	.070
30. S-Relatedness satisfaction (T2)†	.012	-.101*	.050	-.056	-.077	-.051	.046	.165**	.037	.894**	-.047	.097*	-.055	-.156**	.040
31. S-Autonomy unfulfillment (T2)†	.129**	.016	-.022	-.016	-.037	-.017	-.024	-.026	-.017	.173**	.911**	.153**	.155**	.215**	-.137**
32. S-Competence unfulfillment (T2)†	.070	.041	.023	.105*	.134**	-.019	.163**	.354**	-.056	.146**	.114**	.854**	-.099*	.184**	.073
33. S-Relatedness unfulfillment (T2)†	.025	-.052	.034	-.082	-.002	-.078	.072	.287**	.180**	.117**	-.026	-.055	.888**	-.103*	-.137**
34. S-Autonomy frustration (T2)†	.056	.030	.020	.005	.072	.004	-.245**	-.118**	.152**	.066	-.002	.005	-.044	.833**	-.120**
35. S-Competence frustration (T2)†	.021	-.097*	.123**	.008	.018	-.045	-.009	.090*	-.146**	-.025	-.009	.119**	.031	.047	.910**
36. S-Relatedness frustration (T2)†	.113**	.118**	-.002	-.058	.020	.109**	-.061	-.015	.266**	.031	.023	-.195**	.084*	.289**	-.017
37. Need-supportive supervisory behaviors (T2)†	.017	-.040	.038	.011	-.029	-.060	-.531**	.089*	-.023	.413**	-.154**	-.027	-.008	-.203**	.006
38. Need-indifferent supervisory behaviors (T2)†	-.006	-.015	-.020	-.035	.020	.051	.554**	-.094*	.058	-.313**	.202**	.055	.019	.241**	-.011
39. Need-thwarting supervisory behaviors (T2)†	.036	.000	-.019	-.081	.007	.043	.562**	-.096*	.065	-.195**	.197**	-.030	.035	.242**	.040
40. G-Global self-determination (T2)†	-.042	.085*	.010	.044	.131**	.024	-.471**	.151**	.013	.190**	-.066	.127**	-.148**	-.023	.014
41. S-Amotivation (T2)†	.144**	-.048	-.032	-.106*	-.025	-.027	.222**	.052	.092*	.072	.169**	.035	.005	-.057	.051
42. S-External-material regulation (T2)†	.033	-.205**	.182**	-.104*	-.093*	-.036	.232**	-.082*	.035	.170**	-.026	-.012	.087*	-.008	.011
43. S-External-social regulation (T2)†	.056	-.227**	.077	-.116**	-.071	-.084*	.274**	-.059	-.072	.120**	-.026	-.020	.077	.038	.061
44. S-Introjected regulation (T2)†	-.111**	-.192**	.046	.032	.011	-.051	.145**	-.045	-.054	-.004	-.005	.082*	.047	.057	.070
45. S-Identified regulation (T2)†	.045	.224**	-.078	.011	-.053	.054	.026	.032	.042	-.046	.054	.057	-.029	.103*	-.034
46. S-Intrinsic motivation (T2)†	.062	.120**	-.057	.157**	.146**	-.025	-.055	.035	-.006	-.019	-.022	-.037	-.027	-.116**	-.069

Table S7. *Correlations between Variables (continued)*

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
16. S-Relatedness frustration (T1)†	-														
17. Need-supportive supervisory behaviors (T1)†	-.088*	-													
18. Need-indifferent supervisory behaviors (T1)†	.114**	-.790**	-												
19. Need-thwarting supervisory behaviors (T1)†	.349**	-.704**	.724**	-											
20. G-Global self-determination (T1)†	.057	.406**	-.411**	-.361**	-										
21. S-Amotivation (T1)†	.070	-.077	.183**	.230**	-.106**	-									
22. S-External-material regulation (T1)†	.022	.036	.045	.084*	-.002	.087*	-								
23. S-External-social regulation (T1)†	.033	-.082*	.157**	.190**	.015	.100*	.173**	-							
24. S-Introjected regulation (T1)†	-.048	-.008	.079	.035	.009	-.062	.012	.139**	-						
25. S-Identified regulation (T1)†	.042	-.021	.078	.066	.126**	.086*	.004	-.030	-.007	-					
26. S-Intrinsic motivation (T1)†	.064	.151**	-.213**	-.124**	.146**	.123**	.019	-.048	-.032	-.201**	-				
27. G-Global need experience (T2)†	.161**	-.541**	.546**	.605**	-.431**	.193**	.120**	.186**	.134**	.011	-.190**	-			
28. S-Autonomy satisfaction (T2)†	.033	.080	-.099*	-.100*	.138**	-.033	-.077	-.067	-.061	.041	.047	-.045	-		
29. S-Competence satisfaction (T2)†	.297**	-.127**	.177**	.196**	.029	.139**	-.075	-.110**	-.066	.034	-.031	-.004	.081*	-	
30. S-Relatedness satisfaction (T2)†	.110**	.422**	-.251**	-.139**	.148**	.201**	.177**	.126**	.022	-.007	.134**	-.027	.008	-.075	-
31. S-Autonomy unfulfillment (T2)†	-.051	-.032	.118**	.099*	-.031	.114**	.040	-.024	.060	.056	-.049	.025	-.048	.081*	.053
32. S-Competence unfulfillment (T2)†	-.230**	-.009	.151**	-.008	.081	.118**	-.013	.055	.053	.053	.002	.055	.156**	.018	.187**
33. S-Relatedness unfulfillment (T2)†	-.176**	.059	-.014	-.057	-.144**	-.002	.103*	-.015	.021	-.052	-.058	.017	.111**	.099*	.065
34. S-Autonomy frustration (T2)†	-.241**	.037	.014	-.058	.140**	-.138**	.026	-.026	.008	.081	-.065	-.176**	-.089*	-.019	-.096*
35. S-Competence frustration (T2)†	-.110**	.055	-.081	-.008	.027	.057	.013	.159**	.080	-.005	.005	.164**	.128**	-.036	-.022
36. S-Relatedness frustration (T2)†	.795**	-.080	.090*	.323**	.066	.012	.049	.023	-.072	.057	.028	.056	.026	.256**	.013
37. Need-supportive supervisory behaviors (T2)†	-.112**	.847**	-.782**	-.665**	.383**	-.095*	.021	-.063	-.053	-.038	.182**	-.588**	.087*	-.123**	.413**
38. Need-indifferent supervisory behaviors (T2)†	.103*	-.773**	.837**	.644**	-.375**	.110**	.051	.082*	.079	.057	-.196**	.622**	-.080	.179**	-.301**
39. Need-thwarting supervisory behaviors (T2)†	.328**	-.679**	.711**	.900**	-.334**	.184**	.076	.125**	.073	.079	-.121**	.640**	-.097*	.161**	-.189**
40. G-Global self-determination (T2)†	.058	.389**	-.409**	-.338**	.916**	.001	-.018	.030	-.007	.114**	.346**	-.476**	.148**	.034	.202**
41. S-Amotivation (T2)†	.036	-.101*	.138**	.175**	-.202**	.777**	-.037	-.088*	-.124**	.060	.063	.232**	.089*	.152**	.137**
42. S-External material regulation (T2)†	.014	-.051	.112**	.179**	-.212**	.154**	.786**	.414**	-.181**	-.093*	.003	.165**	-.099*	-.060	.202**
43. S-External social regulation (T2)†	.010	-.145**	.207**	.212**	-.183**	.072	.402**	.692**	.117**	.069	-.036	.273**	-.041	-.138**	.142**
44. S-Introjected regulation (T2)†	-.096*	-.046	.096*	.031	-.028	-.186**	-.113**	.261**	.773**	-.275**	-.238**	.129**	-.079	-.024	.023
45. S-Identified regulation (T2)†	.022	-.057	.111**	.083*	.070	.078	-.058	-.079	-.102*	.960**	-.373**	.017	.036	.065	-.027
46. S-Intrinsic motivation (T2)†	.001	.016	-.105*	-.070	-.200**	-.069	-.201**	-.331**	.205**	-.269**	.725**	-.106**	.046	-.041	.008

Table S7. *Correlations between Variables (continued)*

	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
31. S-Autonomy unfulfillment (T2)†	-															
32. S-Competence unfulfillment (T2)†	.120**	-														
33. S-Relatedness unfulfillment (T2)†	.084*	-.031	-													
34. S-Autonomy frustration (T2)†	.177**	.061	-.042	-												
35. S-Competence frustration (T2)†	-.069	.125**	-.070	-.046	-											
36. S-Relatedness frustration (T2)†	.020	-.238**	-.044	.086*	-.095*	-										
37. Need-supportive supervisory behaviors (T2)†	-.078	-.047	.072	-.021	.027	-.085*	-									
38. Need-indifferent supervisory behaviors (T2)†	.143**	.062	-.053	.104*	-.042	.073	-.871**	-								
39. Need-thwarting supervisory behaviors (T2)†	.147**	-.013	-.061	.026	-.012	.306**	-.770**	.775**	-							
40. G-Global self-determination (T2)†	-.038	.122**	-.129**	.066	.011	.064	.418**	-.444**	-.354**	-						
41. S-Amotivation (T2)†	.133**	.078	.008	-.101*	.020	.041	-.125**	.150**	.138**	-.098*	-					
42. S-External-material regulation (T2)†	.007	.014	.095*	-.055	.023	.039	.005	.048	.093*	-.123**	.065	-				
43. S-External-social regulation (T2)†	.010	-.004	.050	-.007	.076	.024	-.158**	.205**	.212**	-.111**	.057	.473**	-			
44. S-Introjected regulation (T2)†	.029	.089*	.033	.022	.104*	-.089*	-.076	.093*	.047	-.054	-.126**	-.073	.167**	-		
45. S-Identified regulation (T2)†	.056	.067	-.040	.074	-.015	.050	-.073	.074	.090*	.052	.085*	-.090*	.025	-.228**	-	
46. S-Intrinsic motivation (T2)†	-.039	-.028	-.009	-.118**	-.056	-.015	.045	-.109**	-.053	.026	.022	-.164**	-.167**	.040	-.337**	-

Note. * $p < .05$; ** $p < .01$; † variables estimated from factor scores with mean of 0 and a standard deviation of 1; sex was coded 0 for women and 1 for men; sector was coded 0 for public sector and 1 for private sector; and contract type was coded 0 for temporary contract and 1 for permanent contract; G: Global factor estimated as part of a bifactor model; S: Specific factor estimated as part of a bifactor model.

Table S8. *Correlations between Variables based on Scale Scores*

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Sex	-	-	-														
2. Age	36.90	12.21	.035	-													
3. Sector	-	-	-.019	-.151**	-												
4. Contract type	-	-	-.016	.287**	.160**	-											
5. Weekly work hours	35.53	10.84	.150**	.170**	.015	.128**	-										
6. Supervisor-subordinate dyad tenure	3.22	4.47	-.017	.359**	.011	.152**	.041	-									
7. Autonomy satisfaction (T1)	5.21	1.32	.119**	.168**	.017	.153**	.152**	.088*	-								
8. Competence satisfaction (T1)	5.84	0.94	.097*	.197**	.012	.060	.102*	.122**	.464**	-							
9. Relatedness satisfaction (T1)	5.21	1.24	.105*	.051	.061	.095*	-.007	.027	.705**	.524**	-						
10. Autonomy unfulfillment (T1)	2.91	1.39	-.017	-.089*	-.036	-.097*	-.032	-.049	-.433**	-.265**	-.508**	-					
11. Competence unfulfillment (T1)	3.54	1.47	-.010	-.074	-.005	-.017	.053	-.083*	-.245**	-.362**	-.350**	.560**	-				
12. Relatedness unfulfillment (T1)	2.89	1.37	.027	-.099*	.017	-.183**	-.030	-.077	-.257**	-.247**	-.415**	.438**	.450**	-			
13. Autonomy frustration (T1)	3.22	1.59	-.004	-.061	-.022	-.095*	.041	-.054	-.439**	-.197**	-.508**	.608**	.497**	.407**	-		
14. Competence frustration (T1)	1.78	1.18	-.042	-.167**	.034	-.107*	-.033	-.080	-.321**	-.520**	-.419**	.449**	.530**	.474**	.474**	-	
15. Relatedness frustration (T1)	1.94	1.22	-.001	-.008	-.015	-.129**	.010	.027	-.339**	-.235**	-.530**	.469**	.414**	.622**	.557**	.624**	-
16. Need-supportive supervisory behaviors (T1)	5.02	1.48	.057	-.065	.036	.028	-.069	-.063	.491**	.277**	.695**	-.456**	-.288**	-.326**	-.488**	-.304**	-.452**
17. Need-indifferent supervisory behaviors (T1)	2.88	1.49	.049	-.005	.007	-.025	.067	.041	-.348**	-.173**	-.543**	.522**	.394**	.352**	.556**	.328**	.483**
18. Need-thwarting supervisory behaviors (T1)	1.96	1.27	.050	-.025	-.004	-.103*	.017	.041	-.411**	-.155**	-.508**	.496**	.314**	.375**	.572**	.417**	.629**
19. Amotivation (T1)	1.77	1.25	.183**	-.157**	.027	-.109*	-.122**	-.054	-.277**	-.166**	-.281**	.401**	.290**	.354**	.309**	.410**	.361**
20. External-material regulation (T1)	2.83	1.53	.057	-.212**	.169**	-.113*	-.131**	-.035	-.117**	-.051	-.012	.123**	.116**	.164**	.139**	.160**	.160**
21. External-social regulation (T1)	3.40	1.53	.008	-.292**	.112**	-.112*	-.094*	-.068	-.119**	-.160**	-.075	.151**	.169**	.147**	.205**	.240**	.170**
22. Introjected regulation (T1)	4.71	1.37	-.063	-.175**	.039	-.011	.010	-.055	-.002	-.091*	.044	.049	.138**	.044	.081*	.102*	.026
23. Identified regulation (T1)	5.03	1.38	-.033	.138**	-.050	.009	.027	.039	.346**	.223**	.380**	-.283**	-.143**	-.342**	-.225**	-.226**	-.262**
24. Intrinsic motivation (T1)	5.25	1.51	-.028	.087*	.007	.049	.112**	.033	.418**	.274**	.489**	-.371**	-.201**	-.386**	-.355**	-.284**	-.298**
25. Autonomy satisfaction (T2)	5.07	1.38	.091	.123	.032	-.090	.149*	.072	.700**	.308**	.478**	-.445**	-.249**	-.317**	-.451**	-.388**	-.330**
26. Competence satisfaction (T2)	5.71	0.94	.089	.166*	.045	.067	-.006	.125	.457**	.665**	.473**	-.330**	-.277**	-.227**	-.390**	-.529**	-.349**
27. Relatedness satisfaction (T2)	5.09	1.29	.174*	.115	.120	-.009	.077	.084	.559**	.418**	.705**	-.433**	-.196**	-.382**	-.472**	-.472**	-.547**
28. Autonomy unfulfillment (T2)	2.95	1.36	-.051	-.115	-.066	-.044	-.050	-.043	-.335**	-.286**	-.375**	.668**	.396**	.385**	.500**	.449**	.393**
29. Competence unfulfillment (T2)	3.38	1.40	-.003	.020	.027	.113	.065	.013	-.248**	-.403**	-.276**	.395**	.688**	.249**	.469**	.498**	.282**
30. Relatedness unfulfillment (T2)	2.94	1.36	-.170*	-.118	-.108	-.107	-.021	-.167*	-.197**	-.178*	-.394**	.397**	.215**	.717**	.295**	.307**	.482**
31. Autonomy frustration (T2)	3.44	1.57	-.133	-.115	-.091	-.032	.004	.036	-.484**	-.312**	-.423**	.486**	.355**	.302**	.634**	.485**	.403**
32. Competence frustration (T2)	1.77	1.11	-.095	-.088	.016	.041	-.049	-.047	-.277**	-.487**	-.367**	.374**	.371**	.283**	.410**	.730**	.444**
33. Relatedness frustration (T2)	1.98	1.21	-.062	-.061	-.071	-.076	-.039	-.052	-.285**	-.226**	-.456**	.339**	.120	.389**	.407**	.442**	.687**
34. Need-supportive supervisory behaviors (T2)	4.86	1.59	.063	-.027	.048	-.057	.034	-.035	.366**	.277**	.512**	-.396**	-.237**	-.234**	-.426**	-.347**	-.410**
35. Need-indifferent supervisory behaviors (T2)	2.94	1.41	-.048	-.070	.024	-.023	-.020	.005	-.359**	-.257**	-.434**	.462**	.293**	.277**	.466**	.378**	.374**
36. Need-thwarting supervisory behaviors (T2)	1.98	1.22	.014	.037	.017	.035	.043	.036	-.366**	-.190*	-.393**	.390**	.170*	.258**	.448**	.297**	.480**
37. Amotivation (T2)	1.81	1.17	.065	-.181*	-.029	-.126	-.110	-.051	-.255**	-.121	-.249**	.374**	.261**	.233**	.275**	.270**	.216**
38. External-material regulation (T2)	2.86	1.50	-.009	-.214**	.214**	-.036	.049	-.076	-.131	-.016	-.039	.193**	.166*	.101	.186*	.107	.086
39. External-social regulation (T2)	3.31	1.52	.081	-.162*	.113	-.029	.103	-.050	-.107	-.138	-.076	.219**	.221**	.146	.230**	.125	.094
40. Introjected regulation (T2)	4.75	1.40	-.104	-.157*	.071	.052	-.004	-.071	.023	-.057	-.009	.088	.209**	.082	.057	.100	-.080
41. Identified regulation (T2)	5.09	1.30	.030	.197**	.119	.038	.265**	.000	.325**	.205**	.211**	-.295**	-.040	-.119	-.149*	-.194**	-.092
42. Intrinsic motivation (T2)	5.19	1.47	.016	.165*	.085	.038	.285**	.005	.350**	.187*	.333**	-.384**	-.179*	-.264**	-.352**	-.281**	-.193**

Note. * $p < .05$; ** $p < .01$; sex was coded 0 for women and 1 for men; sector was coded 0 for public sector and 1 for private sector; and contract type was coded 0 for temporary contract and 1 for permanent contract.

Table S8. *Correlations between Variables based on Scale Scores (continued)*

	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
16. Need-supportive supervisory behaviors (T1)	-														
17. Need-indifferent supervisory behaviors (T1)	-.740**	-													
18. Need-thwarting supervisory behaviors (T1)	-.660**	.680**	-												
19. Amotivation (T1)	-.253**	.365**	.392**	-											
20. External-material regulation (T1)	.008	.088*	.131**	.278**	-										
21. External-social regulation (T1)	-.051	.153**	.197**	.255**	.434**	-									
22. Introjected regulation (T1)	.100*	-.009	-.019	-.102*	.225**	.404**	-								
23. Identified regulation (T1)	.299**	-.245**	-.225**	-.390**	-.027	.116**	.301**	-							
24. Intrinsic motivation (T1)	.390**	-.382**	-.339**	-.460**	-.010	-.007	.181**	.735**	-						
25. Autonomy satisfaction (T2)	.436**	-.401**	-.400**	-.167*	-.001	-.034	-.044	.366**	.380**	-					
26. Competence satisfaction (T2)	.368**	-.229**	-.251**	-.055	-.100	-.223**	-.122	.230**	.261**	.516**	-				
27. Relatedness satisfaction (T2)	.594**	-.439**	-.484**	-.051	.036	-.008	-.032	.274**	.359**	.703**	.602**	-			
28. Autonomy unfulfillment (T2)	-.369**	.320**	.319**	.138	.162*	.176*	.186*	-.176*	-.272**	-.510**	-.399**	-.539**	-		
29. Competence unfulfillment (T2)	-.245**	.260**	.193**	.008	.110	.129	.087	-.076	-.106	-.329**	-.413**	-.330**	.561**	-	
30. Relatedness unfulfillment (T2)	-.314**	.217**	.224**	.068	.091	.034	.049	-.189*	-.240**	-.319**	-.272**	-.458**	.480**	.275**	-
31. Autonomy frustration (T2)	-.451**	.362**	.438**	.109	.157*	.122	.052	-.154*	-.254**	-.586**	-.438**	-.639**	.706**	.551**	.448**
32. Competence frustration (T2)	-.335**	.237**	.380**	.161*	.104	.202**	.091	-.153*	-.231**	-.383**	-.584**	-.496**	.533**	.530**	.373**
33. Relatedness frustration (T2)	-.434**	.241**	.504**	-.001	.058	.056	-.019	-.076	-.159*	-.334**	-.405**	-.640**	.456**	.328**	.621**
34. Need-supportive supervisory behaviors (T2)	.650**	-.554**	-.510**	-.177*	.061	-.022	.021	.194**	.386**	.516**	.361**	.642**	-.453**	-.343**	-.245**
35. Need-indifferent supervisory behaviors (T2)	-.561**	.585**	.471**	.146	.040	.044	.064	-.095	-.249**	-.446**	-.236**	-.592**	.539**	.392**	.289**
36. Need-thwarting supervisory behaviors (T2)	-.545**	.492**	.689**	.137	.028	.026	.015	-.050	-.211**	-.477**	-.292**	-.554**	.521**	.298**	.283**
37. Amotivation (T2)	-.217**	.186*	.225**	.528**	.078	.059	-.143	-.404**	-.403**	-.171*	-.136	-.252**	.416**	.207**	.269**
38. External-material regulation (T2)	.021	.000	.111	.208**	.584**	.375**	.102	-.138	-.101	.000	-.040	.091	.109	.121	.076
39. External-social regulation (T2)	-.133	.125	.139	.198**	.356**	.533**	.151*	-.092	-.094	-.017	-.181*	-.005	.209**	.184*	.127
40. Introjected regulation (T2)	.012	-.004	-.022	-.047	.156*	.304**	.506**	.137	.044	.036	.072	.170*	.104	.199**	.017
41. Identified regulation (T2)	.123	-.033	-.147	-.260**	-.034	-.017	.179*	.622**	.503**	.371**	.255**	.338**	-.268**	-.008	-.137
42. Intrinsic motivation (T2)	.344**	-.342**	-.285**	-.286**	-.040	-.061	.080	.500**	.664**	.448**	.290**	.499**	-.428**	-.145	-.291**

Note. * $p < .05$; ** $p < .01$; sex was coded 0 for women and 1 for men; sector was coded 0 for public sector and 1 for private sector; and contract type was coded 0 for temporary contract and 1 for permanent contract.

Table S8. *Correlations between Variables based on Scale Scores (continued)*

	31	32	33	34	35	36	37	38	39	40	41	42
31. Autonomy frustration (T2)	-											
32. Competence frustration (T2)	.573**	-										
33. Relatedness frustration (T2)	.593**	.589**	-									
34. Need-supportive supervisory behaviors (T2)	-.508**	-.410**	-.416**	-								
35. Need-indifferent supervisory behaviors (T2)	.658**	.442**	.459**	-.670**	-							
36. Need-thwarting supervisory behaviors (T2)	.603**	.395**	.556**	-.679**	.674**	-						
37. Amotivation (T2)	.357**	.361**	.297**	-.244**	.303**	.140	-					
38. External-material regulation (T2)	.113	.071	.030	.133	-.004	-.065	.241**	-				
39. External-social regulation (T2)	.204**	.193**	.105	-.069	.150*	.109	.320**	.499**	-			
40. Introjected regulation (T2)	-.008	.084	-.075	.022	.010	-.045	.059	.371**	.414**	-		
41. Identified regulation (T2)	-.264**	-.258**	-.182*	.168*	-.201**	-.131	-.302**	.045	.066	.341**	-	
42. Intrinsic motivation (T2)	-.445**	-.389**	-.292**	.395**	-.436**	-.290**	-.437**	.028	-.005	.175*	.697**	-

Note. * $p < .05$; ** $p < .01$; sex was coded 0 for women and 1 for men; sector was coded 0 for public sector and 1 for private sector; and contract type was coded 0 for temporary contract and 1 for permanent contract.

Table S9

Results from the Latent Profile Analysis Models at Times 1 and 2

Model	LL	#fp	Scaling	AIC	CAIC	BIC	ABIC	Entropy	aLMR	BLRT
Time 1										
1 Profile	-7570.732	20	1.334	15181.465	15289.067	15269.067	15205.574	Na	Na	Na
2 Profiles	-7015.276	41	1.234	14112.551	14333.136	14292.136	14161.975	.797	.000	< .001
3 Profiles	-6778.138	62	1.319	13680.276	14013.844	13951.844	13755.015	.822	.020	< .001
4 Profiles	-6674.337	83	1.310	13514.673	13961.223	13878.223	13614.726	.851	.218	< .001
5 Profiles	-6594.427	104	1.325	13396.855	13956.388	13852.388	13522.222	.797	.535	< .001
6 Profiles	-6511.013	125	1.230	13272.026	13944.542	13819.542	13422.708	.834	.203	< .001
7 Profiles	-6463.567	146	1.275	13219.133	14004.631	13858.631	13395.129	.837	.650	< .001
8 Profiles	-6422.093	167	1.197	13178.187	14076.667	13909.667	13379.498	.835	.549	< .001
Time 2										
1 Profile	-6620.851	20	1.491	13281.701	13389.304	13369.304	13305.810	Na	Na	Na
2 Profiles	-6006.030	41	1.253	12094.061	12314.646	12273.646	12143.484	.806	.000	< .001
3 Profiles	-5802.581	62	1.244	11729.161	12062.729	12000.729	11803.899	.805	.003	< .001
4 Profiles	-5711.371	83	1.308	11588.743	12035.293	11952.293	11688.795	.821	.260	< .001
5 Profiles	-5647.680	104	1.354	11503.360	12062.893	11958.893	11628.727	.775	.628	< .001
6 Profiles	-5586.809	125	1.249	11423.618	12096.133	11971.133	11574.300	.781	.344	< .001
7 Profiles	-5532.106	146	1.285	11356.213	12141.710	11995.710	11532.209	.815	.396	< .001
8 Profiles	-5494.540	167	1.262	11323.080	12221.561	12054.561	11524.391	.816	.339	< .001

Note. LL: Model loglikelihood; #fp: Number of free parameters; scaling: Scaling correction factor associated with robust maximum likelihood estimates; AIC: Akaïke information criteria; CAIC: Constant AIC; BIC: Bayesian information criteria; ABIC: Sample size adjusted BIC; aLMR: Adjusted Lo-Mendel-Rubin likelihood ratio test; and BLRT: Bootstrap likelihood ratio test.

Figure S1

Elbow Plot of the Value of the Information Criteria for Solutions Including Different Numbers of Latent Profiles at Time 1

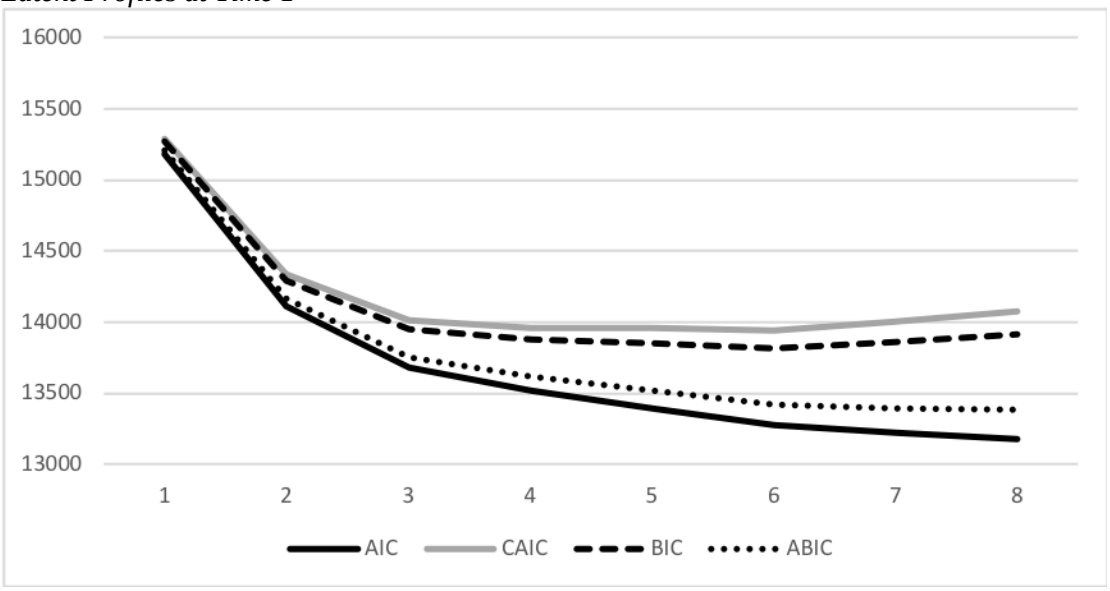

Figure S2

Elbow Plot of the Value of the Information Criteria for Solutions Including Different Numbers of Latent Profiles at Time 2

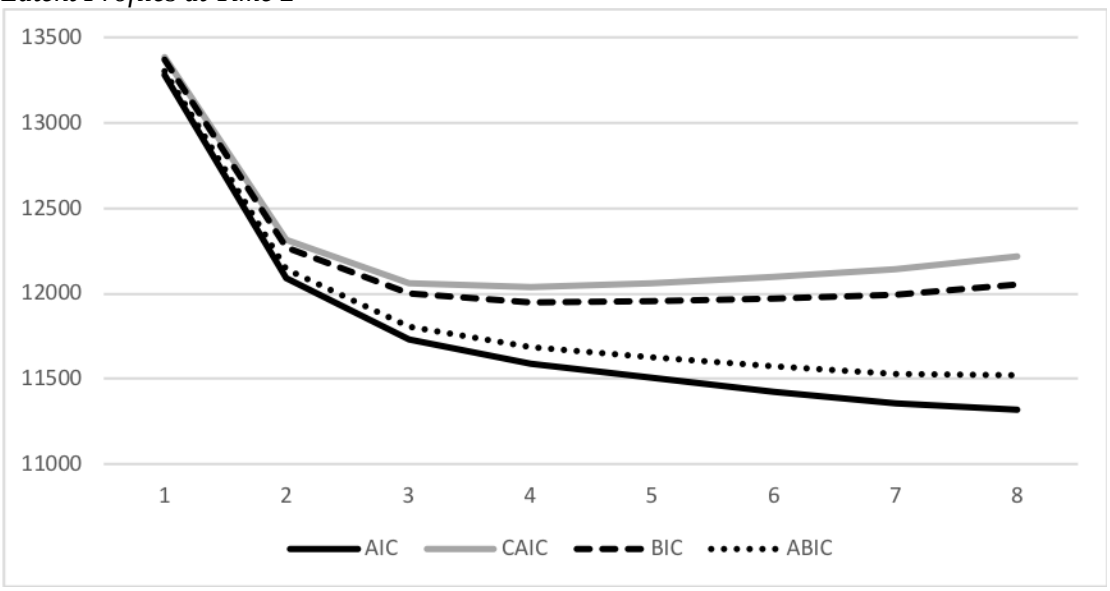

Table S10

Detailed Parameter Estimates from the Final LPA Solution (Distributional Similarity)

	Profile 1 Mean [CI]	Profile 2 Mean [CI]	Profile 3 Mean [CI]	Profile 4 Mean [CI]	Profile 5 Mean [CI]	Profile 6 Mean [CI]
Negative global need experience	-.499 [-.832; -.165]	.125 [-.365; .615]	.184 [-.221; .588]	-.896 [-1.088; -.705]	-1.169 [-1.304; 1.056]	1.108 [.764; 1.452]
Specific autonomy satisfaction	-.005 [-.309; .299]	-.34 [-.741; .061]	-.007 [-.248; .234]	.224 [.097; .352]	.033 [-.164; .230]	-.007 [-.233; .219]
Specific competence satisfaction	-.076 [-.274; .122]	-.042 [-.364; .280]	-.191 [-.456; .074]	.079 [-.115; .273]	.172 [.029; .315]	.232 [-.014; .478]
Specific relatedness satisfaction	-.055 [-.233; .124]	-.030 [-.370; .310]	.252 [.072; .431]	-.024 [-.199; .151]	.194 [-.014; .402]	-.219 [-.482; .044]
Specific autonomy unfulfillment	-.139 [-.463; .186]	.365 [-.065; .795]	-.040 [-.232; .153]	-.039 [-.178; .101]	-.174 [-.287; -.061	-.014 [-.333; .306]
Specific competence unfulfillment	-.033 [-.289; .222]	.093 [-.168; .355]	.137 [-.039; .314]	-.097 [-.238; .044]	-.390 [-.558; -.223]	.009 [-.196; .213]
Specific relatedness unfulfillment	-.025 [-.404; .354]	-.028 [-.310; .254]	.010 [-.297; .316]	.072 [-.134; .278]	-.620 [-.688; -.553]	.230 [.015; .444]
Specific autonomy frustration	.053 [-.178; .284]	.058 [-.485; .602]	-.027 [-.252; .198]	-.022 [-.152; .109]	-.082 [-.212; .048]	.018 [-.284; .320]
Specific competence frustration	-.179 [-.291; -.068]	-.495 [-.821; -.169]	.097 [-.109; .304]	.100 [-.026; .226]	.304 [.235; .373]	.278 [-.056; .611]
Specific relatedness frustration	-.184 [-.430; .062]	-.642 [-1.015; -.270]	-.022 [-.238; .194]	.155 [.291; .018]	.513 [.440; .586]	.411 [.074; .748]

Note. CI: 90% confidence interval; Profile 1: *Globally Positive and Average Specific*; Profile 2: *Globally Average and Mixed Specific*; Profile 3: *Globally Negative and Mixed Specific*; Profile 4: *Globally Very Positive and Average Specific*; Profile 5: *Globally Very Positive and Mixed Specific*; and Profile 6: *Globally Very Negative and Mixed Specific*.

Table S11

Classification Accuracy: Average Probability of Membership into Each Latent Profile (Column) as a Function of the Most Likely Profile Membership (Row)

	Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6
Time 1						
Profile 1	.890	.040	.021	.041	.000	.007
Profile 2	.054	.914	.024	.000	.000	.008
Profile 3	.039	.070	.836	.017	.002	.036
Profile 4	.048	.000	.006	.935	.011	.000
Profile 5	.001	.000	.010	.049	.941	.000
Profile 6	.002	.023	.064	.000	.000	.911
Time 2						
Profile 1	.880	.062	.020	.037	.001	.001
Profile 2	.019	.898	.038	.000	.000	.044
Profile 3	.051	.066	.788	.005	.003	.087
Profile 4	.044	.001	.025	.899	.031	.000
Profile 5	.001	.000	.036	.016	.947	.000
Profile 6	.002	.009	.043	.000	.000	.946

Note. Profile 1: *Globally Positive and Average Specific*; Profile 2: *Globally Average and Mixed Specific*; Profile 3: *Globally Negative and Mixed Specific*; Profile 4: *Globally Very Positive and Average Specific*; Profile 5: *Globally Very Positive and Mixed Specific*; and Profile 6: *Globally Very Negative and Mixed Specific*.