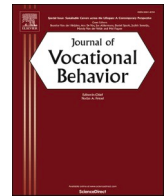




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Longitudinal dynamics of psychological need satisfaction, meaning in work, and burnout[☆]

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ABSTRACT

Drawing on an integrated perspective of self-determination theory (SDT) and conservation of resources theory (COR theory), this study investigated normal and reverse causation within-person effects among basic psychological need satisfaction (BPNS), meaning in work, and burnout over time. Using random intercept cross-lagged panel models (RI-CLPM), we examined data from German-speaking employees (complete cases = 781, imputed cases = 2131) at three time points over 12 months. At the within-person level, increased burnout was related to subsequent decreased BPNS (i.e., autonomy and competence need satisfaction). In line with COR theory, reciprocal within-person effects between burnout and meaning in work suggest a loss-cycle over time. Explorative analyses suggest that increased autonomy need satisfaction is related to subsequent increased competence and relatedness need satisfaction. At the between-person level, all variables were significantly correlated. Overall, this study found limited support for within-person assumptions of SDT, while supporting assumptions of COR theory. We discuss how the previous neglect of reverse causation, within-person effects, and the effect of time in SDT and COR theory may have led to a misrepresentation of the associations among BPNS, meaning in work, and burnout.

1. Introduction

The effects of burnout on individuals are well documented. Burnout is associated with depressive symptoms (Bianchi et al., 2015), posttraumatic stress (Raudenská et al., 2020), insomnia (Salvagioni et al., 2017), and a variety of other negative health consequences (Bayes et al., 2021). In recent years, work-related challenges have increased the prevalence of burnout in many professions and countries (Amanullah & Ramesh Shankar, 2020; Søvdal et al., 2021). Therefore, a solid understanding of the concept and the dynamics of its emergence are highly important today. To study the emergence of burnout, scholars frequently draw from self-determination theory (SDT) (Deci et al., 2017; Ryan & Deci, 2019). SDT assumes that the impairment of the basic psychological needs for autonomy, competence, and relatedness decreases psychological health and well-being (Deci & Ryan, 2000). Accordingly, original studies and meta-analyses have repeatedly shown that low levels of basic psychological need satisfaction (BPNS) are related to negative physical and psychological health outcomes, including burnout (e.g., Coxen et al., 2021; Nunes et al., 2023; Ryan et al., 2022; Slemp et al., 2018; Van den Broeck et al., 2016).

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Meaning in work, defined as one’s perceived significance of work experiences (Rosso et al., 2010 p. 94), is a promising factor for mitigating burnout. SDT and previous empirical literature suggest that failing to internalize the reasons for one’s behavior (i.e., perceiving less meaning) drains more energy and leads to exhaustion (Ryan & Deci, 2008 p. 707), which, over time, can lead to higher burnout levels (Roskam & Mikolajczak, 2021). Accordingly, previous studies have shown that meaning in work is related to multiple beneficial employee outcomes, including improved psychological and physical health (Allan et al., 2019; Martela & Steger, 2016; Rosso et al., 2010). SDT can help to explain the emergence of meaning in work. The theory suggests that different types of motivation exist along a continuum of self-determination, ranging from external to intrinsic regulation (Deci et al., 2017) and that BPNS is a key factor in increasing intrinsic motivation (Deci et al., 2017). As meaning could play an intrinsically motivating role in people’s lives (Allan et al., 2016; Heine et al., 2006), increases in BPNS could be related to increases in meaning in work. Thus, employees who perceive their work to be meaningful may experience decreased burnout, and employees who experience BPNS at work may experience increased meaning in work.

The associations between BPNS, meaning in work, and burnout are not fully understood. SDT predicts that BPNS promotes well-being and reduces ill-being (e.g., Coxen et al., 2021; Nunes et al., 2023; Van den Broeck et al., 2016). However, conservation of resources theory (COR theory) (Hobfoll, 2002; Hobfoll et al., 2018) predicts reverse causation between BPNS and reduced ill-being. Accordingly, increased burnout and decreased meaning in work may lead to a loss cycle, causing employees to subsequently decrease meaning and BPNS at work. The literature is currently unclear as to which of these processes is more plausible: the normal causation predicted by SDT, or the reverse causation predicted by COR. Given the extensive theoretical and empirical evidence for both directions, normal and reverse causation appear plausible, suggesting that the effects are more dynamic than previously thought.

Little is known about the dynamic within-person processes between BPNS, meaning in work, and burnout. Despite the quantity of empirical evidence for relations between these concepts, the majority of the findings were obtained from limited cross-sectional data (see Allan et al., 2019; Nunes et al., 2023; Van den Broeck et al., 2016). Moreover, past studies that relied on longitudinal data commonly lack insights into how psychological states change over time. This limitation appears especially problematic as both SDT and COR theory predict *within-person processes*. Both theories predict that changes in one variable cause changes in another variable, rather than static trait-like factors affecting each other. In recent years, studies started to provide promising insights into within-person processes by focusing on short-term (e.g., daily, or weekly) effects. However, given that clinical burnout may slowly develop over months rather than days (see Bakker & de Vries, 2021; Guthier et al., 2020; Maricuțoiu et al., 2017; Roskam & Mikolajczak, 2021), the literature to date still lacks insights into how burnout increases within-persons over the long term.

To address these limitations, we draw from an integrated perspective of SDT and COR theory and argue that the within-person effects between BPNS, meaning in work, and burnout, predicted by SDT (*normal causation*), are equally plausible as the within-person effects, predicted by COR theory (*reverse causation*; see Fig. 1). To test these hypotheses, we rely on longitudinal data, gathered at three time points with six-months lags, and an advantageous modeling approach that allows us to test reciprocal within-person effects, the random-intercept cross-lagged panel model (RI-CLPM) (Hamaker et al., 2015; Lucas, 2023; Mulder & Hamaker, 2021).

This study contributes to the literature in multiple ways. First, we contribute to SDT and COR theory by providing an integrated perspective of the two theories. We extend previously proposed integrative models of SDT and COR theory (e.g., Halbesleben et al., 2014; Jolly et al., 2021; Quinn et al., 2012) by considering normal and reverse causation effects of BPNS more carefully. In addition, by examining reciprocal effects, our study shows which concept is most important for increasing BPNS and meaning in work and decreasing burnout. Moreover, drawing from these findings, we make a practical contribution by recommending and discussing which factors practitioners should focus on when developing interventions for burnout prevention. Second, we provide a more nuanced understanding of SDT and COR theory by studying their within-person propositions with methods that allow us to test these effects. In doing so, we address the criticism that psychological theories aim to explain within-person processes, but most of the research

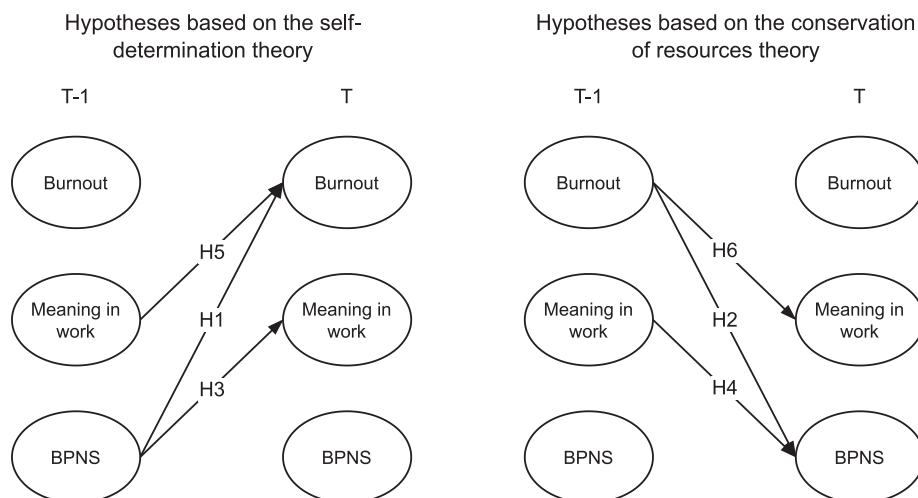


Fig. 1. Visual Representation of Hypotheses Based on SDT and COR. Note. BPNS = basic psychological need satisfaction.

conducted to empirically evaluate these theories relies on inadequate methods or data (Curran & Bauer, 2011; Pitariu & Ployhart, 2010). Moreover, unlike previous studies, we investigate the within-person change processes of burnout with a time frame of 12 months, which appears to be a suitable period to study cross-lagged effects of burnout (Maricuțoiu et al., 2017). Third, we broaden the scope of SDT by viewing the concept of meaning through the lens of SDT. We argue that meaning is inherently motivating because it implies that people have identified the reasons for their actions as significant. Likewise, we add to SDT by investigating the within-person processes of BPNS globally and as separate needs (i.e., needs for autonomy, competence, and relatedness), providing a more detailed understanding of their dynamic interplay and their relation to meaning in work and burnout across time.

1.1. The multidimensional concept of burnout

Burnout is commonly understood as a multidimensional concept consisting of emotional exhaustion, depersonalization, and reduced personal accomplishment (Maslach et al., 2001). However, this understanding of burnout has been criticized for conceptual and methodological shortcomings (see Schaufeli & Taris, 2005; Wheeler et al., 2011). For example, a key component of this definition, professional accomplishment, has been the subject of debate for not being a relevant component of the burnout concept. Additionally, although clinical burnout is commonly associated with cognitive impairments (e.g., Deligkaris et al., 2014), burnout conceptualizations have commonly neglected such distress symptoms (Kulikowski, 2021), leading to questionable usefulness of the concept and its measurement tool for clinical purposes (Schaufeli et al., 2020).

Therefore, we rely on a recently updated conceptualization of burnout (Schaufeli et al., 2020), which aims to retain the core meaning of burnout while addressing previous limitations. This updated burnout definition includes four dimensions or core symptoms. *Exhaustion* refers to an extreme form of fatigue due to a significant loss of energy on both a physical and mental level. *Mental distance* refers to psychological withdrawal from the job, which can be seen as an ineffective coping strategy to deal with feelings of exhaustion. Finally, *emotional impairment* and *cognitive impairment* refer to employees' reduced ability to regulate their cognitive and emotional processes, respectively.

Recent literature has provided support that the four-factor conceptualization of burnout is superior to the three-factor conceptualization in terms of theory and methodology. It retains the core meaning of burnout, while also focusing on clinical aspects (e.g., emotional, and cognitive impairment) (Schaufeli et al., 2020). Unlike previous measurement tools of the three-factor construct (Schaufeli et al., 1996), the measurement of the four-factor construct allows for the assessment of burnout with a single score (Hadžibajramović et al., 2022), for which clinically validated cut-off scores are available (Schaufeli et al., 2023). Furthermore, the four-factor burnout construct has been shown to be valid and reliable in multi-national representative samples (De Beer et al., 2020). In addition, it already demonstrated convergent validity with other burnout measurement tools, discriminant validity from other concepts (e.g., depression, boredom, workaholism), and predictive validity for several theoretical assumptions (e.g., job demands-resources model) (De Beer et al., 2022, 2023; Schaufeli et al., 2019).

1.2. BPNS and burnout

The long-evolving theoretical framework of SDT explains the emergence of motivation, engagement, performance, well-being, and ill-being (Gagné et al., 2018). Specifically, the basic psychological needs theory within SDT offers valuable insights into how well-being and ill-being emerge. It assumes that people have three basic psychological needs: the need for autonomy, competence, and relatedness, the satisfaction vs. frustration of which determines optimal functioning and well-being (Deci & Ryan, 2000). In the context of BPNS, *autonomy* refers to the experience of choice, willingness, and volition in behavior. *Competence* refers to the desire to interact effectively with the environment and express abilities. Finally, *relatedness* refers to the need to form and experience close and secure emotional bonds with significant others and to feel connected to them.

Following SDT, the satisfaction of each psychological need should have unique effects on burnout (Van den Broeck et al., 2016). Satisfying the need for competence should increase employees' flexibility in choosing appropriate coping behaviors to deal with stressors (see Weinstein & Ryan, 2011), and consequently, decreased stressors could reduce burnout (e.g., Guthier et al., 2020). In addition, people feel competent when they engage in activities that match their skills, which in turn should conserve energy and reduce disengagement. Similarly, when people satisfy their need for autonomy, their ability to process, select, and regulate their actions should increase (Deci et al., 2013). Additionally, autonomy need satisfaction implies that people have performed tasks according to their preferences, which requires less inhibition and control, and thus should be less depleting (Ryan & Deci, 2008, p. 707). Finally, the satisfaction of the need for relatedness implies a secure relational base (Deci & Ryan, 2000), which should save energy by being supportive. Consistent with this assumption, a recent study found that employees' perceptions of having access to emotional support at work enabled them to better cope with negative social experiences (Trépanier et al., 2022).

Previous studies found promising results in linking BPNS to burnout. For example, drawing on cross-sectional data, two studies found that BPNS was related to lower burnout and higher engagement levels (Doménech-Betoret et al., 2015; Van den Broeck et al., 2008), and two additional cross-sectional studies found that BPNS was related to lower exhaustion levels (Ebersold et al., 2019; Fernet et al., 2013). Interestingly, not all facets of BPNS appear equally associated with burnout. In their meta-analysis, Van den Broeck et al. (2016) found stronger associations between autonomy need satisfaction and burnout than for competence and relatedness. While all three psychological needs were negatively related to burnout, these findings suggest substantial differences in effect sizes and the importance of studying psychological needs separately.

Although the existing literature on BPNS provides valuable insights, it is almost exclusively based on limited cross-sectional data (Van den Broeck et al., 2016). Some studies have already addressed this limitation and used longitudinal designs to study the effects of

BPNS. For example, psychological need thwarting was related to higher burnout levels three months later (Huyghebaert et al., 2018), and psychological need support was related to mindfulness, which was in turn related to lower burnout levels over 15 months (Olafsen, 2017). These longitudinal studies offer substantial advantages over cross-sectional studies (e.g., Muthén & Curran, 1997).

However, research on the association between BPNS and burnout is still limited by a lack of knowledge about within-person effects. This limitation is problematic because SDT assumes that increased BPNS leads to increased psychological health on the individual level (Deci & Ryan, 2000). Although only longitudinal designs can test such within-person assumptions, longitudinal studies with longer time lags (i.e., studies that use monthly or yearly time lags) commonly have neglected this separation (Hamaker et al., 2015). Regarding the relation between BPNS and burnout, we identified no longitudinal study with longer than daily time-lags that examined within-person effects. However, recent studies show daily and weekly effects of BPNS (for a review see Coxen et al., 2021). For example, increased daily BPNS was related to decreased exhaustion (Aldrup et al., 2017; Coxen et al., 2023) and burnout (Haar et al., 2018).

The time frame of the relation between BPNS and burnout remains unclear (Bakker & de Vries, 2021). SDT provides no specific guidance as to when BPNS should influence burnout. Additionally, the previous literature showing daily within-person effects provides limited insight into the time frame of effects, because it mainly focused on exhaustion and not burnout. Although exhaustion is a major component of burnout (Schaufeli et al., 2020), it may be more short-lived because employees can more easily recover from exhaustion (Sonnentag et al., 2017). Previous literature has argued that stressful work experiences lead to burnout only when employees repeatedly fail to cope or recover from strain (Bakker & de Vries, 2021). In these situations, fatigue may accumulate over time and become more permanent and severe. Therefore, to examine changes in burnout, longer time lags may be more appropriate.

In summary, SDT suggests that increased BPNS saves energy, increases flexible coping behavior, and reduces disengagement and thus reduces burnout. Previous studies with daily time lags showed negative within-person effects between BPNS and exhaustion but lack insight into long-term changes in burnout. While a few longitudinal studies with longer time lags showed negative associations between BPNS and burnout, they have neglected within-person dynamics. Concurrent with theoretical assumptions of SDT and prior empirical literature, we assume:

Hypothesis 1. An increase in BPNS (i.e., autonomy, competence, and relatedness) is related to a subsequent decrease in burnout.

Another theoretical perspective to understand the association between BPNS and burnout is the COR theory (Hobfoll, 2002; Hobfoll et al., 2018). It understands resources as perceived, valuable entities that contribute to the achievement of one's goals (Halbesleben et al., 2014). The theory assumes that people experience stress when resources are threatened or lost. As a consequence of decreased resources, a loss cycle can occur in which people subsequently lose more resources and experience higher stress. The theory posits that burnout can develop if such loss cycles persist (Park et al., 2014), and with each iteration of the loss cycle, employees have fewer resources to compensate for the loss of resources (Hobfoll et al., 2018). In this context, COR theory emphasizes the importance of threatened, lost, or lacking energy resources as antecedents of burnout (Hobfoll & Freedy, 1996). Therefore, as a result of burnout, a loss cycle may occur in which burned-out employees lose more and more resources.

Through the lens of COR theory, the satisfaction of each psychological need can be considered an important resource (Halbesleben et al., 2014; Jolly et al., 2021). The satisfaction of the need for autonomy at work indicates that employees value and pursue intrinsic aspirations (see Ryan et al., 2022; Slemp et al., 2018; Weinstein & Ryan, 2011). The satisfaction of the need for competence at work indicates that employees can effectively influence their environment to attain valued outcomes (see Deci & Ryan, 2000). Finally, the satisfaction of the need for relatedness at work indicates that employees experience supportive interactions with coworkers and supervisors, resulting in beneficial interpersonal and work-related outcomes (see Jolly et al., 2021). Thus, autonomy, competence and relatedness need satisfaction show qualities of work-related resources that help employees to achieve valuable goals.

As COR theory predicts that burnout can lead to resource loss, burnout may cause a loss of BPNS. We argue that this assumption is plausible in light of conceptual assumptions and empirical findings from the burnout literature. For example, as burned-out employees are characterized by extreme tiredness (Schaufeli et al., 2020, p. 4), they may lack the energy to make decisions about their work (e.g., avoid decision-making; Michailidis & Banks, 2016), (b) engage in cognitive and challenging tasks (for a discussion see Kulikowski, 2021), and (c) engage in social relationships. Additionally, burned-out employees are characterized by emotional and cognitive impairments, which may further decrease their ability to engage in social relationships and perform work tasks effectively. Moreover, if employees withdraw and distance themselves from work due to increased burnout, they may have already given up looking for situations that satisfy their needs for autonomy, competence, and relatedness.

Although no study has examined the effects of burnout on BPNS, findings from previous studies of similar concepts support this effect. For example, exhaustion was related to higher levels of work-family conflict (Tone Innstrand et al., 2008), which was related to lower levels of relatedness need satisfaction (e.g., Kluwer et al., 2020; Vanhee et al., 2018). Additionally, a recent meta-analysis showed that burnout is positively related to perceived stress (Guthier et al., 2020), which was related to decreased competence need satisfaction (Weigelt et al., 2019). Furthermore, burnout may impair employees' self-regulation (Bakker & de Vries, 2021), which can limit self-initiated actions to satisfy autonomy needs (for a review see Rudolph et al., 2017; Wrzesniewski & Dutton, 2001). Therefore, drawing on COR theory, conceptual assumptions, and previous empirical literature, we propose the following hypothesis:

Hypothesis 2. An increase in burnout is related to a subsequent decrease in BPNS (i.e., autonomy, competence, and relatedness).

1.3. BPNS and meaning in work

Meaning in work is typically not considered in SDT, but the theory offers insights into why BPNS may increase meaning in work.

SDT argues that different types of motivation exist along a continuum of self-determination, ranging from external to intrinsic regulation (Deci et al., 2017). On this continuum, people experience more integrated forms of (external) motivation because they have internalized or integrated the reasons for action into their self-concept. Specifically, *identified regulation* refers to the engagement in activities because one finds them personally meaningful and important (Van den Broeck et al., 2021). Thus, through the lens of SDT, meaning can be viewed as a self-determined motivator.

As finding meaning could play an intrinsically motivating role in people's lives (Allan et al., 2016; Heine et al., 2006), the process of SDT that explains the emergence of motivation should be similar to the process that explains the emergence of meaning. Specifically, employees who satisfy their need for autonomy perceive themselves as the locus of action and thus experience their actions as meaningful. Employees who satisfy their need for relatedness perceive their social interactions as meaningful and thus draw meaning from them. Finally, employees who satisfy their competence needs explore and manipulate the environment effectively, which should be inherently meaningful. Although previous empirical literature has largely neglected the relation between BPNS and meaning in work (see Coxen et al., 2021; Nunes et al., 2023; Van den Broeck et al., 2016), a few cross-sectional studies have recently found support for a positive association between these concepts. For example, BPNS moderated the relation between the desire for meaning and higher levels of experienced meaning in work (Autin & Allan, 2020), and competence need satisfaction was related to higher levels of meaning in work (Autin et al., 2022).

However, the association between BPNS and meaning in work has not yet been studied longitudinally. Furthermore, drawing on existing studies on related concepts (e.g., autonomous motivation, work engagement) only yields limited insights into when this effect occurs. In their review of diary studies, Coxen et al. (2021) identified three studies that show daily within-person effects, and two studies that show weekly within-person effects of BPNS on increased intrinsic motivation. Additionally, BPNS was previously associated with daily increases in work engagement in eight studies, and related to daily increases in striving in one study (see Coxen et al., 2021). In contrast, some studies have demonstrated long-term effects of BPNS on proximate concepts of meaning in work. For example, BPNS was related to higher levels of meaning in life over ten months (Zhang et al., 2022), higher levels of autonomous motivation over fifteen months (Garn et al., 2019), and higher levels of work motivation over fifteen months (Olafsen et al., 2018). Therefore, drawing on SDT and previous empirical literature, we assume:

Hypothesis 3. An increase in BPNS (i.e., autonomy, competence, and relatedness) is related to a subsequent increase in meaning in work.

Previous research that builds on SDT mainly focused on normal causation effects of BPNS, for example, that increased BPNS leads to increased health and well-being (Ryan et al., 2022). However, reverse causation effects, such as increased meaning in work leading to increased BPNS, appear equally plausible in light of COR theory. COR theory assumes that people are motivated to maintain, protect, and buildup resources (Hobfoll, 2002). In addition, the theory suggests that environments that can nurture or restrict the creation and maintenance of resources (Hobfoll et al., 2018). Accordingly, work environments that employees find meaningful may facilitate resource gains in the form of BPNS. In support of this view, previous literature has argued that people who experience increased meaning perceive their environment as controllable (Heine et al., 2006), which should make them more likely to satisfy their autonomy needs. Additionally, employees who experience increased meaning should set relevant goals and increase their capacities to achieve them (Martela & Steger, 2016), which should make them more likely to satisfy their competence needs. Finally, employees who experience increased meaning were found to be more desirable friends and conversation partners (Stillman et al., 2011), which should make them more likely to satisfy their relatedness needs.

Despite the arguments in favor of a positive effect of meaning in work on BPNS, empirical evaluation of the link is missing. Nevertheless, this association is supported by the previous literature on proximal concepts. For example, in a large sample of students, autonomous motivation was related to higher levels of teachers' autonomy-supportive behaviors (rated by students) over fifteen months (Garn et al., 2019). In addition, students' assessment of their meaning in life was related to higher levels of their satisfaction of psychological needs over ten months (Zhang et al., 2022). Therefore, consistent with assumptions of COR theory, conceptual assumptions, and previous empirical research on proximate concepts, we propose the following hypothesis:

Hypothesis 4. An increase in meaning in work is related to a subsequent increase in BPNS (i.e., autonomy, competence, and relatedness).

1.4. Meaning in work and burnout

Following SDT, we argue that employees who repeatedly fail to internalize the reasons for their behavior (i.e., who don't perceive work tasks as meaningful) regularly deplete their energy and feel exhausted, which, over time, can lead to higher burnout levels (Roskam & Mikolajczak, 2021). Supporting this view, Ryan and Frederick (1997) argued that meaningful challenges mitigate the negative effect of stressors on subjective vitality. Additionally, employees who internalize goals and perceive their work as meaningful should approach their work with a sense of pride and inspiration that increases vitality and involvement (Maslach et al., 2001; Ryan & Deci, 2008).

To date, the effect of meaning in work on burnout is sparsely researched. Only a few studies on proximal concepts of meaning found support for this association. For example, in their meta-analysis, Allan et al. (2019) showed that meaning was positively related to a variety of health outcomes and the opposite of burnout, work engagement. In addition, meaning in work was related to lower levels of absenteeism via engagement after three months (Soane et al., 2013), and it was related to higher levels of psychological well-being after one month (Arnold & Walsh, 2015). Although these studies focused on monthly time lags, three studies also support short-

term effects. Increased meaning was related to increased daily engagement via fatigue (Vogel et al., 2020), it was related to increased vitality at the end of the workday (Niessen et al., 2012), and it was related to increased daily vitality and decreased depression (Hadden & Smith, 2019).

While these studies provide valuable insights, the literature has limitations similar to those discussed in the previous sections. The time lag of the effect is currently unclear. Some studies point to a monthly effect of meaning on health and well-being, while others point to a daily effect. However, as burnout may only develop over a longer period (see Bakker & de Vries, 2021; Guthier et al., 2020), the current literature lacks evidence for the association between meaning in work and burnout. Furthermore, previous studies that used longer time-lags neglected within-person effects and thus provided only limited support for the within-person assumptions of SDT. Therefore, following assumptions of SDT and previous empirical literature, we assume:

Hypothesis 5. An increase in meaning in work is related to a subsequent decrease in burnout.

Previous research has neglected the effects of burnout on meaning in work. We argue that decreased meaning in work not only increases burnout, but that burnout also decreases meaning in work. Such loss cycles (Hobfoll, 2002) are typically not considered in SDT, but previous literature has shown similar effects. For example, burnout was related to higher levels of undermining behavior, which in turn was associated with higher levels of burnout (Bakker & Wang, 2020). Additionally, burnout was related to an increase in work demands, and work demands were in turn related to higher levels of burnout at a later time point (ten Brummelhuis et al., 2011). Furthermore, focusing on longitudinal studies, a recent meta-analysis found that burnout was negatively related to job resources and positively related to job demands, which are commonly found to be positively associated with burnout (Lesener et al., 2019).

The literature offers multiple possible explanations for loss cycles (see Guthier et al., 2020; Hobfoll, 2002; Hobfoll et al., 2018). For example, Garst et al. (2000) argued that stress causes employees to engage in less stressful work tasks. However, tasks that initially appear as less stressful may also offer less cognitive and challenging demands, which are important for intrinsic motivation and learning (Glaser et al., 2015; Kubicek et al., 2022). Therefore, burned-out employees may engage in fewer work tasks that they perceive as meaningful. Another explanatory approach suggests that burned-out employees perceive their work environment more negatively, even if the work tasks remain unchanged (De Lange et al., 2004). Supporting this argument, Bianchi and Laurent (2015) showed in an eye-tracking study that burnout was associated with longer attention to negative stimuli and shorter attention to positive stimuli. Thus, employees with increased burnout may perceive their work environment more negatively over time and, consequently, perceive decreased meaning in work. Therefore, drawing on COR theory and previous empirical literature, we assume:

Hypothesis 6. An increase in burnout is related to a subsequent decrease in meaning in work.

2. Method

2.1. Participants and procedure

The data for this 12-month longitudinal study were gathered by a German polling firm at three time points with time lags of six months. The data were gathered in December 2018 (T1) June 2019 (T2) and December 2019 (T3). Initially, 2131 German-speaking full- and part-time employees participated at T1, 1197 participated at T2, and 917 participated at T3. A sample of 781 employees provided matching data, which was used for the analyses in this study.

The sample ($n = 781$) was 49.7 % female (50.3 % male). The participants were either German (58.3 %) or Austrian (41.7 %). Regarding their highest education, 33.7 % reported a university degree, 29.6 % an apprenticeship diploma, 21.6 % a high-school diploma (i.e., Matura or Abitur), and 13.2 % some form of secondary school education. First- or second-generation immigrants made up 7.9 % of the sample. Regarding their highest level of education, 1.9 % of the sample completed at least compulsory schooling, 29.6 % completed vocational school, 13.2 % completed secondary education without university entrance qualification, 21.6 % completed secondary education with university entrance qualification, and 33.6 % have a university degree. On average at T1, participants were 45.9 years old ($SD = 11.80$, ranging from 18 to 69), worked 10.16 years in their current position ($SD = 9.34$), and worked 36.10 h per week ($SD = 9.06$). They worked in a variety of professional fields, including health and social services (14.9 %), public administration (10.9 %), economic services (10.6 %), production (9.9 %), and retail (9.6 %). In contrast to temporary contracts (11.3 %) or self-employment (7.4 %), most participants had permanent contracts (81.3 %).

The sample showed a high degree of generalizability to the German and Austrian populations at the first measurement time point. Its characteristics were similar to those of the German and Austrian population in terms of age, gender, and weekly working hours (Bundesanstalt Statistik Österreich, Statistik Austria, 2023; Statistisches Bundesamt, Destatis, 2023).

2.2. Measures

BPNS was measured with nine German items of the Work-related Basic Need Satisfaction Questionnaire (Deci et al., 2001). Autonomy (e.g., "I feel like I can make a lot of inputs to deciding how my job gets done"), competence (e.g., "People at work tell me I am good at what I do"), and relatedness (e.g., "I really like the people I work with") need satisfaction were measured with three items each, ranging from 1 (*not at all true*) to 7 (*very true*). The measurement tool demonstrated reliability and validity in multiple previous studies (e.g., Hofer & Busch, 2011; Van den Broeck et al., 2008; Vansteenkiste et al., 2007) and showed good psychometric properties in terms of reliability (omega ranged from 0.77 to 0.93) and validity (see Tables 2 and 3) in this study.

Meaning in work was measured with the German items of the positive meaning facet of the Work as Meaning Inventory (Steger et al.,

2012). The scale comprises three items and captures the subjective experience of the personal significance (i.e., meaningfulness) of work (Steger et al., 2012). The items (e.g., “I understand how my work contributes to my life’s meaning”) were measured on a 7-level Likert scale ranging from 1 (*absolutely untrue*) to 7 (*absolutely true*). The scale previously showed good reliability and validity (e.g., Steger et al., 2012; Tims et al., 2016) and showed good psychometric properties in terms of reliability (omega ranged from 0.92 to 0.93) and validity (see Tables 2 and 3) in this study.

Burnout was measured with the Burnout Assessment Tool (Schaufeli et al., 2020), a validated instrument that distinguishes between four core components of burnout (i.e., exhaustion, mental distance, cognitive impairment, and emotional impairment). Exhaustion (e.g., “At work, I feel physically exhausted”) was measured with eight items ranging from 1 (*never*) to 5 (*always*). The other burnout dimensions are mental distance (e.g., “I struggle to find any enthusiasm for my work”), cognitive impairment (e.g., “At work, I have trouble staying focused”), and emotional impairment (e.g., “At work, I feel unable to control my emotions”). They were measured with five items each, ranging from 1 (*never*) to 5 (*always*). The measurement tool demonstrated reliability and validity in multiple previous studies (De Beer et al., 2020; Hadžibajramović et al., 2022; Schaufeli et al., 2020) and showed good psychometric properties in terms of reliability (omega ranged from 0.89 to 0.94) and validity (see Tables 2 and 3) in this study.

Control variables. Previous studies have shown inconsistent differences between gender groups in burnout (Purvanova & Muros, 2010), meaning in work (Lopez & Ramos, 2017), and BPNS (Coxen et al., 2021; Van den Broeck et al., 2016). Similarly, employees who are in leadership versus non-leadership positions, who work in different countries or fields, who are older or higher educated may experience different work environments, which may influence their burnout, meaning in work, and BPNS. Therefore, we tested the inclusion of gender, age, workplace country, and leadership position as covariates in our analyses.

2.3. Analysis procedure

The statistical analysis approach consisted of three steps. First, we evaluated the psychometric properties of the constructs under study. We evaluated the structural and discriminant validity of concepts using confirmatory factor analyses (Hu & Bentler, 1999) using weighted least squares estimation with robust corrections. Additionally, we evaluated the internal consistency with ω and ω_{ho} coefficients, which are advantageous for higher-order constructs (e.g., burnout) (Raykov & Zinbarg, 2011).

Second, to rule out that changes in the structure of constructs caused factors to change over time, we evaluated measurement time invariance. To do this, we evaluated whether the factor structure is the same between groups of measurement occasions (i.e., configural invariance). We subsequently constrained factor loadings (i.e., metric invariance), intercepts (i.e., scalar invariance), and residual variances (i.e., strict invariance) to be equal across measurement points and used model comparison tests to evaluate measurement time invariance (Brown, 2015; Satorra & Bentler, 2010). After establishing good model fit for the full measurement model, we extracted factor scores to test our hypotheses. We extracted factor scores of second-order factors and first-order factors from respective full measurement models.

Third, we investigated the proposed within-person effects using the random intercept cross-lagged panel model (RI-CLPM; Hamaker et al., 2015). The RI-CLPM extends the traditional cross-lagged panel model. It includes random intercept factors that capture the time-invariant, trait-like stability of constructs (Usami et al., 2019). Cross-lagged effects in the RI-CLPM reflect associations between variables among wave-specific deviations from a person’s stable-trait level (Lucas, 2023). The model allows the interpretation of how such changes in a construct lead to an “increase” or “decrease” in another construct. In contrast, the traditional CLPM does not distinguish between the effects of stable traits and the effects of deviations from traits, which can be unrealistic and lead to biases (Lucas, 2023).

Previous literature has highlighted the need to study BPNS as both a higher-order factor and separate factors (Coxen et al., 2021; e.g., Garn et al., 2019; Van den Broeck et al., 2016). To investigate the effects of BPNS, we ran two models, one with BPNS as a higher-order construct and one treating autonomy, competence, and relatedness need satisfaction as separate constructs. These analyses enabled us to investigate how changes in the satisfaction of one psychological need influence changes in the satisfaction of other needs, meaning in work, and burnout. Additionally, this approach allowed us to gain insights into the unique effects of each psychological need by controlling for the effects of other factors in the model.

Our modeling approach included testing a series of nested models. First, we tested (a) a traditional CLPM (i.e., random intercepts constrained to 0) with specified autoregressive paths between constructs and paths from BPNS to meaning in work and burnout, and from meaning in work to burnout. Next, we tested (b) a CLPM with added reverse causation paths. Next, we tested (c) a model with random intercepts (i.e., the RI-CLPM) and specified normal causation paths and autoregressive paths. We tested (d) the RI-CLPM with added reverse causation paths. Finally, we added (e) equivalence constraints to the autoregressive paths and (f) cross-lagged paths across waves to test whether the lagged effects are time-invariant. At each step, we assessed the model fit with a robust estimation method (Satorra & Bentler, 2010) and proceeded with the better-fitting model or with the more parsimonious model if models fitted the data equally well.

We analyzed the data using the R statistical programming language (R Core Team, 2023) and RStudio IDE (Posit Team, 2020) with the lavaan (Rosseel, 2012) and semTools (Jorgensen et al., 2022) packages. Additional presentations of methods and results (i.e., a full correlation table, tables with standardized and unstandardized model estimates, and a report of missing data management and comparison of results), as well as detailed R syntax and raw outputs are available as supplementary material from <https://osf.io/9vjuw/>. The dataset is available upon request from the first author.

3. Results

Table 1 presents intraclass correlations, correlations, and omega statistics of variables at the first measurement time point. To evaluate construct validity, we tested CFAs of the proposed concepts separately at each time point. We evaluated construct validity by testing a BPNS model with three factors (i.e., autonomy, competence, and relatedness need satisfaction) with three items each. We tested a higher-order burnout model with four factors (i.e., exhaustion, mental distance, emotional impairment, and cognitive impairment). As previously proposed (De Beer et al., 2020), the burnout model captures exhaustion with eight items; and mental distance, emotional impairment, and cognitive impairment with five items each. We did not test a separate CFA for meaning in work because the proposed model with three items is fully saturated making the model fit uninformative. However, we tested a full measurement model, which included meaning in work, BPNS, and burnout in their proposed factor structure. As shown in Table 2, the tested models showed good model fit (Hu & Bentler, 1999) suggesting construct validity. Furthermore, the full measurement model at each time point showed good model fit (see Table 2) suggesting discriminability between study constructs.

Treating measurement occasions as groups, we evaluated the measurement time invariance. Table 3 shows that the differences between the configural, metric, scalar, and strict models were not significant. The CFI changed by a maximum of 0.001 and the RMSEA by a maximum of 0.007. These findings demonstrate measurement time invariance for the BPNS dimensions, the burnout dimensions, and all dimensions combined in a full measurement model.

3.1. Model comparisons

We tested a sequence of models with BPNS as a higher-order factor (Model A) and separate factors (Model B). Fit indices and results of the model comparisons are displayed in Table 4. The model comparison tests showed that the full RI-CLPMs fitted the data significantly better than the competing models. Furthermore, the models that included equivalence constraints of autoregressive and cross-lagged paths did not result in a significant loss of model fit suggesting time invariance of lagged within-person effects. We proceed to test our hypotheses in the RI-CLPMs with equivalence constraints of autoregressive and cross-lagged paths.

3.2. BPNS and burnout

Fig. 2 displays standardized coefficients of hypotheses tests in a model with BPNS as a higher-order factor (Model A) and separate factors (Model B). A full table of estimates can be found in the supplementary material. Hypothesis 1 was not supported by the data. Contrary to our assumption, increased BPNS was not related to subsequent decreased burnout. Similarly, results from Model B showed that increased autonomy and competence need satisfaction were not related to decreased burnout over time. Surprisingly, we found that increased relatedness need satisfaction was related to subsequent increased burnout ($\beta_{t1-t2} = 0.14$, $\beta_{t2-t3} = 0.13$, $SE = 0.06$, $p = .029$).¹

Hypothesis 2 was supported by the data. Increased burnout was related to subsequent decreased BPNS ($\beta_{t1-t2} = -0.19$, $\beta_{t2-t3} = -0.20$, $SE = 0.08$, $p = .017$). Results from Model B further showed that increased burnout was related to subsequent decreased autonomy need satisfaction ($\beta_{t1-t2} = -0.17$, $\beta_{t2-t3} = -0.17$, $SE = 0.08$, $p = .032$) and competence need satisfaction ($\beta_{t1-t2} = -0.19$, $\beta_{t2-t3} = -0.18$, $SE = 0.08$, $p = .020$) but not relatedness need satisfaction ($p = .720$).

The autoregressive paths of burnout ($\beta_{t1-t2} = 0.26$, $\beta_{t2-t3} = 0.27$, $SE = 0.10$, $p = .011$) were significant. In contrast, the autoregressive paths of BPNS ($p = .367$) were not significant. This finding suggests that employees who experience increases in burnout experience subsequent increases in burnout.

The between-person parts of the analyses showed that the random intercepts of burnout and BPNS have significant variance ($p < .001$). This finding suggests stable, trait-like differences between people on these concepts. Additionally, the random intercepts of BPNS and dimensions of BPNS were negatively related to burnout. Burnout was negatively correlated to overall BPNS ($r = -0.83$, $SE = 0.04$, $p < .001$), autonomy ($r = -0.72$, $SE = 0.04$, $p < .001$), competence ($r = -0.79$, $SE = 0.04$, $p < .001$), and relatedness need satisfaction ($r = -0.68$, $SE = 0.04$, $p < .001$). These findings suggest that individuals who experience higher levels of BPNS, in general, also experience lower levels of burnout, in general.

3.3. BPNS and meaning in work

Hypothesis 3 was not supported (see Fig. 2). We found no evidence that increased BPNS ($p = .416$) was related to subsequent increased meaning in work. Similarly, we found no evidence that increased autonomy need satisfaction ($p = .289$) or competence need satisfaction ($p = .365$) were related to increased meaning in work. Surprisingly, increased relatedness need satisfaction was related to decreased meaning in work ($\beta_{t1-t2} = -0.13$, $\beta_{t2-t3} = -0.13$, $SE = 0.07$, $p = .047$). Hypothesis 4 was not supported. Increased meaning in work was not related to increased BPNS ($p = .526$), including autonomy need satisfaction ($p = .517$), competence need satisfaction ($p = .334$), and relatedness need satisfaction ($p = .991$). Additionally, the autoregressive paths of meaning in work were not significant ($p = .890$).

The between-person parts of the analyses showed that the random intercepts of meaning in work and BPNS have significant

¹ We did not impose any equality constraints on within-person variances of predictors and outcomes, which leads to differences in standardized lagged parameters across waves even when the unstandardized lagged parameters are constrained to be equal (Hamaker et al., 2015).

Table 1
Correlations, and internal consistency among variables at the first measurement time point.

Variable	ICC ₁	1	2	3	4	5	6	7	8	9	10
1. BPNS	0.75	(0.81)									
2. Autonomy sat.	0.69	0.86	(0.90)								
3. Competence sat.	0.68	0.99	0.82	(0.77)							
4. Relatedness sat.	0.69	0.77	0.62	0.71	(0.92)						
5. Meaning in work	0.73	0.90	0.70	0.89	0.60	(0.92)					
6. Burnout	0.75	-0.76	-0.61	-0.69	-0.58	-0.71	(0.89)				
7. Exhaustion	0.75	-0.54	-0.46	-0.47	-0.42	-0.47	0.89	(0.94)			
8. Mental distance	0.73	-0.84	-0.68	-0.80	-0.61	-0.82	0.96	0.78	(0.92)		
9. Emot. impairment	0.62	-0.54	-0.47	-0.46	-0.50	-0.45	0.87	0.80	0.75	(0.91)	
10. Cog. impairment	0.69	-0.53	-0.40	-0.48	-0.38	-0.50	0.88	0.84	0.73	0.82	(0.90)

Note. *N* = 781. Omega coefficients in parentheses. Correlation only between T1 variables. Correlation coefficients were estimated based on factor scores. A correlation table of all study variables at all time points is available in the supplementary material. ICC = *intraclass correlation coefficient 1*, BPNS = basic psychological need satisfaction, Emot. impairment = emotional impairment, Cog. Impairment = cognitive impairment. All correlation coefficients are significant at *p* < .001.

Table 2
Confirmatory factor analysis fit indices.

Variable	χ^2	<i>df</i>	χ^2/df	<i>CFI</i>	<i>RMSEA</i>	<i>SRMR</i>	<i>ωho</i>
BPNS T1	368.22	24	15.34	0.98	0.14	0.03	0.81
BPNS T2	356.81	24	14.87	0.98	0.13	0.03	0.84
BPNS T3	343.65	24	14.32	0.98	0.13	0.03	0.82
Burnout T1	1329.27	226	5.88	0.96	0.08	0.04	0.89
Burnout T2	1308.18	226	5.79	0.97	0.08	0.04	0.90
Burnout T3	1228.15	226	5.43	0.97	0.08	0.04	0.90
Full model T1	3656.37	550	6.65	0.93	0.09	0.07	–
Full model T2	3238.84	550	5.89	0.95	0.08	0.06	–
Full model T3	2963.15	550	5.39	0.96	0.08	0.05	–

Note. Robust test statistics are reported. BPNS = basic psychological need satisfaction. *CFI* = comparative fit index, *RMSEA* = root mean square error of approximation, *SRMR* = standardized root mean square residual, *ωho* = higher-order omega.

Table 3
Measurement time invariance tests.

Model	χ^2	<i>df</i>	<i>CFI</i>	<i>RMSEA</i>	<i>SRMR</i>	$\Delta\chi^2$	ΔCFI	$\Delta RMSEA$
<i>BPNS dimensions</i>								
1. Configural invariance	456.82	72	0.95	0.10	0.05		–	–
2. Metric invariance	475.97	84	0.95	0.09	0.05	12.70 ns.	0.00	0.01
3. Scalar invariance	501.83	96	0.95	0.08	0.05	12.40 ns.	0.00	0.01
4. Strict invariance	486.65	114	0.95	0.08	0.05	24.28 ns.	0.00	0.01
<i>Burnout dimensions</i>								
1. Configural invariance	2512.38	672	0.94	0.07	0.05		–	–
2. Metric invariance	2539.92	710	0.94	0.07	0.05	18.20 ns.	0.00	0.00
3. Scalar invariance	2591.89	748	0.94	0.06	0.05	27.13 ns.	0.00	0.00
4. Strict invariance	2597.05	794	0.94	0.06	0.05	44.98 ns.	0.00	0.00
<i>Full model</i>								
1. Configural invariance	5496.85	1650	0.92	0.06	0.07		–	–
2. Metric invariance	5548.66	1714	0.92	0.06	0.07	50.19 ns.	0.00	0.00
3. Scalar invariance	5602.8	1764	0.92	0.06	0.07	36.70 ns.	0.00	0.00
4. Strict invariance	5616.85	1834	0.92	0.06	0.07	86.25 ns.	0.00	0.00

Note. Robust model fit parameters are reported. *CFI* = comparative fit index, *RMSEA* = root mean square error of approximation, *SRMR* = standardized root mean square residual. BPNS = basic psychological need satisfaction. Satorra-Bentler Chi-square difference test was used to compare models.

variance (*p* < .001). This finding suggests stable, trait-like differences between people on these concepts. Additionally, the random intercepts of meaning in work were positively related to BPNS and its dimensions. Trait-level meaning in work was positively related to overall BPNS (*r* = 0.95, *SE* = 0.04, *p* < .001), as well as autonomy (*r* = 0.81, *SE* = 0.0049, *p* < .001), competence (*r* = 0.94, *SE* = 0.04, *p* < .001) and relatedness need satisfaction (*r* = 0.71, *SE* = 0.04, *p* < .001). These findings suggest that individuals who experience higher levels of BPNS, in general, also experience higher levels of meaning in work, in general.

Table 4
Model comparison tests.

Model comparison	χ^2	df	CFI	RMSEA	SRMR	$\Delta\chi^2$	ΔCFI	$\Delta RMSEA$
<i>Model A</i>								
a) Directional CLPM	198.79	15	0.97	0.15	0.06	–	–	–
b) Cross-lagged CLPM ↔ a)	146.70	9	0.98	0.18	0.04	37.92***	0.00	0.03
c) Directional RI – CLPM ↔ a)	26.92	9	1.00	0.05	0.02	141.32***	0.02	0.10
d) Cross-lagged RI – CLPM ↔ c)	1.10	3	1.00	0.00	0.00	25.30***	0.00	0.05
e) Lagged constraints ↔ d)	5.88	6	1.00	0.00	0.00	4.36 ns.	0.00	0.00
f) Cross-lagged constraints ↔ d)	18.48	12	1.00	0.03	0.02	16.62 ns.	0.00	0.03
<i>Model B</i>								
a) Directional CLPM	453.17	51	0.97	0.11	0.17	–	–	–
b) Cross-lagged CLPM ↔ a)	249.17	25	0.98	0.13	0.04	193.61***	0.01	0.01
c) Directional RI – CLPM ↔ a)	58.78	36	1.00	0.03	0.03	416.64***	0.03	0.08
d) Cross-lagged RI – CLPM ↔ c)	7.30	10	1.00	0.00	0.01	50.68**	0.00	0.03
e) Lagged constraints ↔ d)	12.99	15	1.00	0.00	0.01	5.52 ns.	0.00	0.00
f) Cross-lagged constraints ↔ d)	36.48	35	1.00	0.01	0.01	28.74 ns.	0.00	0.01

Note. Robust model fit parameters are reported. CFI = comparative fit index, RMSEA = root mean square error of approximation, SRMR = standardized root mean square residual. Δ symbolizes the change in model fit parameters between models; ↔ symbolizes the compared models. Model A uses BPNS as a higher-order factor, Model B uses BPNS as separate factors. Satorra-Bentler Chi-square difference test was used to compare models. *** $p < .001$, ** $p < .010$.

3.4. Meaning in work and burnout

Hypothesis 5 was supported (see Fig. 2). Increased meaning in work was related to a subsequent decrease in burnout ($\beta_{t1-t2} = -0.21$, $\beta_{t2-t3} = -0.23$, $SE = 0.09$, $p = .024$). Additionally, we found support for Hypothesis 6. Increased burnout was related to subsequent decreased meaning in work ($\beta_{t1-t2} = -0.28$, $\beta_{t2-t3} = -0.27$, $SE = 0.08$, $p < .001$).

The between-person parts of the analyses showed that the random intercepts of burnout and meaning in work have significant variance ($p < .001$), suggesting stable, trait-like differences between people. Furthermore, the random intercept of meaning in work was negatively related to burnout ($r = -0.77$, $SE = 0.04$, $p < .001$). This finding suggests that individuals who experience higher levels of meaning in work, in general, also experience lower levels of burnout, in general.

3.5. Dynamic relations between psychological needs

Within-person effects from Model B (see Fig. 2) showed that increased autonomy need satisfaction was related to subsequent increased competence need satisfaction ($\beta_{t1-t2} = 0.16$, $\beta_{t2-t3} = 0.17$, $SE = 0.08$, $p = .045$) and relatedness need satisfaction ($\beta_{t1-t2} = 0.17$, $\beta_{t2-t3} = 0.17$, $SE = 0.07$, $p = .043$). The auto-regressive paths showed that increased relatedness need satisfaction was related to subsequent increased relatedness need satisfaction ($\beta_{t1-t2} = 0.19$, $\beta_{t2-t3} = 0.19$, $SE = 0.08$, $p = .026$). In contrast, the autoregressive paths of autonomy need satisfaction ($p = .724$) and competence need satisfaction ($p = .185$) were not statistically significant.

The between-person parts of the analyses showed that the random intercepts of autonomy need satisfaction, competence need satisfaction, and relatedness need satisfaction have significant variance ($p < .001$), suggesting stable, trait-like differences between people. Furthermore, the positive correlations of random intercepts of psychological needs (r ranging from 0.72 to 0.88) suggest that individuals who experience higher levels of autonomy, competence, or relatedness need satisfaction, in general, also experience higher levels of satisfaction of other psychological needs, in general.

3.6. Additional analyses

3.6.1. Control variable analysis

We tested additional models that included control variables of age, gender, leadership position, workplace country, occupational field, and educational level. We specified the additional models with included covariates as predictors of (a) the random intercepts or as predictors of (b) the observed variables (Mulder & Hamaker, 2021). The inclusion of the covariates in Model A did not change the overall pattern of results. Likewise, the inclusion of covariates in Model B did not change the overall pattern of results (see online supplements).

3.6.2. Missing data analysis

We investigated potential reasons for dropout with a logistic regression. We regressed the participation pattern (complete vs. missing cases) on gender, age, education, occupational status, type of contract, leadership position, average burnout at T1, average meaning in work at T1, and average BPNS at T1. The results showed that age ($b = -0.03$, $SE = 0.00$, $p < .001$) was a positive predictor of dropout, whereas the other variables were not significant. Next, we used multiple imputation (Asendorpf et al., 2014; Enders, 2023; for an overview see Little, 2013) to generate 50 datasets and retested Models A and B. We refer to the supplementary material where we report the procedure and results in greater detail.

Model A with the imputed data replicated the same pattern of results compared to the analyses with complete cases. Model B with

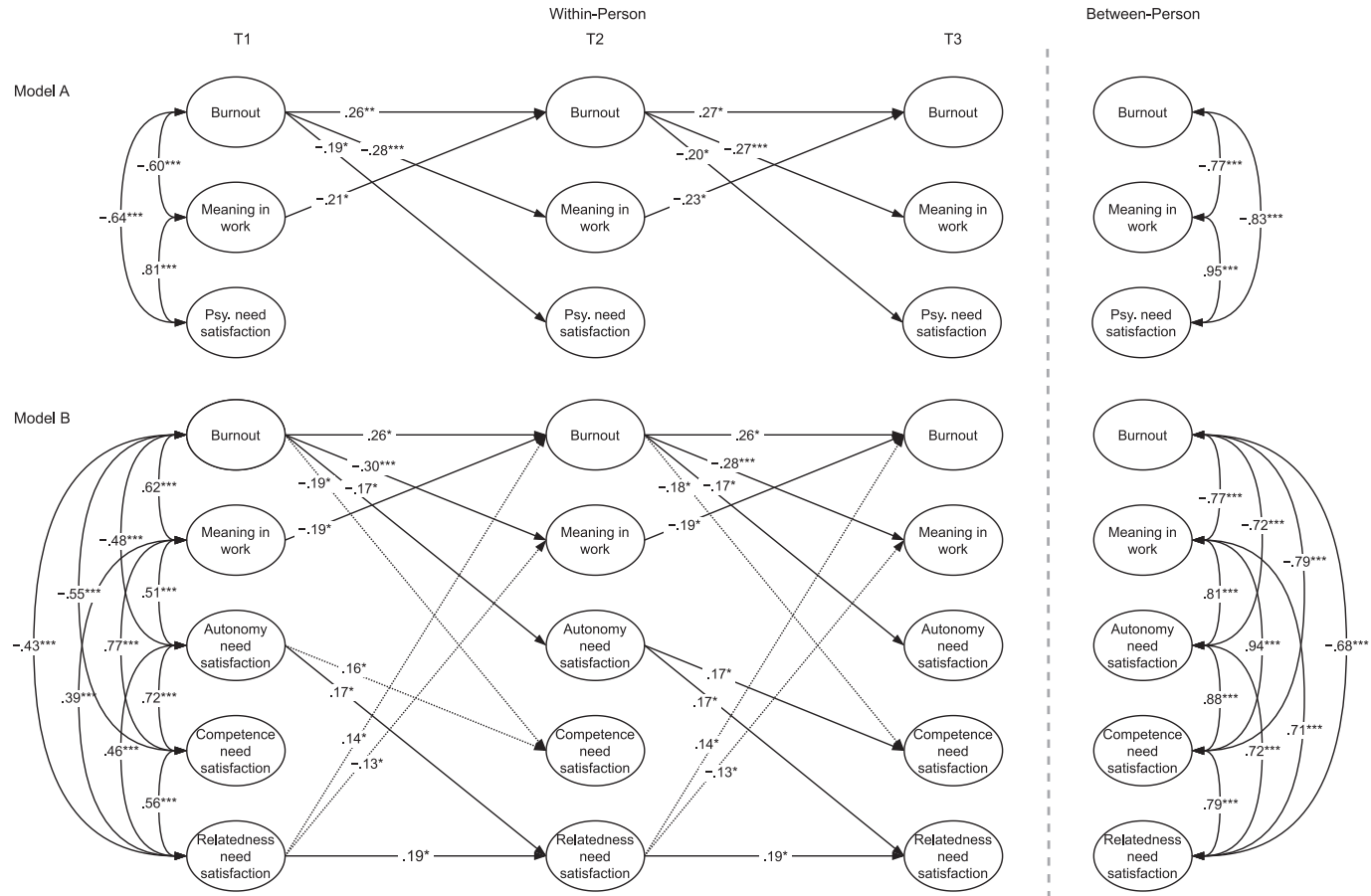


Fig. 2. Results of the Random-Intercept Cross-Lagged Panel Models. *Note.* $N = 781$. Residuals, variances, observed variables, paths to random intercepts, and covariances between T2 and T3 variables are estimated but omitted for clarity. Non-significant paths are omitted for clarity. Dotted lines represent paths that were not replicated in additional analyses using multiple imputation. Cross-lagged paths and autoregressive paths are constrained to be time-invariant. Standardized coefficients are displayed. * $p < .05$, ** $p < .01$, *** $p < .001$.

imputed data resulted in a slightly different pattern of results. The effects of relatedness need satisfaction on meaning in work ($\beta_{t1-t2} = -0.06$, $\beta_{t2-t3} = -0.07$, $SE = 0.05$, $p = .234$) and burnout ($\beta_{t1-t2} = 0.06$, $\beta_{t2-t3} = 0.07$, $SE = 0.06$, $p = .311$) were not significant. In addition, the magnitude of the effect of burnout on competence need satisfaction ($\beta_{t1-t2} = -0.13$, $\beta_{t2-t3} = -0.14$, $SE = 0.08$, $p = .072$), and from autonomy need satisfaction to competence need satisfaction ($\beta_{t1-t2} = 0.09$, $\beta_{t2-t3} = 0.09$, $SE = 0.05$, $p = .094$) decreased. Instead, Model B with imputed data suggests a negative effect of competence need satisfaction on relatedness need satisfaction ($\beta_{t1-t2} = -0.14$, $\beta_{t2-t3} = -0.15$, $SE = 0.06$, $p = .019$), and a positive effect of meaning in work on autonomy need satisfaction ($\beta_{t1-t2} = 0.11$, $\beta_{t2-t3} = 0.12$, $SE = 0.06$, $p = .049$). The change in the significant paths limits the validity of some results of Model B (see Limitations and Future Research Directions).

3.6.3. Post-hoc mediation analysis

To gain additional insight into potential underlying processes between study concepts, we reconfigured our models to examine the possibility of indirect effects (Preacher, 2015). All paths were specified at the within-person level. The c-path was specified between T1 and T3. We found no support for indirect effects. The indirect effects of (1) meaning \rightarrow BPNS \rightarrow burnout; (2) burnout \rightarrow BPNS \rightarrow meaning; (3) BPNS \rightarrow meaning \rightarrow burnout; (4) burnout \rightarrow meaning \rightarrow BPNS; (5) BPNS \rightarrow burnout \rightarrow meaning, and (6) meaning \rightarrow burnout \rightarrow BPNS were not significant, and the model fits substantially decreased compared to reference models. Interested readers find the raw output of these analyses in the supplementary material.

4. Discussion

The present study aimed to shed light on the prospective within-person effects between BPNS, meaning in work, and burnout. To clarify these dynamics, we drew from combined assumptions of SDT and COR and tested normal and reverse causation hypotheses using the advantageous RI-CLPM (Hamaker et al., 2015; e.g., Lucas, 2023).

4.1. Theoretical contribution

Previous literature has already usefully combined assumptions from SDT and COR theory in integrative models, but these models have neglected reverse causation effects of BPNS (e.g., Halbesleben et al., 2014; Jolly et al., 2021; Quinn et al., 2012). Our findings suggest that neglecting reverse within-person effects between BPNS, meaning in work, and burnout misrepresents their association. Specifically, while the lagged within-person effect of BPNS on burnout was not supported (Hypothesis 1), the results provide initial support for a within-person effect of burnout on BPNS over twelve months (Hypothesis 2). Thus, our findings do not confirm previous findings and arguments of SDT, which have suggested that increased BPNS leads to a subsequent decrease in burnout (e.g., Haar et al., 2018). Instead, our findings support previous findings and arguments of COR theory, which have suggested that burnout may decrease employees' resources (Hobfoll et al., 2018; Park et al., 2014).

Contrary to our assumption grounded in SDT, increased BPNS (higher-order or separate factors) was not related to subsequent decreased burnout. The lack of support for this within-person effect may be explained by our chosen time lag and differences in within- and between-person processes. It may be that increased BPNS primarily leads to short-term reductions in exhaustion and burnout, but not long-term reductions. This appears plausible as previous literature has supported such short-term effects (e.g., Aldrup et al., 2017; Coxen et al., 2023; Haar et al., 2018). However, over longer periods, employees may develop a stable view of which psychological needs their job satisfies and which it does not. BPNS may gain the character of a stable personal resource. Such stable resources could be less effective for reducing momentary spikes in work stress, but still lead to overall lower levels of burnout through recovery and job crafting (see Bakker & de Vries, 2021). In line with this argument, our results show that generally higher levels of BPNS were associated with lower levels of burnout (see between-person part of Fig. 1, Model A).

Surprisingly, the results suggest that increased relatedness need satisfaction is associated with subsequent increased burnout.² This finding contrasts with SDT literature, which has argued and shown that relatedness need satisfaction is negatively related to burnout (e.g., Coxen et al., 2021; Nunes et al., 2023; Van den Broeck et al., 2021). However, in light of burnout literature, this finding appears plausible. Indeed, scholars have argued that burnout frequently occurs in jobs that are characterized by frequent and demanding social interactions (Maslach, 1982). For example, being overly involved in social interactions could be exhausting and lead to increased burnout. Accordingly, overinvolvement showed the strongest positive correlation with emotional exhaustion in a meta-analysis (Lee et al., 2011). Another possible explanation for the effect is that increased relatedness need satisfaction serves as an indicator of a coping mechanism for overly stressful or boring work. For example, employees may experience increased relatedness because they procrastinate stressful or boring work tasks by spending more time with colleagues (see Steel, 2007; Wang et al., 2020), which in turn could increase exhaustion and burnout (Harju et al., 2022). Thus, receiving increased emotional support at work may help employees to better cope with negative social experiences (Trépanier et al., 2022), foster positive relationships, and promote social exchange (Jolly et al., 2021); however, employees being overly involved in social interactions may increase exhaustion and burnout (Lee et al., 2011).

Investigating the relation between burnout and BPNS in greater detail, we found that increased burnout was related to subsequent decreased autonomy and competence need satisfaction. These results provide support for our assumption grounded in COR theory, that

² Please note that this effect was not replicated in additional analyses that included missing data using multiple imputation.

employees with increased burnout are less able to satisfy their autonomy and competence needs because they lack the energy to make decisions about their work, engage in cognitive and challenging tasks, and perform work tasks effectively (see Deci et al., 2013; Ryan & Deci, 2008; Weinstein & Ryan, 2011). Furthermore, these findings are in line with past literature that has argued that burnout impairs employees' self-regulation (Bakker & de Vries, 2021) and thus limits self-initiated actions to satisfy autonomy needs (for a review see Rudolph et al., 2017; Wrzesniewski & Dutton, 2001). Surprisingly, the results did not support the within-person effect of burnout on subsequent relatedness need satisfaction over time. Neglecting potential moderators may have contributed to this result. For example, employees who feel burned-out from their work may procrastinate those tasks by spending more time with colleagues (see Steel, 2007; Wang et al., 2020). This procrastination may increase employees' relatedness need satisfaction but also increase their exhaustion and burnout. Indeed, relatedness need satisfaction and burnout might show a complex association because exhausted employees experience more social conflicts (Tone Innstrand et al., 2008) and increased surface acting (Nesher Shoshan et al., 2023), which could reduce relatedness need satisfaction.

This study contributes to SDT's understanding of meaning in work. In line with previous literature, we argued that meaning plays an intrinsically motivating role in people's lives (Allan et al., 2016; Heine et al., 2006). Contrary to our assumptions, we did not confirm the within-person associations (Hypotheses 3 and 4), which contrasts previous literature suggesting a positive relation between BPNS and meaning in work (e.g., Autin et al., 2022; Zhang et al., 2022). However, given that previous literature has either neglected reverse causation or within-person effects, our finding may be due to our accounting for such effects. In fact, if we had neglected reverse causation paths and within-person effects, our conclusion would have changed. For example, the results of an unfavorable model (see Model A, Step A in Table 4) suggests that BPNS has an effect on meaning in work (and on burnout) (BPNS → meaning in work: $\beta_{t1-t2} = 0.37$, $\beta_{t2-t3} = 0.28$, $SE_{t1-t2} = 0.03$, $SE_{t2-t3} = 0.05$, $p < .001$; BPNS → burnout: $\beta_{t1-t2} = -0.21$, $\beta_{t2-t3} = -0.21$, $SE_{t1-t2} = 0.05$, $SE_{t2-t3} = 0.05$, $p < .001$). Furthermore, given that Model A (see Fig. 2) suggests a strong between-person correlation between meaning in work and BPNS, it is reasonable that BPNS is related to meaning in work (and burnout) (Heine et al., 2006) (see also Allan et al., 2016; Rosso et al., 2010). However, considering our findings, the between-person and long-term processes may be substantially different from the within-person and short-term processes (see Limitations and Future Research Directions).

We revealed reciprocal within-person associations between burnout and meaning in work (Hypotheses 5 and 6). This finding complements previously identified daily and weekly within-person effects (Hadden & Smith, 2019; Niessen et al., 2012; Vogel et al., 2020) and demonstrates that the within-person change processes persist over time and may describe a long-term loss cycle. A plausible explanation for the within-person effect of burnout on subsequent decreased meaning in work is that mentally distant employees are cynical about their work (Schaufeli et al., 2020) and thus may experience less dedication and meaning (González-Romá et al., 2006). Furthermore, it could mean that increased burnout causes employees to engage less in stressful work situations (Garst et al., 2000). While less stressful work tasks appear beneficial to employees' health and well-being (Guthier et al., 2020), such tasks may also offer less cognitively demanding and meaningful challenges to employees, hampering employees' ability to learn and be creative at work (Glaser et al., 2015; Kubicek et al., 2022).

Previous studies have neglected the possibility that changes in psychological need satisfaction influence changes in the satisfaction of other needs. Our findings suggest that autonomy need satisfaction is an important antecedent of the satisfaction of increased competence and relatedness need satisfaction. Drawing from previous literature, an explanation for this effect could be that experiences of autonomy increase employees' prosocial behavior (for a review see Donald et al., 2021), which could lead to increases in relatedness need satisfaction. In addition, SDT emphasizes the benefits of an autonomy-supportive environment for the satisfaction of all three psychological needs. Accordingly, Slemp et al. (2018) showed in a meta-analytic path analysis that leader autonomy support is associated with BPNS. However, as is typical in SDT literature, their model specified autonomy support as a predictor of autonomy, competence, and relatedness need satisfaction, simultaneously. Interpreting our findings in the context of their findings suggests that autonomy support could lead to increased autonomy need satisfaction first, which in turn may lead to increased relatedness and competence need satisfaction.

4.2. Practical implications

We encourage practitioners to take action to improve the meaning of work. Such interventions appear beneficial as our study has shown that increased meaning in work is related to a subsequent decrease in burnout, and previous studies have shown that meaning at work is associated with numerous advantageous outcomes, including health, engagement, and productivity (for a review see Allan et al., 2019). We also encourage interventions to reduce burnout. Such interventions appear beneficial as our study has shown that increased burnout is related to a subsequent decrease in meaning in work, and previous studies have shown that burnout is related to a wide range of negative psychological and physical health consequences (for reviews see Bianchi et al., 2015; Raudenská et al., 2020; Salvagioni et al., 2017).

As burnout and meaning in work appear interdependent in our study, we specifically recommend interventions that focus on both concepts. For example, interventions directed at organizations could facilitate meaning in work through a job design that provides employees with skill variety, task identity, and task significance (Hackman & Oldham, 1976; Humphrey et al., 2007) and reduce burnout through the implementation of work hour limits, work process optimization, and on-the-job training and education (see Bakker & de Vries, 2021). In addition, interventions directed at individuals could facilitate meaning in work through journaling about the meaning of work (Cantarero et al., 2022; Gander et al., 2016) and reduce burnout through mindfulness or stress management training (see Bakker & de Vries, 2021).

This study suggests a simultaneous decrease in BPNS and meaning in work after an increase in burnout, which further underscores the importance of burnout monitoring and intervention. The present study questions whether an increase in BPNS can cause a decrease

in burnout over 12 months. Although we cannot evaluate the effectiveness of short-term interventions, our study suggests that if practitioners plan to reduce burnout over a longer period, interventions other than those aimed at improving BPNS may be more appropriate. This study further highlights the benefits of close burnout monitoring and early intervention. In our study, the average burnout levels of participants were moderate and similar to those of comparable European populations (Schaufeli et al., 2019). This suggests that even if burnout levels in organizations are not elevated on average, interventions to reduce individual burnout can have a positive impact. Such actions are not only promising for increasing meaning in work but also for increasing BPNS, which are both associated with beneficial outcomes for employees and organizations (Allan et al., 2019; Nunes et al., 2023).

Finally, we recommend actions to increase autonomy need satisfaction because our findings suggest that it might be an important antecedent to subsequent increased competence and relatedness need satisfaction. Indeed, numerous studies have shown the positive effects of workplace autonomy. For example, meta-analyses demonstrated that autonomy-supportive behaviors are positively and indirectly related to mental and physical health (Ng et al., 2012), and beneficial work-related outcomes (Slemp et al., 2018). Previous studies have already provided promising insights into how to increase autonomy support. For example, a meta-analysis of intervention studies demonstrated the effectiveness of skill-based training programs to support the autonomy of others (Su & Reeve, 2011).

4.3. Limitations and future research directions

Four limitations of this study could be usefully addressed in future research. First, the chosen time lags of six months might have been inadequate to capture the hypothesized effects. For example, COR theory predicts that multiple persisting loss cycles, in which people subsequently lose energy and experience stress, contribute to the development of burnout (Park et al., 2014). It also predicts that resource gain will become more salient in the context of resource loss (Hobfoll et al., 2018). Accordingly, several dynamic cycles may have occurred over six months, in which employees experienced subsequent increases and decreases in burnout, meaning in work, and BPNS. Although previous literature provided some evidence that a time frame of 12 months is a suitable period to study cross-lagged effects of burnout (see Maricuțoiu et al., 2017), the literature is still unclear regarding the optimal time frame to study burnout (see Bakker & de Vries, 2021). Comparing our findings with previous literature suggests that short- and long-term processes could be different. To gain additional insights into the effect of time, future empirical research could study measurement bursts (Sliwinski, 2008) or varying lags (Dormann & Griffin, 2015).

Second, relying entirely on self-reports might have introduced a common method bias. As this bias should occur equally on all measurement occasions (Podsakoff et al., 2003), the consideration of random-intercepts and their correlations in the RI-CLPM should in part account for this bias when estimating the within-person effects. Nevertheless, future research may address common method bias more carefully and incorporate additional sources of information when studying similar effects. For example, assessing other ratings (e.g., work group, peer, or leader ratings), clinical diagnoses, or alternative biological markers could be useful when studying burnout. Moreover, given that work groups often encounter similar working conditions, future research could usefully obtain a collective evaluation of meaning and workplace need satisfaction, which could provide additional insights when studying the effects of BPNS (Deci & Ryan, 2000).

Third, we cannot rule out that the associations between BPNS, meaning in work, and burnout are spurious and caused by third variables. Investigating such confounding variables may be a possible future research direction. Our results suggest that BPNS may act as a more stable resource, influencing burnout and meaning in work primarily through long-term between-person rather than within-person effects. However, the SDT and COR theory are currently quite vague when it comes to within- and between-person effects. As a first step, clearer theoretical predictions are needed to guide empirical research. Next, it would be interesting to identify variables that explain differences in within-person processes. To do this, it could be useful to account for more stable personality traits and resources, such as self-esteem, optimism, hope, and resilience (see Bakker & de Vries, 2021; Hobfoll et al., 2018; Lupșa et al., 2020). In addition, it could be useful to consider stable work characteristics, such as job demands or stressors (see Guthier et al., 2020; Kubicek et al., 2022).

Fourth, additional analyses that accounted for missing data and meaningful covariates supported the robustness of the results from Model A, but limited some of the results obtained from Model B. In particular, the within-person effects of relatedness need satisfaction on meaning in work and burnout were not replicated with imputed data. While the association between relatedness need satisfaction, meaning, and burnout is plausible in light of previous literature (Lee et al., 2011), the differences between analyses with complete cases and imputed cases could also indicate that dropped-out employees substantially differ from non-dropped-out employees (Buckley et al., 2015). To address this limitation and improve causal identification in future studies, we recommend that researchers aim to gather information on the factors leading to dropout (e.g., follow-up surveys) or consider dropout more carefully during the planning of the study (see Graham et al., 2006; Little, 2013).

We encourage future research to consider reverse causality more carefully. Currently, several review articles suggest that increases in BPNS can decrease burnout (i.e., Coxen et al., 2023; Van den Broeck et al., 2016). Our results suggest that some of these general assumptions should be reconsidered. We provide a promising starting point for future research by highlighting the effects of increased burnout on subsequent decreased BPNS. Future research may build on these findings and examine whether similar effects emerge consistently across different types of well-being and health indicators (e.g., psychological vs. physical health). In addition, future research could improve our understanding of this process by examining employees' (stable and fluctuating) resources, job demands (e.g., Lesener et al., 2019), and self-regulation strategies (Bakker & de Vries, 2021). Moreover, investigating whether these variables function as potential mediators or moderators would provide additional insights into the contexts and processes of within- and between-person effects.

Future studies could further examine diverse facets and sources of meaning in work. We understood meaning in work as an employee's perception of the importance of work, which is a common perspective to explain work and health-related outcomes (Allan

et al., 2019; Hackman & Oldham, 1976; Martela & Steger, 2016). However, investigating additional dimensions of meaning, such as the purpose of work, coherence of work (Martela & Steger, 2016), greater good motivation, or meaning-making through work (Steger et al., 2012) may provide additional insights into the link between BPNS and burnout. In addition, investigating specific sources of meaning in work, such as the self, other persons, the work context, or spiritual life (see Rosso et al., 2010) may yield a more nuanced understanding of the meaning-burnout association. Similarly, the theoretical view from calling theory on meaning in work may provide additional insights into associations among meaning in work, BPNS, and burnout (Dik et al., 2009; Duffy & Dik, 2013).

Finally, we encourage theoretical and empirical contributions to SDT and COR theory that consider the process character of BPNS. To date, SDT literature often assumes that BPNS happens simultaneously. Our study suggests that this assumption might not hold. Furthermore, our results show that stable perceptions of BPNS are highly correlated with stable perceptions of meaning in work and burnout over time. These results may suggest that employees can differentiate between BPNS and meaning from moment to moment, but employees' aggregated perception over time may reflect a more global resource or well-being dimension rather than distinctive dimensions (see Morin et al., 2022). These findings highlight the need to gain conceptual clarity of stable and fluctuating resources (for a promising start see Bakker & de Vries, 2021) and serve as a fruitful starting point to investigate the causal chain of BPNS within-persons.

5. Conclusion

Contrary to assumptions of SDT (Deci et al., 2017; Ryan & Deci, 2019), the findings of this study favor assumptions of COR theory (Hobfoll, 2002; Hobfoll et al., 2018). We found that increased burnout was related to subsequent decreased BPNS. Furthermore, this study found reciprocal within-person associations between burnout and meaning in work, suggesting a loss-cycle over time. Overall, the results suggest that increased burnout acts as a common antecedent of subsequent decreased BPNS, and meaning in work, which highlights the diverse negative consequences of burnout and the importance of burnout intervention and monitoring.

CRedit authorship contribution statement

Lucas A. Maunz: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Validation, Visualization, Writing – original draft, Writing – review & editing. **Jürgen Glaser:** Conceptualization, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – review & editing.

Declaration of competing interest

We declare no conflict of interest.

Data availability

Data will be made available on request. Supplementary material is available online at <https://osf.io/9vjuw/>

References

- Aldrup, K., Klusmann, U., & Lüdtke, O. (2017). Does basic need satisfaction mediate the link between stress exposure and well-being? A diary study among beginning teachers. *Learning and Instruction, 50*, 21–30. <https://doi.org/10.1016/j.learninstruc.2016.11.005>
- Allan, B. A., Autin, K. L., & Duffy, R. D. (2016). Self-determination and meaningful work: Exploring socioeconomic constraints. *Frontiers in Psychology, 7*. <https://doi.org/10.3389/fpsyg.2016.00071>
- Allan, B. A., Batz-Barbarich, C., Sterling, H. M., & Tay, L. (2019). Outcomes of meaningful work: A meta-analysis. *Journal of Management Studies, 56*(3), 500–528. <https://doi.org/10.1111/joms.12406>
- Amanullah, S., & Ramesh Shankar, R. (2020). The impact of covid-19 on physician burnout globally: A review. *Healthcare, 8*(4), Article 4. <https://doi.org/10.3390/healthcare8040421>
- Arnold, K. A., & Walsh, M. M. (2015). Customer incivility and employee well-being: Testing the moderating effects of meaning, perspective taking and transformational leadership. *Work and Stress, 29*(4), 362–378. <https://doi.org/10.1080/02678373.2015.1075234>
- Asendorpf, J. B., van de Schoot, R., Denissen, J. J. A., & Hutteman, R. (2014). Reducing bias due to systematic attrition in longitudinal studies: The benefits of multiple imputation. *International Journal of Behavioral Development, 38*(5), 453–460. <https://doi.org/10.1177/0165025414542713>
- Autin, K. L., & Allan, B. A. (2020). Socioeconomic privilege and meaningful work: A psychology of working perspective. *Journal of Career Assessment, 28*(2), 241–256. <https://doi.org/10.1177/1069072719856307>
- Autin, K. L., Herdt, M. E., Garcia, R. G., & Ezema, G. N. (2022). Basic psychological need satisfaction, autonomous motivation, and meaningful work: A self-determination theory perspective. *Journal of Career Assessment, 30*(1), 78–93. <https://doi.org/10.1177/10690727211018647>
- Bakker, A. B., & de Vries, J. D. (2021). Job demands–resources theory and self-regulation: New explanations and remedies for job burnout. *Anxiety, Stress, and Coping, 34*(1), 1–21. <https://doi.org/10.1080/10615806.2020.1797695>
- Bakker, A. B., & Wang, Y. (2020). Self-undermining behavior at work: Evidence of construct and predictive validity. *International Journal of Stress Management, 27*, 241–251. <https://doi.org/10.1037/str0000150>
- Bayes, A., Tavella, G., & Parker, G. (2021). The biology of burnout: Causes and consequences. *The World Journal of Biological Psychiatry, 22*(9), 686–698. <https://doi.org/10.1080/15622975.2021.1907713>
- Bianchi, R., & Laurent, E. (2015). Emotional information processing in depression and burnout: An eye-tracking study. *European Archives of Psychiatry and Clinical Neuroscience, 265*(1), 27–34. <https://doi.org/10.1007/s00406-014-0549-x>
- Bianchi, R., Schonfeld, I. S., & Laurent, E. (2015). Burnout–depression overlap: A review. *Clinical Psychology Review, 36*, 28–41. <https://doi.org/10.1016/j.cpr.2015.01.004>
- Brown, T. A. (2015). *Confirmatory factor analysis for applied research (second edition)*. The Guilford Press.

- Buckley, J. P., Keil, A. P., McGrath, L. J., & Edwards, J. K. (2015). Evolving methods for inference in the presence of healthy worker survivor bias. *Epidemiology*, 26(2), 204–212. <https://doi.org/10.1097/EDE.0000000000000217>
- Bundesanstalt Statistik Österreich, Statistik Austria. (2023). *Bevölkerung nach Alter/Geschlecht*. Arbeitsvolumen, Überstunden: Geleistete Arbeitszeit. <https://www.statistik.at>.
- Cantarero, K., van Tilburg, W. A. P., & Smoktunowicz, E. (2022). Other- (vs. self-) oriented meaning interventions enhance momentary work engagement through changes in work meaningfulness. *Journal of Counseling Psychology*, 69(4), 443–451. <https://doi.org/10.1037/cou0000594>
- Coxen, L., van der Vaart, L., Van den Broeck, A., & Rothmann, S. (2021). Basic psychological needs in the work context: A systematic literature review of diary studies. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.698526>
- Coxen, L., van der Vaart, L., Van den Broeck, A., Rothmann, S., & Schreurs, B. (2023). What matters more for daily well- and ill-being? The dual pathways of daily need satisfaction and frustration. *Current Psychology*. <https://doi.org/10.1007/s12144-023-04235-7>
- Curran, P. J., & Bauer, D. J. (2011). The disaggregation of within-person and between-person effects in longitudinal models of change. *Annual Review of Psychology*, 62, 583–619. <https://doi.org/10.1146/annurev.psych.093008.100356>
- De Beer, L. T., Christensen, M., Sørengaard, T. A., Innstrand, S. T., & Schaufeli, W. B. (2023). The psychometric properties of the Burnout Assessment Tool in Norway: A thorough investigation into construct-relevant multidimensionality. *Scandinavian Journal of Psychology*. <https://doi.org/10.1111/sjop.12996>
- De Beer, L. T., Schaufeli, W. B., & De Witte, H. (2022). The psychometric properties and measurement invariance of the Burnout Assessment Tool (BAT-23) in South Africa. *BMC Public Health*, 22(1), 1555. <https://doi.org/10.1186/s12889-022-13978-0>
- De Beer, L. T., Schaufeli, W. B., De Witte, H., Hakanen, J. J., Shimazu, A., Glaser, J., ... Rudnev, M. (2020). Measurement invariance of the burnout assessment tool (bat) across seven cross-national representative samples. *International Journal of Environmental Research and Public Health*, 17(15), Article 15. <https://doi.org/10.3390/ijerph17155604>
- De Lange, A. H., Taris, T. W., Kompier, M. A. J., Houtman, I. L. D., & Bongers, P. M. (2004). The relationships between work characteristics and mental health: Examining normal, reversed and reciprocal relationships in a 4-wave study. *Work and Stress*, 18(2), 149–166. <https://doi.org/10.1080/02678370412331270860>
- Deci, E. L., Olafsen, A. H., & Ryan, R. M. (2017). Self-determination theory in work organizations: The state of a science. *Annual Review of Organizational Psychology and Organizational Behavior*, 4(1), 19–43. <https://doi.org/10.1146/annurev-orgpsych-032516-113108>
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227–268. https://doi.org/10.1207/s15327965plii104_01
- Deci, E. L., Ryan, R. M., Gagné, M., Leone, D. R., Usunov, J., & Kornazheva, B. P. (2001). Need satisfaction, motivation, and well-being in the work organizations of a former eastern bloc country. *Personality and Social Psychology Bulletin*, 27(8), 930–942. <https://doi.org/10.1177/0146167201278002>
- Deci, E. L., Ryan, R. M., & Guay, F. (2013). Self-determination theory and actualization of human potential. In D. M. McInerney, H. W. Marsh, R. G. Craven, & F. Guay (Eds.), *Theory driving research: New wave perspectives on self-processes and human development* (pp. 109–133). Information Age Press.
- Deligkaris, P., Panagopoulou, E., Montgomery, A., & Masoura, E. (2014). Job burnout and cognitive functioning: A systematic review. *Work and Stress*, 28, 107–123. <https://doi.org/10.1080/02678373.2014.909545>
- Dik, B. J., Duffy, R. D., & Eldridge, B. M. (2009). Calling and vocation in career counseling. *Professional Psychology: Research and Practice*, 40(6), 625–632. <https://doi.org/10.1037/a0015547>
- Doménech-Betoret, F., Lloret-Segura, S., & Gómez-Artiga, A. (2015). Teacher support resources, need satisfaction and well-being. *The Spanish Journal of Psychology*, 18, E6. <https://doi.org/10.1017/sjp.2015.8>
- Donald, J. N., Bradshaw, E. L., Conigrave, J. H., Parker, P. D., Byatt, L. L., Noetel, M., & Ryan, R. M. (2021). Paths to the light and dark sides of human nature: A meta-analytic review of the prosocial benefits of autonomy and the antisocial costs of control. *Psychological Bulletin*, 147(9), 921–946. <https://doi.org/10.1037/bul0000338>
- Dormann, C., & Griffin, M. A. (2015). Optimal time lags in panel studies. *Psychological Methods*, 20(4), 489–505. <https://doi.org/10.1037/met0000041>
- Duffy, R. D., & Dik, B. J. (2013). Research on calling: What have we learned and where are we going? *Journal of Vocational Behavior*, 83(3), 428–436. <https://doi.org/10.1016/j.jvb.2013.06.006>
- Ebersold, S., Rahm, T., & Heise, E. (2019). Autonomy support and well-being in teachers: Differential mediations through basic psychological need satisfaction and frustration. *Social Psychology of Education*, 22(4), 921–942. <https://doi.org/10.1007/s11218-019-09499-1>
- Enders, C. K. (2023). Fitting structural equation models with missing data. In R. H. Hoyle (Ed.), *Handbook of structural equation modeling* (2nd ed., pp. 223–240). The Guilford Press.
- Fernet, C., Austin, S., Trépanier, S.-G., & Dussault, M. (2013). How do job characteristics contribute to burnout? Exploring the distinct mediating roles of perceived autonomy, competence, and relatedness. *European Journal of Work and Organizational Psychology*, 22(2), 123–137. <https://doi.org/10.1080/1359432X.2011.632161>
- Gagné, M., Deci, E. L., & Ryan, R. M. (2018). Self-determination theory applied to work motivation and organizational behavior. In D. S. Ones, N. Anderson, Viswesvaran, & H. K. Sinangil (Eds.), *The SAGE handbook of industrial, work & organizational psychology: Organizational psychology* (pp. 97–121).
- Gander, F., Proyer, R. T., & Ruch, W. (2016). Positive psychology interventions addressing pleasure, engagement, meaning, positive relationships, and accomplishment increase well-being and ameliorate depressive symptoms: A randomized, placebo-controlled online study. *Frontiers in Psychology*, 7. <https://doi.org/10.3389/fpsyg.2016.00686>
- Garn, A. C., Morin, A. J. S., & Lonsdale, C. (2019). Basic psychological need satisfaction toward learning: A longitudinal test of mediation using bifactor exploratory structural equation modeling. *Journal of Educational Psychology*, 111(2), 354–372. <https://doi.org/10.1037/edu0000283>
- Garst, H., Frese, M., & Molenaar, P. C. M. (2000). The temporal factor of change in stressor–strain relationships: A growth curve model on a longitudinal study in East Germany. *Journal of Applied Psychology*, 85, 417–438. <https://doi.org/10.1037/0021-9010.85.3.417>
- Glaser, J., Seubert, C., Hornung, S., & Herbig, B. (2015). The impact of learning demands, work-related resources, and job stressors on creative performance and health. *Journal of Personnel Psychology*, 14(1), 37–48. <https://doi.org/10.1027/1866-5888/a000127>
- González-Romá, V., Schaufeli, W. B., Bakker, A. B., & Lloret, S. (2006). Burnout and work engagement: Independent factors or opposite poles? *Journal of Vocational Behavior*, 68(1), 165–174. <https://doi.org/10.1016/j.jvb.2005.01.003>
- Graham, J. W., Taylor, B. J., Olchowski, A. E., & Cumsille, P. E. (2006). Planned missing data designs in psychological research. *Psychological Methods*, 11(4), 323–343. <https://doi.org/10.1037/1082-989X.11.4.323>
- Guthrie, C., Dormann, C., & Voelkle, M. C. (2020). Reciprocal effects between job stressors and burnout: A continuous time meta-analysis of longitudinal studies. *Psychological Bulletin*, 146(12), 1146–1173. <https://doi.org/10.1037/bul0000304>
- Haar, J. M., Roche, M., & ten Brummelhuis, L. (2018). A daily diary study of work-life balance in managers: Utilizing a daily process model. *The International Journal of Human Resource Management*, 29(18), 2659–2681. <https://doi.org/10.1080/09585192.2017.1314311>
- Hackman, J. R., & Oldham, G. R. (1976). Motivation through the design of work: Test of a theory. *Organizational Behavior and Human Performance*, 16(2), 250–279. [https://doi.org/10.1016/0030-5073\(76\)90016-7](https://doi.org/10.1016/0030-5073(76)90016-7)
- Hadden, B. W., & Smith, C. V. (2019). I gotta say, today was a good (and meaningful) day: Daily meaning in life as a potential basic psychological need. *Journal of Happiness Studies*, 20(1), 185–202. <https://doi.org/10.1007/s10902-017-9946-y>
- Hadžibajramović, E., Schaufeli, W., & De Witte, H. (2022). Shortening of the Burnout Assessment Tool (BAT)—From 23 to 12 items using content and Rasch analysis. *BMC Public Health*, 22(1), 560. <https://doi.org/10.1186/s12889-022-12946-y>
- Halbesleben, J. R. B., Neveu, J.-P., Paustian-Underdahl, S. C., & Westman, M. (2014). Getting to the “COR”: Understanding the role of resources in conservation of resources theory. *Journal of Management*, 40(5), 1334–1364. <https://doi.org/10.1177/0149206314527130>
- Hamaker, E. L., Kuiper, R. M., & Grasman, R. P. P. P. (2015). A critique of the cross-lagged panel model. *Psychological Methods*, 20(1), 102–116. <https://doi.org/10.1037/a0038889>
- Harju, L. K., Van Hooft, A., & De Witte, H. (2022). Bored or burning out? Reciprocal effects between job stressors, boredom and burnout. *Journal of Vocational Behavior*, 139, Article 103807. <https://doi.org/10.1016/j.jvb.2022.103807>

- Heine, S. J., Proulx, T., & Vohs, K. D. (2006). The meaning maintenance model: On the coherence of social motivations. *Personality and Social Psychology Review*, 10(2), 88–110. <https://doi.org/10.1207/s15327957pspr1002.1>
- Hobfoll, S. E. (2002). Social and psychological resources and adaptation. *Review of General Psychology*, 6(4), 307–324. <https://doi.org/10.1037/1089-2680.6.4.307>
- Hobfoll, S. E., & Freedy.. (1996). Conservation of resources: A general stress theory applied to burnout. In W. B. Schaufeli (Ed.), *Professional burnout: Recent developments in theory and research* (1st ed.). Routledge. <https://doi.org/10.1201/9780203741825>.
- Hobfoll, S. E., Halbesleben, J., Neveu, J.-P., & Westman, M. (2018). Conservation of resources in the organizational context: The reality of resources and their consequences. *Annual Review of Organizational Psychology and Organizational Behavior*, 5(1), 103–128. <https://doi.org/10.1146/annurev-orgpsych-032117-104640>
- Hofer, J., & Busch, H. (2011). Satisfying one's needs for competence and relatedness: Consequent domain-specific well-being depends on strength of implicit motives. *Personality and Social Psychology Bulletin*, 37(9), 1147–1158. <https://doi.org/10.1177/0146167211408329>
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1–55. <https://doi.org/10.1080/10705519909540118>
- Humphrey, S. E., Nahrgang, J. D., & Morgeson, F. P. (2007). Integrating motivational, social, and contextual work design features: A meta-analytic summary and theoretical extension of the work design literature. *Journal of Applied Psychology*, 92(5), 1332–1356. <https://doi.org/10.1037/0021-9010.92.5.1332>
- Huyghebaert, T., Gillet, N., Fernet, C., Lahiani, F.-J., & Fouquereau, E. (2018). Leveraging psychosocial safety climate to prevent ill-being: The mediating role of psychological need thwarting. *Journal of Vocational Behavior*, 107, 111–125. <https://doi.org/10.1016/j.jvb.2018.03.010>
- Jolly, P. M., Kong, D. T., & Kim, K. Y. (2021). Social support at work: An integrative review. *Journal of Organizational Behavior*, 42(2), 229–251. <https://doi.org/10.1002/job.2485>
- Jorgensen, T. D., Pornprasertmanit, S., Schoemann, A. M., & Rosseel, Y. (2022). *semTools: Useful tools for structural equation modeling* (R package version 0.5-6) [computer software]. <https://CRAN.R-project.org/package=semTools>.
- Kluwer, E. S., Karremans, J. C., Riedijk, L., & Knee, C. R. (2020). Autonomy in relatedness: How need fulfillment interacts in close relationships. *Personality and Social Psychology Bulletin*, 46(4), 603–616. <https://doi.org/10.1177/0146167219867964>
- Kubicek, B., Uhlig, L., Hülshager, U. R., Korunka, C., & Prem, R. (2022). Are all challenge stressors beneficial for learning? A meta-analytical assessment of differential effects of workload and cognitive demands. *Work and Stress*, 1–30. <https://doi.org/10.1080/02678373.2022.2142986>
- Kulikowski, K. (2021). Cognitive abilities—A new direction in burnout research. *European Journal of Work and Organizational Psychology*, 30(5), 705–719. <https://doi.org/10.1080/1359432X.2020.1841284>
- Lee, J., Lim, N., Yang, E., & Lee, S. M. (2011). Antecedents and consequences of three dimensions of burnout in psychotherapists: A meta-analysis. *Professional Psychology: Research and Practice*, 42(3), 252–258. <https://doi.org/10.1037/a0023319>
- Lesener, T., Gusy, B., & Wolter, C. (2019). The job demands-resources model: A meta-analytic review of longitudinal studies. *Work and Stress*, 33(1), 76–103. <https://doi.org/10.1080/02678373.2018.1529065>
- Little, T. D. (2013). *Longitudinal structural equation modeling*. The Guilford Press.
- Lopez, F. G., & Ramos, K. (2017). An exploration of gender and career stage differences on a multidimensional measure of work meaningfulness. *Journal of Career Assessment*, 25(3), 423–433. <https://doi.org/10.1177/1069072716639851>
- Lucas, R. E. (2023). Why the cross-lagged panel model is almost never the right choice. *Advances in Methods and Practices in Psychological Science*, 6(1), Article 25152459231158378. <https://doi.org/10.1177/25152459231158378>
- Lupşa, D., Virga, D., Maricuţoiu, L. P., & Rusu, A. (2020). Increasing psychological capital: A pre-registered meta-analysis of controlled interventions. *Applied Psychology*, 69(4), 1506–1556. <https://doi.org/10.1111/apps.12219>
- Maricuţoiu, L. P., Sulea, C., & Iancu, A. (2017). Work engagement or burnout: Which comes first? A meta-analysis of longitudinal evidence. *Burnout Research*, 5, 35–43. <https://doi.org/10.1016/j.burn.2017.05.001>
- Martela, F., & Steger, M. F. (2016). The three meanings of meaning in life: Distinguishing coherence, purpose, and significance. *The Journal of Positive Psychology*, 11(5), 531–545. <https://doi.org/10.1080/17439760.2015.1137623>
- Maslach, C. (1982). *Burnout: The cost of caring*. Prentice-Hall.
- Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology*, 52, 397–422. <https://doi.org/10.1146/annurev.psych.52.1.397>
- Michailidis, E., & Banks, A. P. (2016). The relationship between burnout and risk-taking in workplace decision-making and decision-making style. *Work and Stress*, 30(3), 278–292. <https://doi.org/10.1080/02678373.2016.1213773>
- Morin, A. J. S., Blais, A.-R., & Chénard-Poirier, L. A. (2022). Doubly latent multilevel procedures for organizational assessment and prediction. *Journal of Business and Psychology*, 37(1), 47–72. <https://doi.org/10.1007/s10869-021-09736-5>
- Mulder, J. D., & Hamaker, E. L. (2021). Three extensions of the random intercept cross-lagged panel model. *Structural Equation Modeling: A Multidisciplinary Journal*, 28(4), 638–648. <https://doi.org/10.1080/10705511.2020.1784738>
- Muthén, B. O., & Curran, P. J. (1997). General longitudinal modeling of individual differences in experimental designs: A latent variable framework for analysis and power estimation. *Psychological Methods*, 2, 371–402. <https://doi.org/10.1037/1082-989X.2.4.371>
- Nesher Shoshan, H., Venz, L., & Sonnentag, S. (2023). Reciprocal relations between emotional exhaustion and episode-specific emotional labour: An experience-sampling study. *Work and Stress*, 0(0), 1–25. <https://doi.org/10.1080/02678373.2023.2169967>
- Ng, J. Y. Y., Ntoumanis, N., Thøgersen-Ntoumani, C., Deci, E. L., Ryan, R. M., Duda, J. L., & Williams, G. C. (2012). Self-determination theory applied to health contexts. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science*, 7(4), 325–340. <https://doi.org/10.1177/1745691612447309>
- Niessen, C., Sonnentag, S., & Sach, F. (2012). Thriving at work-A diary study. *Journal of Organizational Behavior*, 33(4), 468–487. <https://doi.org/10.1002/job.763>
- Nunes, P. M., Proença, T., & Carozzo-Todaró, M. E. (2023). A systematic review on well-being and ill-being in working contexts: Contributions of self-determination theory. *Personnel Review*. <https://doi.org/10.1108/PR-11-2021-0812>. ahead-of-print(ahead-of-print).
- Olafsen, A. H. (2017). The implications of need-satisfying work climates on state mindfulness in a longitudinal analysis of work outcomes. *Motivation and Emotion*, 41(1), 22–37. <https://doi.org/10.1007/s11031-016-9592-4>
- Olafsen, A. H., Deci, E. L., & Halvari, H. (2018). Basic psychological needs and work motivation: A longitudinal test of directionality. *Motivation and Emotion*, 42(2), 178–189. <https://doi.org/10.1007/s11031-017-9646-2>
- Park, H. I., Jacob, A. C., Wagner, S. H., & Baiden, M. (2014). Job control and burnout: A meta-analytic test of the conservation of resources model: Job control and burnout. *Applied Psychology*, 63(4), 607–642. <https://doi.org/10.1111/apps.12008>
- Pitariu, A. H., & Ployhart, R. E. (2010). Explaining change: Theorizing and testing dynamic mediated longitudinal relationships. *Journal of Management*, 36(2), 405–429. <https://doi.org/10.1177/0149206308331096>
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879–903. <https://doi.org/10/czwv>
- Posit Team. (2020). *RStudio: Integrated development for R*. PBC. <http://www.rstudio.com/>.
- Preacher, K. J. (2015). Advances in mediation analysis: A survey and synthesis of new developments. *Annual Review of Psychology*, 66(1), 825–852. <https://doi.org/10.1146/annurev-psych-010814-015258>
- Purvanova, R. K., & Muros, J. P. (2010). Gender differences in burnout: A meta-analysis. *Journal of Vocational Behavior*, 77(2), 168–185. <https://doi.org/10.1016/j.jvb.2010.04.006>
- Quinn, R. W., Spreitzer, G. M., & Lam, C. F. (2012). Building a sustainable model of human energy in organizations: Exploring the critical role of resources. *Academy of Management Annals*, 6(1), 337–396. <https://doi.org/10.5465/19416520.2012.676762>
- R Core Team. (2023). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. <http://r-project.org>.
- Raudenská, J., Steinerová, V., Javůrková, A., Urits, I., Kaye, A. D., Viswanath, O., & Varrassi, G. (2020). Occupational burnout syndrome and post-traumatic stress among healthcare professionals during the novel coronavirus disease 2019 (COVID-19) pandemic. *Best Practice & Research. Clinical Anaesthesiology*, 34(3), 553–560. <https://doi.org/10.1016/j.bpa.2020.07.008>

- Raykov, T., & Zinbarg, R. E. (2011). Proportion of general factor variance in a hierarchical multiple-component measuring instrument: A note on a confidence interval estimation procedure: Proportion general factor variance. *British Journal of Mathematical and Statistical Psychology*, 64(2), 193–207. <https://doi.org/10.1348/000711009X479714>
- Roskam, I., & Mikolajczak, M. (2021). The slippery slope of parental exhaustion: A process model of parental burnout. *Journal of Applied Developmental Psychology*, 77, Article 101354. <https://doi.org/10.1016/j.appdev.2021.101354>
- Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, 48(2). <https://doi.org/10.18637/jss.v048.i02>
- Rosso, B. D., Dekas, K. H., & Wrzesniewski, A. (2010). On the meaning of work: A theoretical integration and review. *Research in Organizational Behavior*, 30, 91–127. <https://doi.org/10.1016/j.riob.2010.09.001>
- Rudolph, C. W., Katz, I. M., Lavigne, K. N., & Zacher, H. (2017). Job crafting: A meta-analysis of relationships with individual differences, job characteristics, and work outcomes. *Journal of Vocational Behavior*, 102, 112–138. <https://doi.org/10.1016/j.jvb.2017.05.008>
- Ryan, R. M., & Deci, E. L. (2008). From ego depletion to vitality: Theory and findings concerning the facilitation of energy available to the self. *Social and Personality Psychology Compass*, 2(2), 702–717. <https://doi.org/10.1111/j.1751-9004.2008.00098.x>
- Ryan, R. M., & Deci, E. L. (2019). Brick by brick: The origins, development, and future of self-determination theory. In A. J. Elliot (Ed.), Vol. 6. *Advances in motivation science* (pp. 111–156). Elsevier. <https://doi.org/10.1016/bs.adms.2019.01.001>
- Ryan, R. M., Duineveld, J. J., Di Domenico, S. I., Ryan, W. S., Steward, B. A., & Bradshaw, E. L. (2022). We know this much is (meta-analytically) true: A meta-review of meta-analytic findings evaluating self-determination theory. *Psychological Bulletin*, 148(11–12), 813–842. <https://doi.org/10.1037/bul0000385>
- Ryan, R. M., & Frederick, C. (1997). On energy, personality, and health: Subjective vitality as a dynamic reflection of well-being. *Journal of Personality*, 65(3), 529–565. <https://doi.org/10.1111/j.1467-6494.1997.tb00326.x>
- Salvagioni, D. A. J., Melanda, F. N., Mesas, A. E., González, A. D., Gabani, F. L., & de Andrade, S. M. (2017). Physical, psychological and occupational consequences of job burnout: A systematic review of prospective studies. *PLoS ONE*, 12(10), Article e0185781. <https://doi.org/10.1371/journal.pone.0185781>
- Satorra, A., & Bentler, P. M. (2010). Ensuring positiveness of the scaled difference chi-square test statistic. *Psychometrika*, 75(2), 243–248. <https://doi.org/10.1007/s11336-009-9135-y>
- Schaufeli, W. B., De Witte, H., & Desart, S. (2019). *User manual – Burnout Assessment Tool (BAT) – Version 2.0. Internal report*.
- Schaufeli, W. B., De Witte, H., Hakkanen, J. J., Kaltiainen, J., & Kok, R. (2023). How to assess severe burnout? Cutoff points for the Burnout Assessment Tool (BAT) based on three European samples. *Scandinavian Journal of Work, Environment & Health*, 49(4), 293–302. <https://doi.org/10.5271/sjweh.4093>
- Schaufeli, W. B., Desart, S., & De Witte, H. (2020). Burnout Assessment Tool (BAT)—Development, validity, and reliability. *International Journal of Environmental Research and Public Health*, 17(24), 9495. <https://doi.org/10.3390/ijerph17249495>
- Schaufeli, W. B., Leiter, M. P., Maslach, C., & Jackson, S. E. (1996). Maslach burnout inventory – General survey. In S. E. J. C. Maslach, & M. P. Leiter (Eds.), *The Maslach Burnout Inventory-Test manual* (pp. 22–26). Consulting Psychologists Press.
- Schaufeli, W. B., & Taris, T. W. (2005). The conceptualization and measurement of burnout: Common ground and worlds apart. *Work and Stress*, 19(3), 256–262. <https://doi.org/10.1080/02678370500385913>
- Slemp, G. R., Kern, M. L., Patrick, K. J., & Ryan, R. M. (2018). Leader autonomy support in the workplace: A meta-analytic review. *Motivation and Emotion*, 42(5), 706–724. <https://doi.org/10.1007/s11031-018-9698-y>
- Sliwinski, M. J. (2008). Measurement-burst designs for social health research. *Social and Personality Psychology Compass*, 2(1), 245–261. <https://doi.org/10.1111/j.1751-9004.2007.00043.x>
- Soane, E., Shantz, A., Alfes, K., Truss, C., Rees, C., & Gatenby, M. (2013). The association of meaningfulness, well-being, and engagement with absenteeism: A moderated mediation model. *Human Resource Management*, 52(3), 441–456. <https://doi.org/10.1002/hrm.21534>
- Sonnentag, S., Venz, L., & Casper, A. (2017). Advances in recovery research: What have we learned? What should be done next? *Journal of Occupational Health Psychology*, 22, 365–380. <https://doi.org/10.1037/ocp0000079>
- Søvdal, L. E., Naslund, J. A., Kousoulis, A. A., Saxena, S., Qoronfle, M. W., Grobler, C., & Münter, L. (2021). Prioritizing the mental health and well-being of healthcare workers: An urgent global public health priority. *Frontiers in Public Health*, 9. <https://doi.org/10.3389/fpubh.2021.679397>
- Statistisches Bundesamt, Destatis. (2023). Bevölkerung nach Nationalität und Geschlecht 2021; Durchschnittliche normalerweise geleistete Wochenarbeitszeit im Jahr 2021 in Stunden; Einkommen, Einnahmen und Ausgaben privater Haushalte nach der Haushaltsgröße 2021. <https://www.destatis.de>.
- Steel, P. (2007). The nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin*, 133, 65–94. <https://doi.org/10.1037/0033-2909.133.1.65>
- Steger, M. F., Dik, B. J., & Duffy, R. D. (2012). Measuring meaningful work: The work and meaning inventory (WAMI). *Journal of Career Assessment*, 20(3), 322–337. <https://doi.org/10.1177/1069072711436160>
- Stillman, T. F., Lambert, N. M., Fincham, F. D., & Baumeister, R. F. (2011). Meaning as magnetic force: Evidence that meaning in life promotes interpersonal appeal. *Social Psychological and Personality Science*, 2(1), 13–20. <https://doi.org/10.1177/1948550610378382>
- Su, Y.-L., & Reeve, J. (2011). A meta-analysis of the effectiveness of intervention programs designed to support autonomy. *Educational Psychology Review*, 23(1), 159–188. <https://doi.org/10.1007/s10648-010-9142-7>
- ten Brummelhuis, L. L., ter Hoeven, C. L., Bakker, A. B., & Peper, B. (2011). Breaking through the loss cycle of burnout. *Journal of Occupational and Organizational Psychology*, 84(2), 268–287. <https://doi.org/10.1111/j.2044-8325.2011.02019.x>
- Tims, M., Derks, D., & Bakker, A. B. (2016). Job crafting and its relationships with person–job fit and meaningfulness: A three-wave study. *Journal of Vocational Behavior*, 92, 44–53. <https://doi.org/10.1016/j.jvb.2015.11.007>
- Tone Innstrand, S., Melbye Langballe, E., Arild Espnes, G., Falkum, E., & Gjerløw Aasland, O. (2008). Positive and negative work–family interaction and burnout: A longitudinal study of reciprocal relations. *Work and Stress*, 22(1), 1–15. <https://doi.org/10.1080/02678370801975842>
- Trépanier, S.-G., Peterson, C., Ménard, J., & Notelaers, G. (2022). When does exposure to daily negative acts frustrate employees' psychological needs? A within-person approach. *Journal of Occupational Health Psychology*. <https://doi.org/10.1037/ocp0000338>
- Usami, S., Todo, N., & Murayama, K. (2019). Modeling reciprocal effects in medical research: Critical discussion on the current practices and potential alternative models. *PLoS ONE*, 14(9), Article e0209133. <https://doi.org/10.1371/journal.pone.0209133>
- Van den Broeck, A., Ferris, D. L., Chang, C.-H., & Rosen, C. C. (2016). A review of self-determination theory's basic psychological needs at work. *Journal of Management*, 42(5), 1195–1229. <https://doi.org/10.1177/0149206316632058>
- Van den Broeck, A., Howard, J. L., Van Vaerenbergh, Y., Leroy, H., & Gagné, M. (2021). Beyond intrinsic and extrinsic motivation: A meta-analysis on self-determination theory's multidimensional conceptualization of work motivation. *Organizational Psychology Review*, 11(3), 240–273. <https://doi.org/10.1177/20413866211006173>
- Van den Broeck, A., Vansteenkiste, M., Witte, H., & Lens, W. (2008). Explaining the relationships between job characteristics, burnout, and engagement: The role of basic psychological need satisfaction. *Work and Stress*, 22(3), 277–294. <https://doi.org/10.1080/02678370802393672>
- Vanhee, G., Lemmens, G. M. D., Stas, L., Loeyts, T., & Verhofstadt, L. L. (2018). Why are couples fighting? A need frustration perspective on relationship conflict and dissatisfaction. *Journal of Family Therapy*, 40(S1), S4–S23. <https://doi.org/10.1111/1467-6427.12126>
- Vansteenkiste, M., Neyrinck, B., Niemiec, C. P., Soenens, B., Witte, H., & Broeck, A. (2007). On the relations among work value orientations, psychological need satisfaction and job outcomes. *Journal of Occupational and Organizational Psychology*, 80(2), 251–277. <https://doi.org/10.1348/096317906x111024>
- Vogel, R. M., Rodell, J. B., & Sabey, T. B. (2020). Meaningfulness misfit: Consequences of daily meaningful work needs–supplies incongruence for daily engagement. *Journal of Applied Psychology*, 105(7), 760–770. <https://doi.org/10.1037/apl0000464>
- Wang, B., Liu, Y., Qian, J., & Parker, S. K. (2020). Achieving effective remote working during the COVID-19 pandemic: A work design perspective. *Applied Psychology = Psychologie Appliquée*, 70(1), 16–59. <https://doi.org/10.1111/apps.12290>
- Weigelt, O., Syrek, C. J., Schmitt, A., & Urbach, T. (2019). Finding peace of mind when there still is so much left undone—A diary study on how job stress, competence need satisfaction, and proactive work behavior contribute to work-related rumination during the weekend. *Journal of Occupational Health Psychology*, 24, 373–386. <https://doi.org/10.1037/ocp0000117>

- Weinstein, N., & Ryan, R. M. (2011). A self-determination theory approach to understanding stress incursion and responses. *Stress and Health*, 27(1), 4–17. <https://doi.org/10.1002/smi.1368>
- Wheeler, D. L., Vassar, M., Worley, J. A., & Barnes, L. L. B. (2011). A reliability generalization meta-analysis of coefficient alpha for the Maslach Burnout Inventory. *Educational and Psychological Measurement*, 71(1), 231–244. <https://doi.org/10.1177/0013164410391579>
- Wrzesniewski, A., & Dutton, J. E. (2001). Crafting a job. *Academy of Management Review*, 26(2), 179–201. <https://doi.org/10.5465/amr.2001.4378011>
- Zhang, S., Feng, R., Fu, Y.-N., Liu, Q., He, Y., Turel, O., & He, Q. (2022). The bidirectional relationship between basic psychological needs and meaning in life: A longitudinal study. *Personality and Individual Differences*, 197, Article 111784. <https://doi.org/10.1016/j.paid.2022.111784>