

## **What matters more for daily well- and ill-being? The dual pathways of daily need satisfaction and frustration.**

### **Abstract**

The self-determination theory denotes that employees' basic psychological needs should be fulfilled for them to experience optimal functioning ('bright' pathway). However, these needs may also be thwarted, often resulting in less favorable outcomes ('dark' pathway). Although need satisfaction has been widely researched, need frustration has been explored less. The needs are context-responsive and vary daily but are more often investigated at the between-person level rather than the within-person level. This study aimed to understand the dual pathways (to well- and ill-being) of daily need satisfaction and frustration through the different motivational regulations. We also compared whether daily need satisfaction related more strongly to positive outcomes than need frustration and whether need frustration was more strongly associated with adverse outcomes. An intensive longitudinal quantitative research design with a multilevel approach was used. Employees in small and medium enterprises were asked to complete daily surveys for 10 working days ( $N = 68/n = 557$ ). Data were analyzed using multilevel structural equation modeling. The results revealed that both daily need satisfaction and frustration had an indirect influence on work engagement and exhaustion via intrinsic motivation. The indirect effect of daily need satisfaction on work engagement was more substantial than need frustration, while daily need frustration was more strongly related to exhaustion via intrinsic motivation. The implications are that management can actively make efforts to support employees' daily needs and reduce their daily need frustration. Theoretically, researchers should include both need satisfaction and frustration to account for the dual pathways to employee outcomes.

**Keywords:** daily basic psychological needs, need satisfaction, need frustration, engagement, exhaustion, motivational regulations.

## Introduction

The self-determination theory (SDT) posits that employees function optimally when their three basic psychological needs are met, that is, when they feel they can act freely (*autonomy satisfaction*), feel proficient at mastering tasks (*competence satisfaction*), and feel cared for (*relatedness satisfaction*) (Deci & Ryan, 2000; Ryan & Deci, 2019). However, these needs may also be frustrated. Needs are frustrated when employees feel that their decisions and actions are controlled (*autonomy frustration*), that they are unable to utilize their skills fully (*competence frustration*), and when they feel excluded by others in the workplace (*relatedness frustration*) (Ryan & Deci, 2019).

The satisfaction or frustration of the basic psychological needs is often dependent on the degree to which the work environment supports or thwarts employee needs (Warburton, 2020), which gives rise to the notion that these needs are context-responsive (Vansteenkiste et al., 2020). As a result of daily changes in these environments, the extent to which these needs are satisfied or frustrated will also vary over time. Consequently, researchers recently started focusing on the within-person variance of need satisfaction, with many supporting its day-to-day variance (see Coxen et al., 2021 for a review). Despite calls to include need frustration (Coxen et al., 2021; Van den Broeck et al., 2016; Vansteenkiste et al., 2020), little is known about its within-person variance and outcomes. This is unfortunate, as research at a between-person level showed that need satisfaction differed from need frustration and that they related differently to the same outcomes (Rouse et al., 2020; Warburton et al., 2020). For example, need satisfaction seems more strongly related to well-being than need frustration, whereas need frustration seems more strongly associated with ill-being (Ryan & Deci, 2019).

Given its stronger (or weaker) associations with positive (or negative) outcomes, need satisfaction accounts for the 'bright' side of human functioning. Conversely, need frustration accounts for the 'dark' side of human functioning (Vansteenkiste et al., 2020). The distinction between these two sides becomes evident in the dual pathways from the needs to employee outcomes via motivation. The needs are important precursors of (different types of) motivation (Van den Broeck et al., 2016). The 'bright' pathway results from the positive effect of need

satisfaction on motivation that emanates from 'within' the individual (i.e., more autonomous types of motivation) (Deci et al., 2017; Olafsen et al., 2021). The more autonomous one's behavior, the more positive the implications for employee functioning (Deci & Ryan, 2000). The 'dark' pathway results from the positive effect of need frustration on motivation that emanates from 'outside' the individual (i.e., more controlled types of motivation [Olafsen et al., 2021] and amotivation [Van Tuin et al., 2020]). The more controlled or passive one's behavior is, the more detrimental the impact on employee functioning is (Van den Broeck et al., 2021).

The literature identified these motivational processes as mechanisms underlying the differential effects of need satisfaction and frustration in the work context. However, these studies had some limitations. Most focused on between- instead of within-person processes and favored basic psychological need satisfaction and intrinsic motivation, while excluding need frustration and extrinsic motivation. Uncovering the within-person processes of both need satisfaction and frustration as they unfold and influence different motivational regulations will provide a more comprehensive understanding of the 'bright' and 'dark' pathways. In studying both pathways, one can also determine whether daily need satisfaction is a better predictor of positive outcomes and need frustration more strongly predicts negative outcomes. These questions are yet to be answered and were, therefore, the main aims of the research paper.

More specifically, the present study examined how employees' daily work-related need satisfaction and frustration experiences influenced their daily well- and ill-being (i.e., work engagement and exhaustion) and the role that daily motivation played in these relationships. We also investigated (1) whether daily need satisfaction more strongly predicted well-being (i.e., work engagement) via motivation compared to need frustration and (2) whether daily need frustration then more strongly predicted ill-being (i.e., exhaustion) via motivation.

The study aimed to make two important contributions. Firstly, we intended to advance the literature by providing insights into the within-person dual pathways of need satisfaction and frustration. While previous studies have typically examined the underlying mechanisms between the basic psychological needs, motivation, and outcomes across individuals,

psychological mechanisms operating at the between-person level do not necessarily transfer to the within-person level (Sonnentag & Ilies, 2011). Within-person studies (in the form of diary studies) allow for the examination of individual variability rather than static variables (Boschman et al., 2018), providing powerful, reliable indicators of employee experiences. Focusing on daily experiences, one can avoid the biases associated with retrospective or global judgments (e.g., focusing on readily accessible memories to form judgments) (Boschman et al., 2018). Secondly, both the 'bright' and 'dark' sides of basic psychological needs were investigated, considering that need satisfaction and frustration were distinct, yet co-occurring (Vansteenkiste et al., 2020), and might have different associations with the same outcomes. This would enable us to provide insights into daily need frustration and its related processes instead of only looking at one side of the coin (i.e., need satisfaction). In the third place, all motivational regulations (i.e., autonomous [intrinsic/identified regulation], controlled [introjected/external regulation], and amotivation) were included. Doing this would enable an understanding of the entire motivational process instead of focusing only on the optimal (i.e., autonomous) forms of motivation. The importance of understanding the complexity of controlled motivation is suggested by Van den Broeck et al. (2021), who also advocate the inclusion of amotivation to show its value when assessing employee outcomes.

Thus, in practice (and theoretically), the effects of daily need satisfaction on employees are known, but the effects of daily need frustration and less desirable employee outcomes are less well-known. Sufficient day-level interventions can only be made for organizations if the dual process (i.e., 'bright side' and 'dark side') is considered. Furthermore, it may also assist with decision-making regarding the prioritization of interventions.

### **Theory and Hypotheses Development**

#### ***The 'Bright' Pathway of Daily Basic Psychological Need Satisfaction***

SDT describes autonomy, competence, and relatedness as universal psychological needs essential for employee motivation and well-being (Deci et al., 2017), which are the basis of the 'bright' pathway. The proposed model for the 'bright' pathway is depicted in Fig. 1a. The satisfaction of these needs occurs in the workplace at an interpersonal level when employees'

needs are supported by others (Warburton, 2020). Given that social interactions change daily, it is argued that the extent to which needs are satisfied also varies daily.

Previous diary studies found that, on days when employees' needs were met, they were more inclined to be autonomously motivated, specifically more intrinsically motivated (Van Hooff & Geurts, 2015; Van Hooff & Van Hooft, 2017); that is, when employees' needs were met, they were more likely to internalize their behaviors and the reasons for engaging in them (i.e., *autonomous motivation*). When autonomously motivated, employees will perform tasks due to the inherent enjoyment of the tasks (*intrinsic motivation*) and/or attach personal value and meaning to the task (*identified regulation*) (Deci & Ryan, 2000; Van den Broeck et al., 2021).

Although introjected regulation is regarded as a 'negative' (i.e., controlled) form of motivation, employees' motivation to engage in tasks out of pride, shame, or guilt results in some degree of internalization (Van den Broeck et al., 2021). This means that when employees' needs are satisfied, they may be more likely to engage in tasks due to the pressures they impose on themselves (Van den Broeck et al., 2016).

***Hypothesis 1 (H1):*** *Daily basic psychological need satisfaction positively relates to (a) intrinsic motivation, (b) identified regulation, and (c) introjected regulation.*

As a result of being more autonomously motivated, employees are more engaged in what they do (Deci & Ryan, 2000). On such days, they may be more dedicated and immersed in their work tasks (Schaufeli et al., 2017). Several studies confirmed the positive association between autonomous motivation and work engagement at a between-person level (Deci et al., 2017; Van den Broeck et al., 2021). Although introjected regulation is a controlled form of motivation, it relates to both well- and ill-being outcomes (Van den Broeck et al., 2021). Specifically, studies showed that introjected regulation positively associated with work engagement (see Van den Broeck et al., 2021).

Daily studies confirmed the within-person variability of work engagement (e.g., Liebenberg et al., 2022; Van Hooff & Geurts, 2015). Given its relationship with motivation at a between-person level and the within-person variability of both constructs, it is proposed that

on days when employees' needs are met, they are more likely to be autonomously motivated and/or experience introjected regulation, which will result in higher levels of daily work engagement.

**Hypothesis 2 (H2):** *Daily basic psychological need satisfaction has an indirect effect on work engagement via (a) intrinsic motivation, (b) identified regulation, and (c) introjected regulation.*

[INSERT FIG. 1A HERE]

### **The 'Dark' Pathway: Daily Basic Psychological Need Frustration**

The work environment is not always conducive to need satisfaction. Some days, employees' needs may be actively thwarted (Warburton, 2020), resulting in need frustration and subsequent adverse employee outcomes (Deci et al., 2017). This 'dark' pathway is characterized by need frustration, external regulation, passivity, and ill-being (Warburton et al., 2020). Although evidence in the work domain is scarce, there is evidence in other domains that daily need frustration negatively affects human functioning (e.g., Kosa & Uysal, 2021). The proposed research model for the 'dark' pathway is depicted in Fig. 1b.

External regulation (as a type of controlled motivation) is regarded as a lower-quality motivation than the more autonomous types of motivation due to its associated psychological costs and inability to sustain goal-directed behaviors over the long term (Ryan & Deci, 2019; Van den Broeck et al., 2021). Amotivation is the least desirable form of motivation due to its passivity and almost always results in negative outcomes (Van den Broeck et al., 2021).

It can, therefore, be argued that when employees' needs are frustrated, they are more likely to externalize their behaviors and the reasons for engaging in them (*i.e., controlled motivation*); that is, they may be more inclined to engage in behaviors to gain approval or avoid criticism from others (*i.e., external regulation*) (Ryan & Deci, 2019). Given that need frustration is likely to vary intra-individually (Laporte et al., 2021), it can be argued that employees' motivation for engaging in tasks on certain days is likely due to external reasons because their needs are frustrated. Employees may also 'give up' when their needs are frustrated, as need frustration can lead to passivity for some (Warburton et al., 2020). Feelings

of 'giving up' indicate a lack of intention, referred to as *amotivation* (Ryan & Deci, 2019). This means that on days when employees' needs are frustrated, they may not be motivated to engage in behaviors, as they may feel like 'giving up'.

**Hypothesis 3 (H3):** *Daily basic psychological need frustration positively relates to (a) external regulation and (b) amotivation.*

Between-person studies found that less optimal forms of motivation (*i.e.*, *external regulation and amotivation*) were related to burnout (Cuevas et al., 2018; Van den Broeck et al., 2021). Considering that exhaustion may be the most visible manifestation of burnout (Ferreira et al., 2019) and that the other burnout components may develop because of it (De Beer et al., 2013), only the exhaustion component of burnout was investigated in this study. Therefore, employees who engage in tasks due to external reasons are more likely to be exhausted (*i.e.*, mentally and physically tired and lacking the energy for task completion [Schaufeli et al., 2020]). It may then be argued that on days when employees do not internalize the reasons for engaging in certain behaviors, it will take more energy from them to complete tasks, which will result in feelings of exhaustion.

Although knowledge of amotivation and its outcomes is limited, being amotivated arguably results in the least favorable outcomes (Deci et al., 2017; Van den Broeck et al., 2021). Amotivation is helpful in understanding burnout (Van den Broeck et al., 2021), which means that amotivated employees may experience exhaustion (Cuevas et al., 2018). Depending on their social context, employees may feel like giving up more on certain days than others, which means that amotivation can fluctuate daily. Therefore, we propose that when employees feel like giving up, they will be more likely to feel exhausted.

**Hypothesis 4 (H4):** *Daily basic psychological need frustration has an indirect effect on exhaustion via (a) external regulation and (b) amotivation.*

[INSERT FIG. 1B HERE]

### ***Interplay Between the 'Bright' and 'Dark' Pathways***

In the aforementioned hypotheses, it is proposed that daily need satisfaction positively relates to well-being (*i.e.*, work engagement), while daily need frustration positively relates to

ill-being (i.e., exhaustion). The formulation of these hypotheses does not imply that opposite relations may not be present. For instance, the 'bright' side can play a role in reducing ill-being, while the 'dark' side can reduce well-being. The reality is that psychological need satisfaction may merely be a stronger predictor of positive outcomes compared to need frustration, while need frustration may be more strongly associated with negative outcomes (Rouse et al., 2020). Need satisfaction is, thus, not irrelevant when studying negative outcomes (Van den Broeck et al., 2016), but need frustration may hold stronger associations with negative outcomes.

***Hypothesis 5 (H5):*** *Daily basic psychological need satisfaction is a stronger predictor of work engagement via motivation, while daily basic psychological need frustration is a stronger predictor of exhaustion via motivation.*

## **Methods**

### **Participants and Procedure**

Prolific, an online research platform, was used to recruit participants. Several pre-screening criteria were used for recruitment. Employees needed to be employed full time by South African small to medium enterprises and had to have a secondary school qualification. A comprehensive description of the design of the study and the payment structure was provided to potential participants. Participants were provided with an initial link to a consent form, and on agreeing to participate, they were asked to complete baseline surveys. Eighty-seven participants provided consent and completed the initial surveys. They were then prompted to download the ExpiWell application on their mobile phones and complete the daily surveys for 10 working days (starting on a Monday). They received daily reminders at the end of the workday and were required to complete the surveys between 16:00 and 21:00. Daily surveys closed at 21:00 each day to prevent back-filling. Seventy-three participants commenced with the daily surveys. Participants who completed less than two daily surveys were removed from further analyses. The final sample consisted of 68 employees who completed daily surveys between three and 10 days. This resulted in a total of 557 responses across the 10 days.



The majority of participants were African (58.8%), English-speaking (55.9%) females (70.6%) with a secondary school qualification (58.8%). The mean age was 29.07 ( $SD = 7.41$ ). On average, participants had a tenure of approximately 3.5 years. A question about how often they engaged in remote work yielded the following: never (35.3%), followed by a few times a week (25%). Participants worked in various sectors/industries, but finance, real estate, and business services were represented the most (34.3%), followed by community, social, and personal services (13.4%).

### **Measuring Instruments**

Demographic (i.e., age, gender, ethnicity, language, education, tenure, remote work, and sector) and 'outcome' variables (i.e., work engagement and exhaustion) were measured in the baseline survey. Daily variables were measured using short daily surveys adapted from existing instruments. The length of each instrument was reduced according to recommendations for diary research (Ohly et al., 2010), and the items were adapted to make them suitable for daily measurement (e.g., today ...). The research team selected items based on (1) ensuring that the items represented all the dimensions operationalized in the scales, (2) the highest factor loadings from previous studies, and (3) face validity.

#### ***Basic Psychological Need Satisfaction and Frustration***

The 12-item Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS) diary measure (Van der Kaap-Deeder et al., 2020), consisting of six subscales, was used. It was shortened to a six-item measure, consisting of two dimensions: need satisfaction (three items) and need frustration (three items). It uses a five-point scale, ranging from 1 (*not at all true*) to 5 (*totally true*). Example items include "Today, I felt confident that I could do things well" (need satisfaction) and "Today, I felt forced to do many things I wouldn't choose to do" (need frustration).

#### ***Motivational Regulation***

The Multidimensional Work Motivation Scale (MWMS; Gagné et al., 2015) was used to assess participants' reasons for putting effort into their job (i.e., motivation). It was shortened to 15 items and uses a seven-point scale, ranging from 1 (*not at all*) to 7 (*completely*). The

following subscales of motivation were measured: amotivation (three items), controlled motivation in the form of external (three items) and introjected (three items) regulation, and autonomous motivation in the form of identified regulation (three items) and intrinsic motivation (three items). Example items include the following: “Today, I didn’t know why I’m doing this job, it’s pointless work” (amotivation); “Today, I worked to get others’ approval (e.g., supervisor, colleagues, family, clients ...)” (extrinsic regulation); “Today, I worked because it made me feel proud of myself” (introjected regulation); “Today, I worked because putting efforts in this job aligned with my personal values” (identified regulation); and “Today, I worked because I had fun doing my job” (intrinsic motivation).

### ***Work Engagement***

The three-item version of the Utrecht Work Engagement Scale (UWES-3; Schaufeli et al., 2017) was used to measure the participants’ work engagement levels. It uses one item for each dimension: vigor, dedication, and absorption. It uses a seven-point frequency scale, ranging from 0 (*strongly disagree*) to 6 (*strongly agree*). The items include “Today, at my work, I felt bursting with energy” (vigor), “Today, I was enthusiastic about my job” (dedication), and “Today, I was immersed in my work” (absorption).

### ***Exhaustion***

The exhaustion subscale of the 12-item Burnout Assessment Tool (BAT-12; Schaufeli et al., 2020) was used to measure participants’ exhaustion levels. The subscale consisted of three items, and it uses a five-point frequency scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Example items include “Today, after a day at work, I found it hard to recover my energy” and “Today, at work, I felt physically exhausted”.

### **Data Analyses**

Mplus 8.8 (Muthén & Muthén, 1998-2017) was used to analyze the data. Given the hierarchical structure of the data (i.e., 10 daily measurements [Level 1] nested within persons [Level 2]), multilevel modeling was used to test the hypotheses. A multilevel confirmatory factor analysis (MLCFA) was conducted to confirm the distinctiveness of our predictor, mediator, and outcome variables. This was done to examine whether the items loaded onto

their respective factors at the within- and between-person levels. Model fit was determined with the following indices: comparative fit index (CFI), Tucker-Lewis index (TLI) [ $> .90$ ], root mean square error of approximation (RMSEA) [ $\leq .08$ ], and standardized root mean square residual (SRMR) [ $< .10$ ] (Schweizer, 2010). Intraclass correlation coefficients (ICCs) were calculated to estimate the amount of within- and between-person variance. The calculation of ICCs also helped to confirm the nested structure of the data and to determine sufficient within-person variability in the main variables. Reliability was tested by calculating the omega coefficient, which included 95% confidence intervals (CIs) for both levels of analyses (i.e., within and between) (Geldhof et al., 2014).

The multilevel structural equation modeling (MSEM) framework was used, specifically emphasizing the procedures to test for multilevel mediation (Preacher et al., 2011). Based on the hypotheses, the focus was on the role of within-person rather than static between-person aspects of need satisfaction and frustration. The constructs were modeled using their respective observed scores (i.e., mean scores) to avoid overly complex modeling and due to the small number of individuals (i.e., clusters) in the study. The analysis should, thus, be seen as a form of path modeling rather than structural equation modeling with latent variables. As recommended by the literature, the time variant (daily-level) predictors were centered at the person-mean (Haumann et al., 2021).

An overall model was specified using need satisfaction and frustration as predictors of work engagement and emotional exhaustion, including all mediating paths (i.e., motivational regulations) simultaneously. Finally, a model constraint was used to compare the strength of the different indirect effects as proposed in Hypothesis 5.

## **Results**

### **Preliminary Analyses**

The results of the MLCFA indicated good model fit (CFI = .93; TLI = .91; RMSEA = .03; SRMR within = .05; SRMR between = .08) and confirmed that items loaded onto their respective factors at both levels. At the between level, one identified regulation and one work

engagement item had a slightly negative residual variance and was fixed to zero (as recommended by Mplus support).

The ICCs revealed that 56.4% and 62.9% of need satisfaction and frustration, respectively, were attributable to within-person variance. The within-person variance of the other variables was intrinsic motivation (30.5%), identified regulation (23.1%), introjected regulation (24.1%), external regulation (25.1%), amotivation (37.7%), work engagement (57.4%), and exhaustion (63.5%). Table 1 shows the means, standard deviations, reliability coefficients, and within- and between-person correlations of the study variables. All scales, except need frustration ( $\omega = .42$ ) showed acceptable within-person reliability. Need frustration showed acceptable between-person reliability ( $\omega = .81$ ). Nezlek (2017) maintains that standard reliability cut-off criteria cannot be applied to within-person reliability and proposes that standards should be relaxed, as day-level measures will have lower reliability coefficients compared to trait-level measures due to fewer items and a greater frequency of response.

[INSERT TABLE 1 HERE]

### **Hypotheses Testing**

The ICCs of work engagement and exhaustion reported in the previous section indicated that a multilevel model was warranted. Testing the hypotheses, using a random intercept, fixed slope model, revealed good fit to the data (CFI = .99; TLI = .96; RMSEA = .04; SRMR-within = .00). Fig. 2a and 2b show the significant standardized parameter estimates in the hypothesized models. Table 2 contains the results of the hypothesized indirect effects.

[INSERT TABLE 2 HERE]

### **Results of the 'Bright' Pathway**

*Hypothesis 1* stated that daily basic psychological need satisfaction positively related to (a) intrinsic motivation, (b) identified regulation, and (c) introjected regulation. This hypothesis was accepted, as daily need satisfaction positively related to (a) intrinsic motivation (Est. = .35 [.26; .44],  $p < .001$ ), (b) identified regulation (Est. = .25 [.16; .35],  $p < .001$ ), and (c) introjected regulation (Est. = .27 [.20; .35],  $p < .001$ ). *Hypothesis 2*, which stated that daily basic

psychological need satisfaction had an indirect effect on work engagement via (a) intrinsic motivation, (b) identified regulation, and (c) introjected regulation, was only partially supported. Only the indirect effect through intrinsic motivation (a) was significant (Est. = .20 [.12; .28],  $p < .001$ ). Although daily need satisfaction was related to identified and introjected regulation, these motivational regulations did not relate to work engagement. The indirect effect of need satisfaction on work engagement via external and introjected regulation was also not significant. The standardized path coefficients for the positive effects of the 'bright' pathway are depicted in Fig. 2a.

[INSERT FIG. 2A HERE]

### **Results of the 'Dark' Pathway**

*Hypothesis 3* stated that daily basic psychological need frustration positively related to (a) external regulation and (b) amotivation. This hypothesis was partially accepted, as daily need frustration related to amotivation (Est. = .31 [.23; .38],  $p < .001$ ), but not to external regulation. *Hypothesis 4*, which stated that daily basic psychological need frustration had an indirect effect on exhaustion via (a) external regulation and (b) amotivation, was rejected. Although daily need frustration positively affected amotivation, exhaustion was not associated with amotivation. The standardized path coefficients for the positive effects of the 'dark' pathway are depicted in Fig. 2b.

[INSERT FIG. 2B HERE]

### **Interplay Between the 'Bright' and 'Dark' Pathways**

*Hypothesis 5*, which stated that daily basic psychological need satisfaction was a stronger predictor of work engagement via motivation, while daily basic psychological need frustration was a stronger predictor of exhaustion via motivation, was accepted. Given that intrinsic motivation was the only significant motivational mediator in all the hypothesized pathways (see Table 2), additional analyses were conducted to determine the mediating role of intrinsic motivation in the other pathways that were not hypothesized. These included the following pathways: need satisfaction-exhaustion, need frustration-engagement, and need frustration-exhaustion. The results are summarised in Table 3 and confirmed the mediating role of

intrinsic motivation in all of these pathways. Accordingly, the difference between the following indirect effects was tested: (1) daily basic psychological satisfaction→intrinsic motivation→work engagement versus daily basic psychological frustration→intrinsic motivation→work engagement; and (2) daily basic psychological satisfaction→intrinsic motivation→exhaustion versus daily basic psychological frustration→intrinsic motivation→exhaustion. The results indicated that the indirect effects of need satisfaction and frustration on work engagement via intrinsic motivation were statistically different (Est. = .34 [.21; .46],  $p < .001$ ): the pathway from need satisfaction to work engagement via intrinsic motivation was stronger than the need frustration to engagement pathway. As expected, the pathway from need satisfaction to exhaustion via intrinsic motivation was weaker compared to the need frustration to exhaustion pathway (Est. = -.21 [-.30; -.11],  $p < .001$ ).

[INSERT TABLE 3 HERE]

### **Discussion**

This study aimed to investigate how employees' daily work-related need satisfaction and frustration experiences influenced their daily work engagement and exhaustion and the role that daily motivation played in these relationships. Another aim was to identify whether daily need satisfaction and frustration differed in their strength in predicting work engagement and exhaustion via motivation. Importantly, the within-person dual pathways of need satisfaction (i.e., the 'bright' side) and need frustration (i.e., the 'dark' side) were investigated, allowing us to investigate 'both sides of the coin'. This helped us to address an essential question in the basic psychological needs literature regarding whether daily need satisfaction and frustration accounted for a 'bright' and 'dark' side of human functioning. Previously, researchers indicated a need to study both need satisfaction and frustration simultaneously (Van den Broeck et al., 2016; Vansteenkiste et al., 2020) and to focus on their within-person (i.e., daily) processes (Coxen et al., 2021).

There was substantial variation in the experience of daily work-related needs satisfaction and frustration among employees, suggesting the value of studying these constructs as they

varied from day to day. This implied that, although some employees might differ in how they experienced need satisfaction and frustration, their own experiences of the needs might also fluctuate daily. These findings are consistent with previous studies that found that daily need satisfaction (see Coxen et al., 2021 for a review) and frustration (see Laporte et al., 2021) varied daily.

This study supports the theory that daily basic psychological need satisfaction positively relates to optimal forms of motivation (i.e., intrinsic motivation and identified regulation) and to introjected regulation. In line with the hypothesis, previous daily diary studies of employees found that daily need satisfaction positively related to intrinsic motivation (see Van Hooff & Geurts, 2015; Van Hooff & Van Hooft, 2017). This indicates that on days when employees feel competent, that they belong, and that they have free will, they may be more likely to engage in tasks for reasons of enjoyment or interest. Although there is less literature supporting the association between daily need satisfaction and identified and introjected regulation, this is in line with SDT. Considering that both intrinsic motivation and identified regulation are autonomous forms of motivation and characterized by the internalization of behavior (Van den Broeck et al., 2021), having one's needs met could result in a stronger internalization and translate into a personal acceptance of the value and importance of engaging in certain tasks/behaviors (identified regulation). Although not a form of autonomous motivation, introjected regulation presents a partial degree of internalization (Van den Broeck et al., 2021). Accordingly, when employees' needs are satisfied, they may partially internalize the value of a behavior if they feel competent, feel connected to others who endorse the value, and have free will in how they behave towards the value (Taris et al., 2020).

Daily basic psychological need satisfaction indirectly affected work engagement via intrinsic motivation. When employees' needs were fulfilled, they could do what they found enjoyable (intrinsic motivation), thus engaging in their work out of their own free will (Taris et al., 2020) and, in turn, showing a greater investment in, and dedication to, their work (work engagement). This finding is consistent with previous research that proposed a motivation mediation model (see Blechman et al., 2022; Olafsen et al., 2018), in which need satisfaction

predicted work motivation, which, in turn, predicted well-being outcomes (i.e., work engagement). Despite daily need satisfaction being related to identified and introjected regulations, these regulations did not significantly relate to daily work engagement. These findings contradict the literature, as a person who regulates their behavior via identification (i.e., identified regulation) is described as personally invested (Ryan & Deci, 2019). Since a personal investment in tasks/behaviors lies at the core of work engagement (Taris et al., 2020), identified regulation should theoretically relate to it. Similarly, regulating behavior based on self-esteem (introjected regulation) was found to relate to enhanced investment, energy, and dedication (work engagement) (see the meta-analysis of Van den Broeck et al., 2021). In this study, it seems evident that daily motivation should be very positive (i.e., intrinsic motivation) and that daily tasks should be interesting and enjoyable for them to enhance positive well-being outcomes (i.e., higher work engagement). Employees who find daily tasks enjoyable may experience 'flow' during completing these tasks, which shares many attributes with work engagement (Yan & Donaldson, 2022). This means that on days when employees gain pleasure from their work tasks, they will give their full attention and be absorbed in what they do, transpiring in work engagement.

The results revealed that daily need frustration positively related to amotivation, but not to external regulation. Although not much research exists on daily need frustration and its influence on amotivation and external regulation in the work context, a few conclusions from between-person studies could be drawn. Individuals may resort to coping strategies to deal with need frustration (Inguglia et al., 2019). Previous studies found that when needs were frustrated, people were more inclined to act with passivity and lack of intent (Oram et al., 2020), which could be a form of avoidance coping. Avoidance coping is when individuals try to avoid a stressful situation by withdrawing from the situation (Inguglia et al., 2019). Based on this, it could be concluded that when employees' needs are frustrated, they may employ a form of avoidance coping, which results in amotivation. Consequently, withdrawing from situations and lacking intent would mean that these employees will not be influenced by external pressures from others (i.e., external regulation).



Contrary to expectations, daily amotivation did not relate to exhaustion. Interestingly, previous between-person studies found amotivation to predict higher levels of burnout (Van den Broeck et al., 2021), as it reflected apathy, indifference, and lethargy (De Francisco et al., 2020). As only the exhaustion component of burnout was included in this study, it was not possible to determine whether amotivation resulted in the other components of burnout. Future studies should address all three components to determine the effect of daily amotivation. However, a possible explanation for the non-relatedness of daily amotivation with exhaustion may be that having short 'spurts' of amotivation from day to day does not constitute or warrant enough 'giving up' behaviors to have an impact on an employee's daily exhaustion levels. Perhaps daily amotivation (1) rather affects the apathy and indifference components of burnout or (2) is employed as a coping mechanism (i.e., avoidance coping as discussed above), which protects against daily exhaustion. Also, having no motivation on a certain day could result in less effort being exerted on that day, which does not significantly affect exhaustion.

The results showed that daily basic psychological need satisfaction was a stronger predictor of work engagement via motivation than was psychological need frustration. In comparison, daily basic psychological need frustration was a stronger predictor of exhaustion via motivation than was psychological need satisfaction. However, since only intrinsic motivation proved to play a role in these relationships, this conclusion could only be drawn based on this type of motivational regulation. In line with SDT, it seems that daily need satisfaction best explains a 'bright' pathway to human functioning, while need frustration may best explain a 'dark' pathway, although not necessarily through good- or poor-quality motivation. The findings suggest that daily need satisfaction and frustration seem to influence the extreme positives of motivation (i.e., intrinsic motivation), which will then have an impact on daily well-being (enhanced well-being and reduced exhaustion). The role of need frustration in intrinsic motivation could mean that the needs also play a directional role, pulling individuals into action and resulting in adaptive coping responses (Vansteenkiste et al., 2020). When

engaging in adaptive coping, individuals tend to cope by creating favorable conditions for themselves to manage stressful conditions (Javed & Parveen, 2021).

Despite the stronger associations between daily need satisfaction and work engagement (via intrinsic motivation) compared to the dark pathway of frustration to exhaustion, it still seems that these two needs predict the same outcomes, albeit in a different direction. A suitable explanation can be derived from the study by Bidee et al. (2016), which found that, at a within-person level, the processes of need satisfaction and frustration seemed to “mirror each other” (p. 909). Hence, at a within-person level, if a person’s need satisfaction increases, the person’s need frustration will decrease, and vice versa (Bidee et al., 2016), thus resulting in similar outcomes in opposite directions. Similarly, if need satisfaction and frustration experiences mirror each other at a daily level, their outcomes will also be mirrored. The findings of the study confirm the findings of Van den Broeck et al. (2016), which suggest that need satisfaction is not irrelevant when studying negative outcomes, but that need frustration may hold stronger associations with negative outcomes.

### **Practical Implications**

Results of the ‘bright’ pathway show that daily need satisfaction matters for introjected and identified regulation and intrinsic motivation. Daily need satisfaction, thus, results in a greater internalization of behaviors. This study indicates that once internalization has reached an optimal form (i.e., intrinsic motivation), employees become more engaged and less exhausted. The ‘dark’ pathway of daily need frustration is also supported in this study, resulting in a lack of motivation and hampering intrinsic motivation. Although amotivation did not result in increased exhaustion, the research suggests that it could result in other negative employee outcomes. Van den Broeck et al. (2021) explain that amotivation only has negative consequences. Daily need frustration plays a role in hampering internalization, resulting in lower engagement and more exhaustion. Evidence of the respective ‘positive’ and ‘negative’ effects of daily need satisfaction and frustration in this study, together with the explanation that these processes tend to mirror each other at a within-person level, means that if organizations focus on the daily support of employee needs, the frustration of these will automatically

decline. Therefore, separate interventions for these two processes are not necessary (Bidee et al., 2016). In this instance, enhancing daily need satisfaction (and, subsequently, reducing daily need frustration) should be a priority for employees, managers, and organizations.

To enhance their need satisfaction, employees could play a more integral part in structuring their jobs through job crafting (Toyama et al., 2022). If they can be involved in crafting their jobs daily for enjoyment, their daily need satisfaction experiences may be enhanced. Managers and colleagues can also enhance daily employee need satisfaction (and reduce frustration) by consciously considering their daily interactions. Research suggests that social environments (i.e., workplaces) should be need-supportive (and not need-thwarting) for need satisfaction to occur (Vansteenkiste et al., 2020). On the one hand, managers and colleagues can ensure that they show daily concern for the welfare of others, encourage employees to personally take initiative, and recognize employee efforts and accomplishments (Bhavsar et al., 2019). On the other hand, managers and colleagues should refrain from ignoring, controlling, and blaming employees (Bhavsar et al., 2019). From an organizational perspective, job redesign could be considered to enhance daily need satisfaction (and reduce daily need frustration). For example, the job characteristics model proposes that five core characteristics can enhance need satisfaction: (1) autonomy, (2) opportunities for feedback, (3) skill variety, (4) task identity, and (5) task significance (Liu et al., 2022).

### **Limitations and Recommendations for Future Research**

There are some limitations to this study, which should be acknowledged. Firstly, the design of the study did not allow for causal inferences to be drawn, as there was no temporal separation of the variables. The conditions to demonstrate causality involve the following: (1) the variables should be statistically related; (2) the hypothesized causal relationships should be theoretically plausible; (3) the predictors should be measured before the outcomes; and (4) alternative explanations for these relationships should be ruled out (Spector, 2019). Only the first two criteria were met in this study. It was not possible to exclude that the causal chain could have operated in the opposite direction (criterion 4 not met), since all variables were measured simultaneously in one questionnaire at the end of the workday (criterion 3 not met).

However, hypotheses were presented in a manner that is aligned with SDT literature. It might be possible to further disentangle these causal associations by measuring the constructs of interest on multiple occasions throughout a workday.

Secondly, the study relied on self-report measures, which may raise questions about measurement bias. Participants in diary studies, however, appear to show minimal cognitive processing prior to reporting their current states at a particular moment (Liebenberg et al., 2022). Since the MLCFA results showed that items loaded onto different factors, thus distinguishing the predictor, mediator, and outcome variables, no threats of common method variance (CMV) were detected. For future studies, issues of CMV should be considered and accounted for in the design of the study, such as the inclusion of a marker variable. Also, shortened versions of the measuring instruments were used to reduce participant burden and fatigue. Therefore, it cannot be ruled out that the selected items did not capture the construct well.

Thirdly, daily basic psychological need satisfaction and frustration were aggregated to reduce the number of items to which participants had to respond. Since previous studies suggested that it made more theoretical sense to separate the needs into autonomy, competence, and relatedness (see Van den Broeck et al., 2016), a recommendation for future studies would be to consider these needs as separate constructs. Perhaps, if need satisfaction and frustration had been broken down into autonomy, competence, and relatedness in this study, more definitive conclusions regarding which needs related to different motivational regulations on a day-to-day basis could have been drawn.

Finally, some of the results were unexpected (and in some instances, contrary to existing research findings). External regulation and amotivation did not lead to daily exhaustion. A potential explanation is that exhaustion was the only subcomponent of burnout included in the study. Future researchers could consider including all burnout components to see whether different motivational regulations would result in different burnout components. Another explanation is that perhaps 'giving up' (i.e., amotivation) could have been a buffering or

protective effect (i.e., coping mechanism) against becoming exhausted. Future studies could then investigate the role of coping in these pathways.

## References

- Bhavsar, N., Ntoumanis, N., Quested, E., Gucciardi, D. F., Thøgersen-Ntoumani, C., Ryan, R. M., Reeve, J., & 4, Sarrazin, P., & Bartholomew, K. J. (2019). Conceptualizing and testing a new tripartite measure of coach interpersonal behaviors. *Psychology of Sport and Exercise, 44*, 107–120. <https://doi.org/10.1016/j.psychsport.2019.05.006>
- Bidee, J., Vantilborgh, T., Pepermans, R., Griep, Y., & Hofmans, J. (2016). Temporal dynamics of need satisfaction and need frustration. Two sides of the same coin? *European Journal of Work and Organizational Psychology, 25*(6), 900–913. <https://doi.org/10.1080/1359432X.2016.1176021>
- Blechman, Y., Tóth-Király, I., Nadon, L., Fernet, C., & Morin, A. (2022). On the global and specific nature of psychological need satisfaction and work motivation in predicting employees' wellbeing: A self-determination theory perspective. *Journal of Management & Organization, 1–22*. <https://doi.org/10.1017/jmo.2022.76>
- Boschman, J. S., Nieuwenhuijsen, K., & Sluiter, J. K. (2018). Within-person fluctuations in wellbeing and task-specific work ability. *Quality of Life Research, 27*, 437–446. <https://doi.org/10.1007/s11136-017-1713-3>
- 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>
- Cuevas, R., Ntoumanis, N., Fernandez-Bustos, J. G., & Bartholomew, K. (2018). Does teacher evaluation based on student performance predict motivation, well-being, and ill-being? *Journal of School Psychology, 68*, 154–162. <https://doi.org/10.1016/j.jsp.2018.03.005>
- De Beer, L. T., Pienaar, J., & Rothmann Jr., S. (2013). Investigating the reversed causality of engagement and burnout in job demands-resources theory. *South African Journal of Industrial Psychology, 39*(1), Art. #1055. <https://doi.org/10.4102/sajip.v39i1.1055>
- De Francisco, C., Sánchez-Romero, E. I., Del Pilar Vílchez Conesa, M., & Arce, C. (2020). Basic Psychological needs, burnout and engagement in sport: The mediating role of

- motivation regulation. *International Journal of Environmental Research and Public Health*, *17*, 4941. <https://doi.org/10.3390/ijerph17144941>
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*, 227–268. [https://doi.org/10.1207/S15327965PLI1104\\_01](https://doi.org/10.1207/S15327965PLI1104_01)
- Deci, E. L., Olafsen, A. H., & Ryan, R. M. (2017). Self-Determination Theory in work organizations: The state of a science. *Annual Review of Organizational Psychology and Organizational Behavior*, *4*, 19–43. <https://doi.org/10.1146/annurev-orgpsych-032516-113108>
- Ferreira, A. I., Ferreira, P. A. N., Cooper, C. L., & Oliveira, D. (2019). How daily negative affect and emotional exhaustion correlates with work engagement and presenteeism-constrained productivity. *International Journal of Stress Management*. <https://doi.org/10.1037/str0000114>
- Gagné, M., Forest, J., Vansteenkiste, M., Crevier-Braud, L., Van den Broeck, A., Aspeli, A. K., Bellerose, J., Benabou, C., Chemolli, E., Güntert, S. T., Halvari, H., Indiyastuti, D. L., Johnson, P. A., Molstad, M. H., Naudin, M., Ndao, A., Olafsen, A. H., Roussel, P., Wang, Z., & Westbye, C. (2015). The Multidimensional Work Motivation Scale: Validation evidence in seven languages and nine countries. *European Journal of Work and Organizational Psychology*, *24*(2), 178–196. <https://doi.org/10.1080/1359432X.2013.877892>
- Geldhof, G. J., Preacher, K. J., & Zyphur, M. J. (2014). Reliability estimation in a multilevel confirmatory factor analysis framework. *Psychological Methods*, *19*(1), 72–91. <https://doi.org/10.1037/a0032138>
- Haumann, T., Kassemeier, R., & Wieseke, J. (2021). Multilevel modeling. In C. Homburg, M. Klarmann, & A. Vomberg (Eds.), *Handbook of Market Research* (pp. 369–409). Springer.
- Inguglia, C., Costa, S., Inguglia, S., & Liga, F. (2019). Associations between peer pressure and adolescents' binge behaviors: The role of basic needs and coping. *Journal of Genetic Psychology*, *180*(2-3), 144–155. <https://doi.org/10.1080/00221325.2019.1621259>

- Javed, S., & Parveen, H. (2021). Adaptive coping strategies used by people during coronavirus. *Journal of Education and Health Promotion*, 10(122).  
[https://doi.org/10.4103/jehp.jehp\\_522\\_20](https://doi.org/10.4103/jehp.jehp_522_20)
- Kosa, M., & Uysal, A. (2021). Need frustration in online video games. *Behaviour and Information Technology*. <https://doi.org/10.1080/0144929X.2021.1928753>
- Laporte, N., Soenens, B., Flamant, N., Vansteenkiste, M., Mabbe, E., & Brenning, K. (2021). The role of daily need crafting in daily fluctuations in adolescents' need-based and affective experiences. *Motivation and Emotion*, 46, 137–149.  
<https://doi.org/10.1007/s11031-021-09921-2>
- Liebenberg, J.-M., Scholtz, S. E., & De Beer, L. T. (2022). The daily basic psychological need satisfaction and work engagement of nurses: A 'shortitudinal' diary study. *Healthcare*, 10, 863. <https://doi.org/10.3390/healthcare10050863>
- Liu, Y., Wang, S., Wang, J., & Li, S. (2022). When and how job design influences work motivation: A Self-Determination Theory approach. *Psychological Reports*, 125(3), 1573–1600. <https://doi.org/10.1177/00332941211027320>
- Muthén, L. K., & Muthén, B. O. (1998-2017). *Mplus User's Guide* (8th ed.). Muthén & Muthén.
- Ohly, S., Sonnentag, S., Niessen, C., & Zapf, D. (2010). Diary studies in organizational research: An introduction and some practical recommendations. *Journal of Personnel Psychology*, 9(2), 79–93. <https://doi.org/10.1027/1866-5888/a000009>
- Nezlek, J. B. (2017). A practical guide to understanding reliability in studies of within-person variability. *Journal of Research in Personality*, 69, 149–155.  
<https://doi.org/10.1016/j.jrp.2016.06.020>
- Ohly, S., Sonnentag, S., Niessen, C., & Zapf, D. (2010). Diary studies in organizational research: An introduction and some practical recommendations. *Journal of Personnel Psychology*, 9(2), 79–93. <https://doi.org/10.1027/1866-5888/a000009>
- Olafsen, A. H., Deci, E. L., & Halvari, H. (2018). Basic psychological needs and work motivation: A longitudinal test of directionality. *Motivation and Emotion*, 42, 178–189.  
<https://doi.org/10.1007/S11031-017-9646-2>



- Olafsen, A. H., Halvari, H., & Frølund, C. W. (2021). The Basic Psychological Need Satisfaction and Need Frustration at Work Scale: A validation study. *Frontiers in Psychology, 12*, 697306. <https://doi.org/10.3389/fpsyg.2021.697306>
- Oram, R., Rogers, M., & DuPaul, G. (2020). Explaining the relationship between ADHD symptomatology and amotivation in the undergraduate population: The role of basic psychological need frustration. *Canadian Journal of School Psychology, 35*(2), 139–153. <https://doi.org/10.1177/0829573519880063>
- Preacher, K. J., Zhang, Z., & Zyphur, M. J. (2011). Alternative methods for assessing mediation in multilevel data: The advantages of multilevel SEM. *Structural Equation Modeling, 18*, 161–182. <https://doi.org/10.1080/10705511.2011.557329>
- Rouse, P. C., Turner, P. J. F., Siddall, A. G., Schmid, J., Standage, M., & Bilzon, J. L. J. (2020). The interplay between psychological need satisfaction and psychological need frustration within a work context: A variable and person-oriented approach. *Motivation and Emotion, 44*, 175–189. <https://doi.org/10.1007/s11031-019-09816-3>
- Ryan, R. M., & Deci, E. L. (2019). Brick by brick: The origins, development, and future of self-determination theory. *Advances in Motivation Science, 1*–51. <https://doi.org/10.1016/bs.adms.2019.01.001>
- Schaufeli, W. B., Shimazu, A., Hakanen, J., Salanova, M., & De Witte, H. (2017). An ultra-short measure for work engagement: The UWES-3 validation across five countries. *European Journal of Psychological Assessment, 32*(1), 57–67. <https://doi.org/10.1027/1015-5759/a000430>
- Schaufeli, W.B., De Witte, H. & Desart, S. (2020). *Manual Burnout Assessment Tool (BAT) – Version 2.0*. KU Leuven, Belgium: Unpublished internal report.
- Schweizer, K. (2010). Some guidelines concerning the modeling of traits and abilities in test construction. *European Journal of Psychological Assessment, 26*, 1–2. <https://doi.org/10.1027/1015-5759/a000001>

- Sonnentag, S., & Ilies, R. (2011). Intra-individual processes linking work and employee well-being: Introduction into the special issue. *Journal of Organizational Behavior*, 32, 521–525. <https://doi.org/10.1002/job.757>
- Spector, P. E. (2019). Do not cross me: Optimizing the use of cross-sectional designs. *Journal of Business Psychology*, 34, 125–137. <https://doi.org/10.1007/s10869-018-09613-8>
- Taris, T. W., van Beek, I., & Schaufeli, W. B. (2020) The motivational make-up of workaholism and work engagement: A longitudinal study on need satisfaction, motivation, and heavy work investment. *Frontiers in Psychology*, 11(1419). <https://doi.org/10.3389/fpsyg.2020.01419>
- Toyama, H., Upadyaya, K., & Salmela-Aro, K. (2022). Job crafting and well-being among school principals: The role of basic psychological need satisfaction and frustration. *European Management Journal*, 40(5), 809–818. <https://doi.org/10.1016/j.emj.2021.10.003>
- 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 Vaerenborgh, 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*, 1–34. <https://doi.org/10.1177/20413866211006173>
- Van der Kaap-Deeder, J., Soenens, B., Ryan, R. M., & Vansteenkiste, M. (2020). *Manual of the Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS)*. Ghent University, Belgium.
- Van Hooff, M. L. M., & Geurts, S. A. E. (2015). Need satisfaction and employees' recovery state at work: A daily diary study. *Journal of Occupational Health Psychology*. Advance online publication. <https://doi.org/10.1037/a0038761>
- Van Hooff, M. L. M., & Van Hooft, E. A. J. (2017). Boredom at work: Towards a dynamic spill over model of need satisfaction, work motivation, and work-related boredom. *European*

*Journal of Work and Organizational Psychology*, 26(1), 133–148.

<https://doi.org/10.1080/1359432X.2016.1241769>

Van Tuin, L., Schafeli, W. B., & van Rhenen, W. (2020). The satisfaction and frustration of basic psychological needs in engaging leadership. *Journal of Leadership Studies*, 14(2), 6–23. <https://doi.org/10.1002/jls.21695>

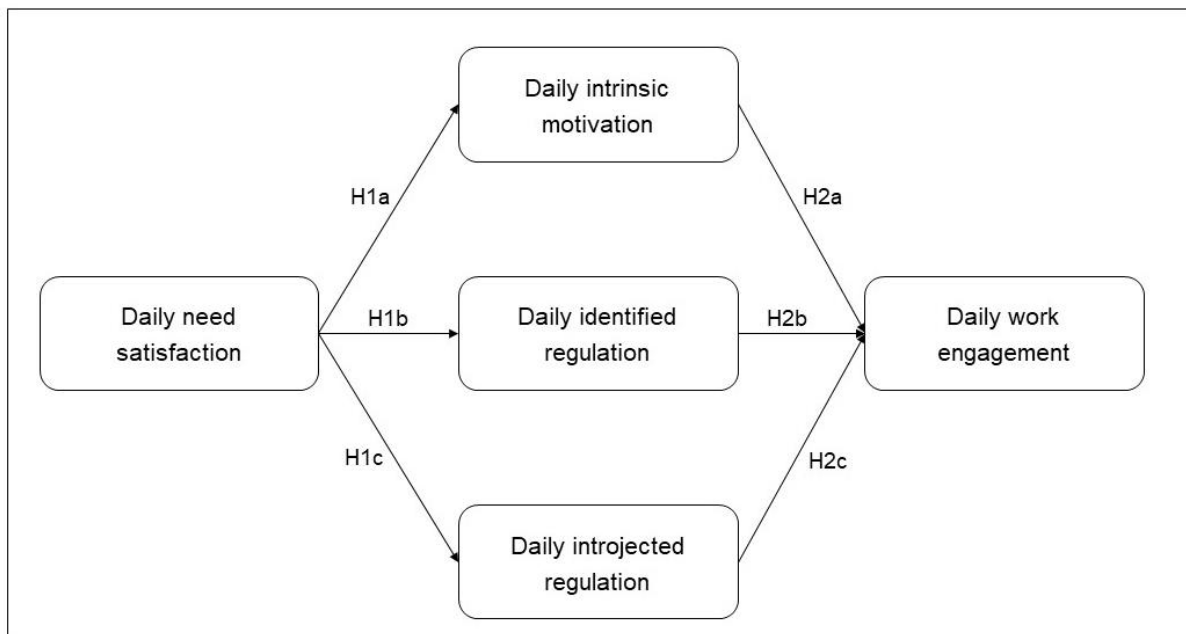
Vansteenkiste, M., Ryan, R. M., & Soenens, B. (2020). Basic psychological need theory: Advancements, critical themes, and future directions. *Motivation and Emotion*, 1–31. <https://doi.org/10.1007/s11031-019-09818-1>

Warburton, V. E., Wang, K. C., Bartholomew, K. J., Tuff, R. L., & Bishop, K. C. M. (2020). Need satisfaction and need frustration as distinct and potentially co-occurring constructs: Need profiles examined in physical education and sport. *Motivation and Emotion*, 44, 54–66. <https://doi.org/10.1007/s11031-019-09798-2>

Yan, Q., & Donaldson, S. I. (2022). What are the differences between flow and work engagement? A systematic review of positive intervention research. *Journal of Positive Psychology*. <https://doi.org/10.1080/17439760.2022.2036798>

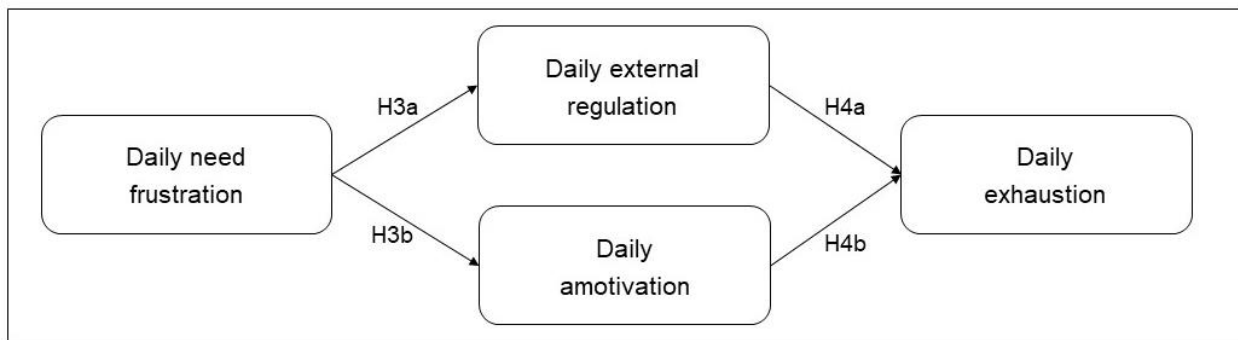
**Fig. 1a**

*Research Model of the Positive Paths in the 'Bright' Pathway*



**Fig. 1b**

*Research Model of the Positive Paths in the 'Dark' Pathway*



**Table 1***Means, Standard Deviations, Reliability, and Correlations of the Study Variables*

Variable	M	SD	$\omega$	95% CI	Correlations									
					1	2	3	4	5	6	7	8	9	10
1. Need satisfaction	3.89	0.86	.63	[.57; .68]	-	-.33***	-.28***	-.04	.31***	.29***	.42***	.44***	-.36***	-
2. Need frustration	1.87	0.82	.42	[.34; .51]	-.56***	-	.36***	.09	-.19**	-.19***	-.33***	-.39***	.37***	-
3. Amotivation	1.92	1.23	.66	[.61; .72]	-.62***	.70***	-	.04	-.20***	-.23***	-.28***	-.24***	.20***	-
4. External regulation	3.16	1.66	.71	[.67; .76]	.14	.24*	.24*	-	.19***	.16***	.00	.01	.03	-
5. Introjected regulation	5.10	1.58	.62	[.56; .68]	.58***	-.25†	-.39***	.33*	-	.42***	.32***	.26***	-.20***	-
6. Identified regulation	5.35	1.52	.77	[.73; .80]	.74***	-.46***	-.55***	.17	.84***	-	.35***	.19***	-.14**	-
7. Intrinsic motivation	4.26	1.76	.86	[.84; .88]	.75***	-.40***	-.51***	.15	.68***	.82***	-	.50***	-.39***	-
8. Work engagement	3.67	1.49	.86	[.84; .88]	.75***	-.36**	-.60***	.00	.53***	.74***	.86***	-	-.67***	-
9. Exhaustion	2.81	1.22	.88	[.86; .89]	-.46***	.49***	.44***	.17	-.28*	-.48***	-.57***		-	-
10. General work engagement	4.47	0.92	**.79	[.76; .82]	.34**	-.07	-.31**	.09	.24	.42***	.51***	.56***	-.30*	-
11. General exhaustion	2.82	0.78	**.80	[.77; .83]	-.43***	.40**	.34***	-.01	-.18	-.33***	-.47***	-.50***	.60***	-.58***

Note.  $N = 68$  individuals and 557 observations.  $M$  = mean.  $SD$  = standard deviation.  $\omega$  = omega reliability coefficient (within-person; \*\* between-person). 95% CI = 95% confidence interval of  $\omega$ . Within-person correlations are depicted above the diagonal; between-level correlations are below the diagonal.

†  $p < .10$ . \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

**Table 2**

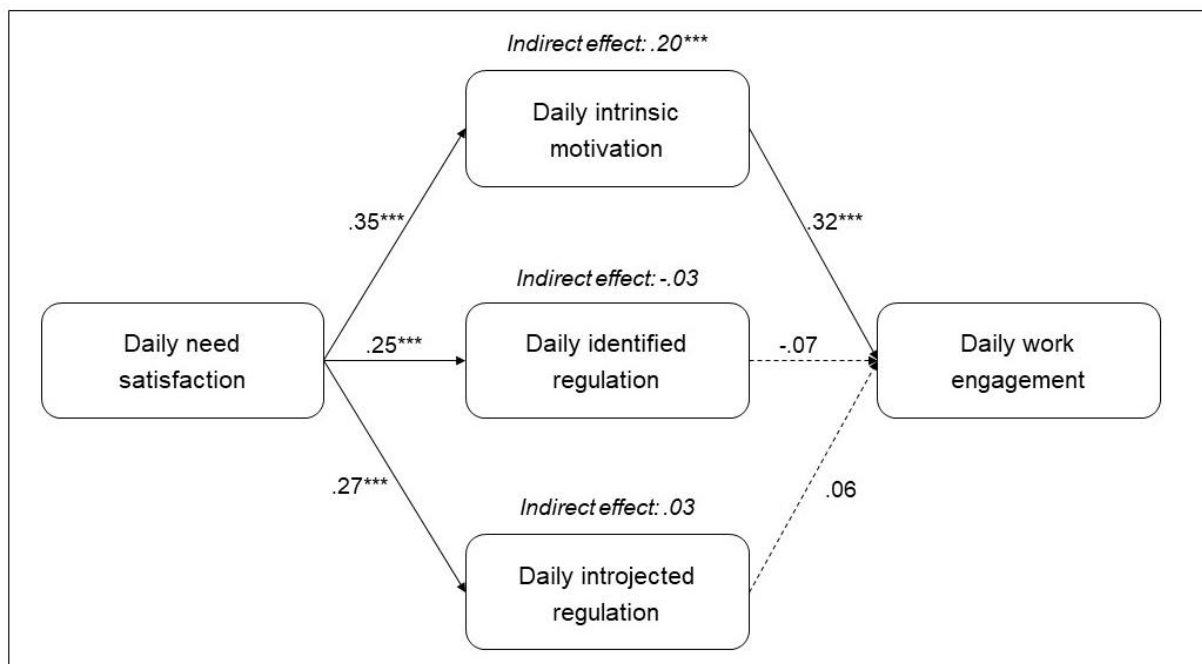
*Maximum Likelihood Parameter Estimates, Standard Errors, and Confidence Intervals for Indirect Effects*

Indirect effects	Hypothesis	Standardized		95% CI	
		Est.	SE	Lower	Upper
NS → IM → WE	H2a	.20***	.05	.13	.28
NS → ID → WE	H2b	-.03	.02	-.07	.01
NS → IJ → WE	H2c	.03	.02	-.00	.07
NF → ER → EX	H3a	.00	.01	-.01	.01
NF → AM → EX	H3b	.00	.02	-.04	.04

*Note.*  $N = 68$  individuals and 557 observations. Est. = estimate. SE = standard error. 95% CI = 95% confidence interval. NS = need satisfaction. NF = need frustration. WE = work engagement. EX = exhaustion. AM = amotivation. ER = external regulation. IJ = introjected regulation. ID = identified regulation. IM = intrinsic motivation.

**Fig. 2a**

*Standardized Path Coefficients of Need Satisfaction (i.e., 'Bright' Pathway)*



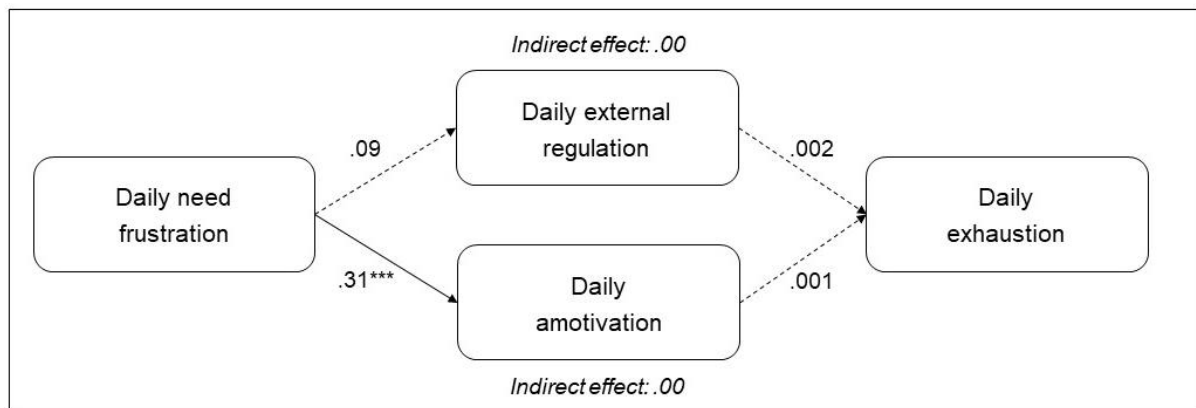
Note. For the sake of readability, paths for need satisfaction are indicated in Fig. 2a, and paths for need frustration are indicated in Fig. 2b, although both predictors were entered simultaneously in one analytical model.

\*\*\*  $p < .001$ .



**Fig. 2b**

*Standardized Path Coefficients of Need Frustration (i.e., 'Dark' Pathway)*



*Note.* For the sake of readability, paths for need satisfaction are indicated in Fig. 2a, and paths for need frustration are indicated in Fig. 2b, although both predictors were entered simultaneously in one analytical model.

\*\*\*  $p < .001$ .

**Table 3**

*Maximum Likelihood Parameter Estimates, Standard Errors, and Confidence Intervals for Indirect Effects of the Additional Analyses*

Indirect effects	Standardized		95% CI	
	Est.	SE	Lower	Upper
NS → IM → WE	.20***	.05	.13	.28
NS → IM → EX	-.13**	.04	-.18	-.07
NF → IM → WE	-.13**	.04	-.20	-.07
NF → IM → EX	.08**	.03	.03	.13

*Note.*  $N = 68$  individuals and 557 observations. Est. = estimate. SE = standard error. 95% CI = 95% confidence interval. NS = need satisfaction. NF = need frustration. WE = work engagement. EX = exhaustion. IM = intrinsic motivation.