

Awareness at Work: A Diary Study on the Direct and Buffering Effects of State Mindfulness in the Stressor-Strain Relationship

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Abstract

High work demands have been consistently linked to strain outcomes in employees. The present study examined within-individual relationships of time pressure as a work demand, fatigue as a strain outcome, and the potential moderating as well as the direct relationship of state mindfulness. Drawing on the effort-recovery model as well as the job-demands resources model, it was hypothesized that time pressure would be positively related to fatigue. Taking into account the addition of personal resources to the job-demands resources model, the influence of mindfulness was hypothesized to be twofold: through a direct negative relationship with fatigue as well as a buffering effect on the relationship between time pressure and fatigue. Over the course of a cross-sectional 30-day diary study, participants from a multitude of employment sectors (N=410) were asked to fill out an initial baseline questionnaire as well as a daily questionnaire in the evening of each working day. All variables of interest were measured in the daily questionnaire, and within individual relationships were assessed. Results confirmed a positive relationship between time pressure and fatigue, as well as a negative relationship between state mindfulness and fatigue. No buffering effect of state mindfulness could be found. Practical implications of these findings and future research directions are discussed.

Awareness at Work: A Diary Study on the Direct and Buffering Effects of State Mindfulness in the Stressor-Strain Relationship

The majority of people spend most of their adult lives working. But high demands and changing workplaces are taking a toll on the workforce. A study commissioned by a German statutory health insurance found in 2016, that in the years since 2001, sick leave times due to psychological problems rose by 90%. Out of all the workers partaking in the survey, 22% reported having experienced stress levels at which they felt unable to cope (Wohlers & Hombrecher, 2016). There are plenty of resources and methods that ease stress and promote recovery from work strain (e.g. Demerouti et al., 2009). However, the study commissioned by the insurance company found that many people use their off time by engaging in rather passive recovery activities that are not consistently shown to be effective (Sonnentag et al., 2017; Wohlers & Hombrecher, 2016). Thus, facilitating recovery for employees burdened by work strain through health promotion programs, organizational interventions, or policies are important to meet the increasing demands of modern work environments. **The current research project will investigate a potential factor involved in better recovery from work strain: mindfulness.**

Mindfulness is defined as non-judgmental moment-to-moment awareness (Kabat-Zinn, 2003). Over the past 20 years, a significant interest in the beneficial effects of mindfulness for recovery from work stress has emerged. Mindfulness and interventions inducing it have been found to build a resource for people that facilitates recovery (e.g. Fisher et al., 2019; Grover et al., 2017; Hülshager et al., 2013; Kabat-Zinn, 2003; Michel et al., 2014; Querstret et al., 2019; Sonnentag & Freese, 2003). While it can be categorized as a trait variable, this study will look at mindfulness as a momentary state (Brown & Ryan, 2003). Doing so, the current project draws on a set of data from a 30-day diary study with employees from a diverse set of employment sectors. Using the advantage of the multilevel data, the investigation focuses on day-to-day relationships within-individuals in mindfulness with regards to the stressor-strain relationship. **The main question of this project is whether mindfulness as a state might ease the effects that work demands impose on employees.**

These work demands will be indicated by time pressure in this project. This variable is associated with incomplete time to fulfill a task (Teuchmann et al., 1999). As a potential consequence of changing workplaces, time pressure has substantially increased over the last years (Eurofound, 2012, 2015; Prem et al., 2017). Therefore, it is important to investigate this variable more closely. Additionally, the present studies focus on time pressure will give further insight into the ambivalent nature of time pressure as a challenge stressor that can have both positive and negative outcomes on individuals and performance (Baethge et al., 2018).

As time pressure has been linked to imposing strain outcomes on individuals, this study will focus on the negative consequences of time pressure, as opposed to positive motivational outcomes (Baethge et al., 2018; Crawford et al., 2010). The variable indicating strain outcomes is fatigue. As a psychophysiological state, fatigue comes with low energy levels, high irritability, and a low motivation to exert further effort (Zijlstra et al., 2014). Fatigue was chosen as an indicator for strain in this project over others, as it is -as a state- a 'subjective affective experience' (Hülshager et al., 2018, p. 277), that changes quickly in response to demands and is thus feasible as an indicator of acute strain reactions.

The current project aims to add to the state of research on the influence of mindfulness at work in several ways. Most importantly, this thesis focuses on investigating within-individual relationships in all variables of interest over six weeks. That is, the day-to-day level of work demands as indicated by time pressure, its relationship with employee strain indicated by fatigue as well as the relationship with mindfulness are analyzed as they happen within-individuals. Previous cross-sectional research at the between-individual level saw a buffering effect of mindfulness in the relationship of work demands on strain outcomes (Fisher et al., 2019; Grover et al., 2017). However, the inferences one can draw from cross-sectional studies investigating only between-persons relationships are limited as they assess only one point in time (Good et al., 2016). It has been argued, that as well-being is defined to be about momentary experiences, one should not only pay attention to individuals' averages in well-being but also pay attention to within-person relationships (Ilies et al., 2010). A diary study can thus give more insight into these within-person relationships in our variables of interest.

Secondly, previous research has mostly focused on investigating mindfulness as a trait characteristic or induced it through interventions as a state variable (e.g. Hülshager et al., 2015). Recent studies have begun to investigate antecedents of state mindfulness as it naturally occurs and have considered day-to-day variations and fluctuations in this variable (Hülshager et al., 2018; Tuckey et al., 2018). The current project will add to this strain of research by looking at state mindfulness, and its buffering and direct effect at the day-level, following the early notion from Brown and Ryan (2003) that within-individual variations in state mindfulness are rather high.

Thirdly, the findings of this study might generally help to extend theories and make them more applicable to a within-individual level. The methodological perspective of this study, by looking at within-individual relationships, could contribute to extending previous theories on work demands and personal resources such as the job-demands resources model (JD-R model). It has been argued that the motivational processes of the JD-R model are

dynamic and should be investigated on a day-to-day level (Schaufeli & Taris, 2014). This study aims to further add to research on the JD-R model by examining the health impairment process on a dynamic, day-to-day level. Besides that, more light could be shed on the ambivalence of time pressure as a variable that is related to positive as well as negative outcomes (Baetghe et al., 2018; Crawford et al., 2010).

Lastly, this study will further add to the general state of research on whether mindfulness as a resource may have beneficial effects in reducing strain outcomes. This could help address the issue of mental health problems induced by work stress. In turn, this could improve worker well-being while companies could reduce their costs towards sick leave. In a seminal review, it was noted that most studies finding beneficial effects of mindfulness were only using clinical samples (Glomb et al., 2011). Despite the field having evolved since then, some scholars still argue that further research using more sound methods is needed (Fisher et al., 2019; Good et al., 2016). Thus, this project aims to further add to the ecological validity of the findings. This could help to make practitioners and policymakers alert of important implications. If hypotheses are supported, one could argue for the need for more training offered to employees to induce state mindfulness and thus improve recovery.

Additionally, implications for workplace designs could be drawn to align with the notion that certain spaces may promote more mindful behavior (Good et al., 2016). As per the suggestion of the World Health Organisation, employers should not only focus on avoiding harm due to stress but also contribute to a work environment where health promotion is a priority (WHO, 2020). Becoming aware of the importance of facilitating recovery through certain states like mindfulness would thus be in line with this request.

Work Demands and Strain on Employees

To better understand how work demands are related to employee strain, several theories help to draw a complete picture. A prominent theory in organizational employee well-being literature is the effort-recovery model by Meijman and Mulder (1998). In this model, it is argued that when individuals are exposed to high work demands, the effort they need to expend to meet these demands is associated with acute load reactions. These load reactions could manifest as fatigue or an increased heart rate. The model claims that if there is a load reaction such as fatigue, individuals will avoid taking on new tasks (Meijman & Mulder, 1998; Zijlstra et al., 2014). If individuals are unable to fully recover from the load induced in their previous work unit, they will have to expend compensatory effort to continue to perform up to par. This will ultimately contribute to chronic load reactions that may impair health in the long run (Demerouti et al., 2009). While revisiting the effort-recovery model,

Zijlstra et al. (2014) underlined that the notion of load inducing *states* identifies the process of recovery as dynamic rather than static. This gives further support to the choice of our research model, investigating relationships within-individuals over several weeks.

Adding to the effort-recovery model, a further prominent theory explaining the effects of work demands on well-being is conservation of resources theory. It states that individuals try to conserve their resources, and any threat to these conservation efforts results in stress (Hobfoll & Shirom, 2001). Individuals experiencing a prolonged threat to their resources will experience a depletion of the latter, resulting in fatigue (Sonnentag & Zijlstra, 2006). Building upon the assumptions of conservation of resources theory and aiming to explain the stressor-strain relationship further is the JD-R model (Bakker & Demerouti, 2007). This model proposes two simultaneous processes: a health impairment process and a motivational process. In the health impairment process, when job demands are too high, employee resources may not enable coping sufficiently anymore. The motivational process happens when job resources foster employee engagement and extra-role performance.

To link this theory to the current project, the variable indicating job demands will be time pressure. Time pressure can act through both processes described in the JD-R model. On the one hand, it is characterized as a challenge stressor in the challenge-hindrance stressor framework (Rodell & Judge, 2009). That said, it may contribute to personal growth, mastery, and future gains through the motivational process (Bakker & Demerouti, 2007). Over short periods, time pressure has been associated with higher work engagement within-individuals (Baethge et al., 2018). However, these favorable effects did not hold up over the 6 weeks of the study as well as between-individuals (Baethge et al., 2018).

Until now, only findings of short-term positive effects of time pressure through the motivational process have been discussed. However, time pressure is also suggested to be related to strain outcomes through the health impairment process. Thus, the positive motivational outcomes seem to be concurring with the negative strain outcomes (Bakker & Demerouti, 2007; LePine et al., 2004). This ambivalence of time pressure as a work characteristic that can have both positive outcomes as well as negative outcomes has been further supported by Widmer et al. (2012). In the current project, the focus will be on strain outcomes of time pressure to underline the negative consequences of it further. Strain outcomes through the health impairment process will be indicated by measuring the variable fatigue. As discussed earlier in the scope of the effort-recovery model, fatigue has been defined as resulting from being active to meet work demands (Sonnentag & Zijlstra, 2006).

As established, work demands are thought to induce strain on individuals. Based on

the theoretical and empirical considerations, it is expected that time pressure will be positively related to fatigue. As this project aims to shed light on within-individual relationships with regards to work demands and recovery, this relationship will be investigated at the day level. Thus, the first hypothesis is:

H 1: Time pressure is positively related to fatigue at the within-individual level. On days with more subjective time pressure than usual, individuals will feel more fatigue.

Mindfulness and Fatigue: A Direct and a Buffering Effect

Considering past research findings on the effects of work demands on employee strain, one may attempt to find remedies that may buffer the impact on employee strain. Mindfulness has been found to improve employee well-being, job satisfaction, and even act as a buffer in the relationship between work demands and strain (e.g. Hülshager et al., 2013/ 2015; Fisher et al., 2018). Positive effects of mindfulness can also affect physiology, such as improving sleep quality and can even be pinpointed in the brain due to its neuroplasticity (Hölzel et al., 2010; Hülshager et al., 2014;). Thus, in this project, we will continue adding to the current state of research on the beneficial effects of mindfulness.

A distinction has been made between trait and state mindfulness (Brown & Ryan, 2003). Trait mindfulness is a naturally occurring personality trait that is somewhat stable across time. State mindfulness is a more fluctuating variable, varying greatly within individuals (Brown & Ryan, 2003). It may be induced through specific training such as mindfulness-based stress reduction, short mindfulness interventions, and potentially, surroundings, events, and further antecedents that are not fully known (Good et al., 2016; Hülshager et al., 2013; Querstret et al., 2017; Tuckey et al., 2018; Sutcliffe et al., 2016).

Considering organizational antecedents, there has been weak support of the notion that job experience, as well as organizational factors, may contribute to more mindfulness in individuals (Sutcliffe et al., 2016). However, a prominent part of research in the past has focused on investigating trait mindfulness or intervention studies inducing state mindfulness (e.g. Hülshager et al., 2013). Thus, the current project aims to acknowledge the natural day-to-day variations in mindfulness found in previous research. The differential effects of relationships of mindfulness from day to day on the stressor-strain framework within people will be investigated.

To better understand how mindfulness may exert its positive effects, scholars have taken into account different potential mechanisms. First of all, through decentering one's observations from interpretations when mindful, one uses experiential processing rather than conceptual processing (Good et al., 2016). This may result in a less threatening experience

with less worry and rumination, called cognitive decentering. The positive outcomes of mindfulness may be further explained through reduced automaticity (Good et al., 2016). The moment-by-moment awareness induced by mindfulness may reduce the speed of the stimulus-response link, giving more time to individuals to make a conscious decision about behavior. Thus, habitual response patterns would be interrupted, giving individuals more flexibility in responding to workplace stressors (Fisher et al., 2019; Glomb et al., 2016)

Working mechanisms of mindfulness go beyond cognitive decentering and the slowing down of the stimulus-response link. Mindfulness also enables individuals to focus their thoughts more on what is happening right now, rather than worry about what this might lead to in the future (Grover et al., 2017). This enables mindful individuals to face challenges more competently and autonomously (Hülshager et al., 2015). Moreover, mindfulness has been categorized as being a cognitive-emotional segmentation strategy (Michel et al., 2014). It may help individuals to shape boundaries more clearly and thus be a remedy for rumination, which is a critical factor in recovery (Michel et al., 2014; Querstret et al., 2017).

Lastly, mindfulness could be seen as a resource in the JD-R model (Grover et al., 2017). The model has been revised to include personal resources characterized as 'psychological characteristics or aspects of the self that are generally associated with resiliency and that refer to the ability to control and impact one's environment successfully' (Schaufeli & Taris, 2014, p. 49). Personal resources have been suggested to have a direct relationship with strain outcomes (Schaufeli & Taris, 2014). Thus, mindfulness will be categorized as a personal resource in this project. Lending further support to this notion, Grover et al. (2017) drew on the JD-R model in their study with nurses and found a negative relationship between mindfulness and strain outcomes. This negative relationship between mindfulness and strain outcomes has been established meta-analytically (Bartlett et al., 2019).

The following example aims to elucidate the hypothesized mechanism further. A person who is more mindful than usual on a given day, would feel less fatigued on this day for multiple reasons: First of all, the individual would be more aware of his needs and therefore tend to them quicker than on a day where he is less mindful (e.g. Hülshager et al., 2015). Further, cognitive decentering that comes with mindfulness would help the person decouple his experience from how he is feeling. His acknowledgment of experiencing straining elements in the environment helps him not automatically to react and thus would weaken the strain response he experiences (Grover et al., 2017). This mechanism is also suggested to be the underlying principle of why mindfulness interventions work in reducing strain (Hülshager et al., 2013).

Based on these considerations, the second hypothesis will investigate whether state mindfulness' day-to-day variations are negatively related to work strain outcomes, indicated by fatigue. Even though antecedents to state mindfulness are still not fully known, we are aware that it tends to vary from day to day while staying rather stable throughout the day (Hülshager et al., 2018; Tuckey et al., 2018). This further highlights the importance of investigating this variable on a day level. It is expected that on days where higher state mindfulness is experienced than usual, individuals will feel less fatigued.

H2: State mindfulness has a negative relationship with fatigue at the within-individual level. On days where individuals feel more mindful than usual, they will feel less fatigued.

Leading up to my third hypothesis, the vital contribution of categorizing mindfulness as a personal resource in the JD-R model will be further drawn upon. Besides being directly related to fatigue, mindfulness as a personal resource could act as a unique employee attribute. In turn, it may create a buffer in the relationship between job demands and adverse outcomes such as employee burnout or fatigue (Bakker & Demerouti, 2007; Fisher et al., 2017; Schaufeli & Taris, 2014). For example, a study with a large sample of nurses found a buffering effect of mindfulness on the relationship of work demands on strain (Grover et al., 2017). In part, this may be related to mindful individuals' focus on immediate job demands while filtering out extraneous job demands and utilizing job resources (Grover et al., 2017). Thus, mindfulness as a personal resource may enable individuals to use other available resources more effectively.

To better understand the proposed working mechanisms of mindfulness as a buffer, an example will be used. An individual that is more mindful than usual on a given day may recognize that he is experiencing time pressure sooner, due to the moment-by-moment awareness induced by mindfulness (Kabat-Zinn, 2003). The fact that this person is rather mindful on this day would also enable him to focus on utilizing job resources to meet the demands. The focus on solving the problem in the present moment, rather than ruminating and worrying about future implications may lead to more mastery in facing time pressures (Good et al., 2016; Grover et al., 2017). The buffering effect is further aided by the fact that mindfulness slowed down the stimulus-response link and gave time to the individual to make a conscious decision about coping, such as using job crafting (Demerouti, 2014; Good et al., 2016). Overall, improved self-regulation that comes with more mindfulness could help in finding a more adaptive coping response after identifying that one is stressed (Hülshager et al., 2015). Therefore, the more mindful individual experiencing time pressure would feel less fatigued than on a day where he experienced less mindfulness.

When investigating the hypothesized buffering effect of mindfulness on the relationship between time pressure and fatigue, within-person variance will be looked at. Based on the considerations until now, mindfulness is expected to buffer the relationship between time pressure and fatigue.

H3: Mindfulness acts as a buffer in the relationship between time pressure and fatigue at the within-individual level. The relationship between time pressure and fatigue will be less strong on days where individuals report to feel higher state mindfulness than usual.

Method

Participants

The participants in this study were recruited by a group of eight masters students of Work and Organisational Psychology as a part of their thesis project. Once the ethical commission of the Faculty of Psychology and Neuroscience at the University of Maastricht had reviewed and approved of the study, recruiting efforts were started (166-07-04-2016-S3). Each participant was informed that participation was voluntary and that one had the right to end participation at any time without giving a reason. Anonymity was ensured to participants.

Each student set out to recruit at least 60 participants from their network and through snowballing. Methods such as posting an invitation message on private as well as professional social media and approaching friends, relatives, and former colleagues through personal communication were used for recruiting. 588 people were contacted directly or reacted to social media posts, indicating an approximate response rate of 77%. However, an exact response rate can't be determined as it is not clear how many people participated without commenting on posts on social media or were recruited through snowballing. Additionally, response rates might have been influenced by the Covid-19 crisis as people working in jobs revolving around face-to-face interactions with clients such as waiting and teaching were not working during most of the data collection and thus, could not participate. Only people who worked four days a week for a minimum of four hours each were encouraged to partake in the survey. To further motivate people to complete the surveys regularly, participants had the chance to win financial rewards that increased depending on the number of daily questionnaires completed.

In total, 452 people completed the baseline survey. Out of the people completing the initial survey, 410 participants fulfilled the criteria for their diary data to be used. Cases were excluded if no diary questionnaires were completed. The final sample was rather international with participants from 19 different countries. Countries with the most participants were Germany ($n=141$), Greece ($n=79$), the United States ($n=45$), Belgium ($n=32$), the United

Kingdom ($n=31$), Canada ($n=15$), the Netherlands ($n=15$) and Italy ($n=13$). 26.6% of participants chose to respond to the questionnaire in German, and 73.4% responded to the questionnaire in English, indicating that not all German participants made use of the German survey.

In the sample, the mean age was 38 ($SD=12.9$). Out of the participants, 40.3% were male, and 59.7% were female. The average workweek the participants had was 39 hours ($SD=12.9$). On average, the participants worked 7.75 hours a day ($SD=2.6$). Participants were distributed among the following employment sectors: Human Health and Social Services (19%), Manufacturing (9%), Public Administration and Safety (7.6%), Real Estate Activities (1.2%), Financial Insurance Activities (4.1%), Accommodation and Food Service Activities (2.7%), Construction (4.1%), Arts, Entertainment and Recreation (6.6%) and Electricity, Gas, Steam and Air Conditioning Supply (2.9%). However, the most substantial part of the sample reported working in 'Other Service Activities' (21.2%) or 'Others' (27.6%).

The average tenure was 11.5 years ($SD=11.8$). Out of that, however, 100 participants had a tenure of ≤ 1 year. The sample was highly educated, with most participants holding a university degree such as a Bachelor (34.5%), Master (32.3%), or Ph.D. (6.9%). The other participants held a Secondary School Degree (7.7%) or High School Degree (18.5%). Two persons reported having no degree. Due to the Covid-19 crisis, more people than usual were working from home, and work contexts for many people had changed considerably.

Procedure

The study was set-up using online survey software 'Qualtrics'. Two questionnaires were used: a baseline questionnaire and a diary questionnaire. Both questionnaires were available in either English or German. Non-native speakers were asked to rate their level of fluency to decide whether their data can be used. After receiving information about the study, participants had the opportunity to access the baseline questionnaire through a link. First, informed consent was given. Participants were informed that the study aimed to investigate how work demands affect well-being over a more extended period.

The baseline questionnaire assessed demographic information and screened the inclusion criteria of the study, which were the minimum working hour requirements. Several questionnaires assessing different topics followed: a burnout scale, a challenge and hindrance stressor scale, as well as scales about autonomy, job insecurity, and neuroticism. Assessing the effects of the Covid-19 crisis, a newly developed scale was administered. Overall, the baseline questionnaire took around 10 minutes to complete. After having filled out this initial questionnaire, participants received their first daily diary questionnaire the following Monday

at 8 pm. These daily questionnaires were sent out at the same time from Monday to Friday for 6 weeks. Thus, there was a total of 31 measurement occasions.

The daily questionnaire took approximately 3 minutes to complete, which is in line with the recommendations of Reis and Gable (2000), stating that diary questionnaires should not exceed 5-7 minutes in length. It assessed challenge and hindrance stressors, psychological detachment, relaxation, work engagement, sleep duration, sleep quality, positive and negative affect, fatigue, state mindfulness as well as social media use. Four items assessing daily events regarding the Covid-19 crisis were used in the daily questionnaires. All scales were shortened to only a few items. This is an established practice in diary studies to make the questionnaires more feasible for participants to complete every day (Ohly et al., 2010).

Participants were encouraged to fill out the daily questionnaires before 3 am on the following day, at which point the timeslot to fill them out closed to avoid retrospective bias. Upon completion of the study, participants received a debriefing by e-mail as well as a summary of the studies purpose. Participants who won in the raffle were contacted and received their reward.

Measures

All measures used to answer this project's research question were derived from the daily diary measurements. Ratings for all three measures were indicated on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). A higher rating on the scale indicated a higher time pressure, higher fatigue, and higher state mindfulness reported by an individual on a corresponding day.

Time Pressure

To assess time pressure, the daily diary item 'time urgency' from the challenge and hindrance stressor scale developed by Rodell and Judge was used (2009). The item asks respondents to rate to what extent they agree to a statement. For time pressure, this statement is: 'Today, I have experienced severe time pressures in my work.' The mean time pressure across the 30 days ranged from 2.35 to 2.94 ($SD=1.17$ to 1.23).

Fatigue

Fatigue was assessed by the scale of Van Hooff et al. (2007). Respondents were asked to indicate their rating to the statement: 'Today, I feel fatigued.' The mean level of fatigue across the 30 days ranged from 2.58 to 2.92 ($SD=1.26$; $SD=1.23$).

State Mindfulness

State mindfulness was measured through a recently developed item by Hülshager and Alberts (submitted). The shortened version of this scale consists of three statements for which

individuals are asked to rate how much they correspond to how they felt at work on the present day. The statements are: 'I found it easy to stay focused on the task at hand', 'I quickly realized when my thoughts wandered off and brought my attention back to what I was doing' and 'I was only focused on what I was doing, nothing else.' The mean state mindfulness across the 30 days ranged from 3.30 to 3.56 ($SD=.85$; $SD=.82$). The reliability, as indicated by Cronbach's alpha for the state mindfulness scale, ranged from $\alpha=.64$ to $\alpha=.86$. It is generally said that reliabilities under $\alpha=.70$ are considered acceptable but moderate. However, Nezlek (2017) has argued, that while this may hold true for trait measures, more relaxed standards can be used when assessing within-individual reliability. Thus, scale reliability can be regarded as sufficient.

Statistical Analyses

Using the IBM Statistical Package for Social Sciences 24, Multilevel Analysis was conducted on the data. The dataset had a 2-level hierarchical structure, with the daily measurements of the variables of interest nested at the day level (level 1) and the cases nested within participants at level 2. The sample of 410 participants had a maximum of 30 daily measurement occasions. This sample size is sufficient to find robust effects in a diary study (Ohly et al., 2010). Finally, the predictors in the model were centered around the person mean to remove between-person variance and make the interpretation of within-person effects acceptable (Ohly et al., 2010).

Results

Descriptive and Preliminary Analysis

Table 1 shows the inter-correlations of the variables of interest. To establish whether multilevel modeling is justified, the intraclass correlation coefficient (ICC) of the dependent variable was examined. This measure shows how much of the total variance is attributable to between-persons differences. The ICC was calculated by computing an unconditional model with fatigue as the dependant variable with a random intercept. The ICC for fatigue at level 1 was .35, indicating that 65% percent of the variation in fatigue was due to within-person differences. Thus, multilevel analysis was justified, and hypothesis testing was proceeded (Bliese, 2000).

To proceed with hypothesis testing, the control variable age was entered in Model 1. Then, it was analyzed whether time pressure was related to fatigue in Model 2. Afterward, the relationship between state mindfulness and fatigue was assessed in Model 3. Lastly, in Model 4, 5, and 6, the interaction of time pressure and state mindfulness was built up in a stepwise

manner to test for the hypothesized moderation effect of state mindfulness. The improvement from one model to the next was evaluated by calculating the log-likelihood ratio difference test.

Table 1
Descriptive Statistics and Intercorrelations of Study Variables

Variable	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.
1. Age	37.9	12.97	-				
2. Gender	-	-	-				
3. Time Pressure	2.69	.852	-0.71**	-0.72**	—	.052**	.172**
4. State Mindfulness	3.40	.519	.200**	.111*	-.024**	—	-.295**
5. Fatigue	2.83	.781	-.193**	.093**	.260**	-.381**	—

Notes. Correlation below the diagonal are between-persons correlations, calculated from the aggregated person means across 30 days. Correlations above the diagonal are within-persons correlations. * $p < .05$; ** $p < .01$

Hypothesis Testing

Table 2 shows the results of the multilevel analysis. First, the control variable age was entered into the unconditional model to build Model 1. Model fit improved significantly ($\chi^2=(1) 73.69, p= 0.05; y= .01, SE= .00, t= -4.15, p= .001$). Hypothesis 1 proposed that daily time pressure would be positively related to daily fatigue. Thus, in Model 2, time pressure was included as a predictor to Model 1. The variable was entered into a random intercept-fixed slope model. The fit improved compared to the Model 1 ($\chi^2=(1) 5000.64, p= 0.05; y= .046, SE= .01, t= 3.39, p= .001$). The effect of time pressure on fatigue was significant. Thus, on days where individuals felt more time pressure than usual, they also reported feeling more fatigued, as predicted by hypothesis 1.

To test whether the hypothesized direct negative relationship between state mindfulness and fatigue can be found (hypothesis 2), state mindfulness was entered as a predictor to Model 1 to build up Model 3. The log-likelihood ratio of the random intercept-fixed slope model was compared to that of Model 1, and the result indicated an improved fit ($\chi^2=(1) 566.19, p= 0.05$). The effect of state mindfulness on fatigue was negative and significant, which confirmed hypothesis 2 ($y= -.34; SE= .02; t= -22.72; p= .001$). Therefore, on days where individuals reported having experienced more state mindfulness than usual, they felt less fatigued.

Hypothesis 3 predicted a buffering effect of state mindfulness on the relationship between time pressure and fatigue. To test this hypothesis, Model 4 was built up from Model

2 by first inserting state mindfulness and time pressure in a random intercept-fixed slope model. Fit increased over just one predictor ($\chi^2=(1) 398.10, p= 0.05$). As such, the variables were inserted in a random intercept-random slope model. The fit of Model 5 increased over that of Model 4 ($\chi^2=(2) 65.24, p= 0.05$). Lastly, to test hypothesis 3, the interaction term of time pressure and mindfulness was added to Model 6 in a random intercept-fixed slope model. Model fit did not increase significantly ($\chi^2=(2) -5.57, p= 0.05$). Furthermore, the effect of the interaction was not significant ($\gamma = .01, SE = .02, t = .803, p = .422$). Thus, hypothesis 3 could not be confirmed. State mindfulness could not be found to act as a buffer, weakening the positive relationship between time pressure and fatigue.

Exploratory Analysis

As the proposed moderation effect was not significant, in an attempt to explain these findings, time pressure was tested to evaluate if it may be related to experiencing state mindfulness. It has been proposed by earlier research that high workloads may inhibit feelings of state mindfulness as it limits energetic resources that are available (Hülshager et al., 2018). With time pressure being a challenge stressor like workload, the data was further analyzed to identify if a similar occurrence may have been possible.

State mindfulness was entered as the dependent variable in this model. The unconditional model was built up, and the ICC was .26, justifying multilevel analysis (Bliese, 2000). When entering time pressure as a predictor, in Model 1, the fit increased ($\chi^2=(1) 4154.10, p= 0.05$). Further, time pressure was a significant predictor of state mindfulness ($\gamma = .07, SE = .01, t = 6.836, p = .001$). However, as this relationship was positive, this does not help to explain further why hypothesis 3 was not confirmed.

Table 2
Multilevel Analysis of Fatigue

DV	Baseline Model			Model 1			Model 2			Model 3			Model 6		
	F			F			F			F			F		
Parameters	y	SE	t	y	SE	t	y	SE	t	y	SE	t	y	SE	t
Fixed Effects															
Intercept	2.81***	.04	73.81	3.27**	.12	28.23	3.30***	.12	26.26	3.27***	.12	28.25	3.32***	.12	27.04
Age				-.01***	.00	-4.15	-.01***	.00	-3.83	-.01***	.00	-4.12	-.01***	.00	-4.07
Time Pressure							.05***	.01	3.39				.08***	.02	4.98
State Mindfulness										-.34***	.02	-22.72	-.34***	.02	-15.83
Time Pressure* State Mindfulness													.014	.02	.80
Random Effects															
Residual	.92***	.02		.92***	.02		.89***	.01		.86***	.01		.79***	.02	
Intercept	.51***	.04		.49***	.04		.53***	.04		.48***	.04				
-2*LL	22391.29			22317.59			17390.36			21825.15			16932.61		
df				1			2			2			2		
Δ -2**LL	-			73.69***			5000.64**			566.19**			-5.57		
Δ df				1			1			1			1		

Notes: N= 410; y= estimate; * $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$

Discussion

The current project set out to investigate whether mindfulness can weaken the stressor-strain relationship between time pressure and fatigue and whether it may be directly related to fatigue. As mindfulness had in previous research been found to buffer negative effects of strain and be related to positive employee outcomes, this project aimed to add to and extend the state of research (Grover et al., 2017; Hülshager et al., 2013). To do so, a set of 30-day diary data was collected, and within-person relationships were analyzed. It was hypothesized that time pressure would relate positively to fatigue. Furthermore, state mindfulness was suggested to be negatively related to fatigue. Lastly, it was hypothesized that the relationship between time pressure and fatigue would be moderated by state mindfulness.

Discussion of Results

The first hypothesis was confirmed. Thus, on days where individuals experienced more time pressure than usual, they felt more fatigue. This is in line with previous research, examining the effects of time pressure on employee strain (Teuchmann et al., 1999). It also lends support to the JD-R model's health impairment process being applicable at a within-individual level. This extends Schaufeli and Taris' discussion on only the motivational process being supported by within-individual research (2014). It thus can help refine the JD-R model to also investigate day-level predictors of work strain and thus look more closely at employee well-being outcomes.

Furthermore, it lends support to the notion that time pressure does have negative outcomes on employees besides having positive motivational outcomes (Crawford et al., 2010). Having been categorized as a challenge stressor, it has been often regarded in a positive light, as it has been linked to increased work engagement and other motivational outcomes (Baetghe et al., 2018). However, it has been suggested early by Crawford et al. (2010), that even though particular challenging job demands may increase employee engagement, they should be carefully weighed against the strain outcomes they impose on employees. The present findings give further support to this notion. Adding to that, as suggested in the effort-recovery model, acute load reactions such as fatigue can lead to chronic load reactions if individuals are unable to recover (Meijman & Mulder, 1998). This can impair employee health in the long run. Thus, the finding that time pressure is positively related to fatigue point to important implications for work design that will be discussed later on.

As predicted by the second hypothesis, the relationship between state mindfulness and

fatigue was negative. This indicates that on days where individuals felt more state mindfulness than usual, they tended to feel less fatigue. Thus, this is in line with earlier research indicating that mindfulness is negatively related to strain outcomes (e.g. Bartlett et al., 2019; Grover et al., 2017). It also lends further support to the notion of state mindfulness as a personal resource in the JD-R model (Grover et al., 2017; Schaufeli & Taris, 2014). Besides, it extends previous research by showing a negative relationship between state mindfulness and fatigue on the day level. This is interesting, as it leads to the question about the direction of this relationship, which should be investigated by further research. It also gives important implications for policymakers and HR practitioners that will be discussed in the following section.

The buffering hypothesis was not confirmed. Thus, on days where individuals felt more state mindfulness than usual, they were not experiencing significantly less fatigue after being exposed to time pressure. This finding is in contrast to what has been found in previous research. While Fisher et al. (2019) found a buffering effect of mindfulness on the relationship between workload and strain outcomes, Grover et al. (2017) found that mindfulness could buffer the relationship of emotional demands on psychological stress. There are several possible explanations of why the results concerning hypothesis 3 of the present study were not in line with earlier findings. First of all, previous research has examined *emotional* work demands when investigating mindfulness as a buffer in the stressor-strain relationship (Grover et al., 2017). The reason for this choice of emotional demands was that mindfulness is -in essence- about awareness of one's emotions. Therefore, the mechanism induced by time pressure might be different from the mechanism caused by emotional demands. It can thus be hypothesized that even though mindfulness may buffer negative effects of emotional work demands on strain, this may not hold universally true for typical challenge stressors.

The second possible reason for not finding a significant buffering effect has been discussed by Fisher et al. (2019). The authors argued that when measuring the effect of a work demand that has a negative connotation to it ('severe time pressures'), those endorsing these items have already negatively appraised them. This negative appraisal would be likely to be related to a stronger strain reaction, with mindfulness having fewer chances of buffering this effect (Fisher et al., 2019). There is evidence of such a negative appraisal having taken place in the current project, with the significant negative zero-order correlation between overall state mindfulness and time pressure (Table 1).

Besides the previously mentioned reasons, the overall mean of time pressure in the

sample was rather low (Table 1). In previous research that found buffering effects of mindfulness, studies were conducted in samples that experience high levels of stress, such as nurses and police officers (Fisher et al., 2019; Grover et al., 2017). In research investigating time pressures in the frame of the JD-R model, mean values of time pressure were well above the present observed mean on a 5-point Likert scale. As such, Schmidt et al., (2015) observed a mean of $M=3.31$ while Syrek et al., (2013) observed a mean of $M=4.37$. As the observed mean value in this study is lower (Table 1), individuals may not have felt pressed for time very strongly on most days.

In a previous section, it was argued that there might have been a negative appraisal process for those strongly endorsing the item assessing time pressure. Those not endorsing this item strongly would perhaps not have negatively appraised it. Thus, the working mechanism of the buffering effect of state mindfulness, which is enabled by the awareness of experiencing time pressure, may not have been induced. The low levels of time pressure in our sample may have been since we used a convenience sample. Besides, as previously mentioned, the Covid-19 crisis led to irregular operations in many workplaces. Furthermore, our sample consisted of individuals with enough time to devote to a 30-day study. This may have led to self-selection of individuals having lower time pressure overall.

Besides the rather low levels of time pressure in the sample, it may also be that participants engaged in other coping strategies such as relaxation that affected the relationships. Even though there may be concerns about the levels of time pressure in the sample, the findings overall suggest that although mindfulness may be adaptive in some situations, it is not a universal cure for any kind of stressor. It may, however -as indicated by hypothesis 2- alleviate the effects stressors impose on us once they have occurred.

Practical Implications

The results of the present project can guide some important implications for practice. First and foremost, the finding that time pressure was negatively related to fatigue further highlights the notion that even though challenge stressors do have positive outcomes such as employee engagement, the negative consequences on well-being should not be disregarded. They should be carefully weighed when trying to increase challenging demands to improve performance or work engagement (Baethge et al. 2018, Crawford et al., 2010). Thus, employees should not be burdened with too much work to complete in too little time, leaving them with severe time pressures. Strain outcomes, such as fatigue, could likely contribute to the problem presented in the opening of this paper: rising sick leave times due to psychological problems and employees experiencing stress levels at which they feel unable to

cope (Wohlers & Hombrecher, 2016).

Besides reducing the amount of time pressure employees are exposed to, giving training to employees to improve their coping possibilities follows as an essential next step. The finding that state mindfulness and fatigue are negatively related on the day level highlights the importance of further efforts to promote mindfulness in the workplace. This can be done by providing mindfulness training, but also other methods such as providing 'mindful spaces' have been suggested (Good et al., 2016). Also, it is crucial to give enough time to employees to execute mindfulness exercises regularly to induce state mindfulness. The World Health Organisations' urge to policymakers and organizations to promote the health of employees, could be in part fulfilled by promoting state mindfulness in such ways (WHO, 2020). Less fatigued individuals will be more likely to exert further effort in their next work unit and thus likely provide improved performance (Meijman & Mulder, 1998). Therefore, employees, as well as organizations could benefit from bringing more state mindfulness to the workplace.

Limitations

Even though this study aimed to address certain methodological issues of cross-sectional designs by using a diary component assessing variables at the within-individual level, it does not come without limitations. First, as there was no time lag between predictor and outcome, no statement about causality or direction of effects can be made. Future research aiming to make these findings more precise could include a time lag between predictor and outcome variables.

Second, the fact that this project used the same self-report questionnaire for a 30-day period is likely to have introduced some common-method bias (Podsakoff et al., 2003). Even though, observations were made at the within-individual level with the predictor variables centered around the person mean, this only reduces between-person differences. In future research, concerns of common method bias could be further alleviated by using a cross-lagged design as well as using more objective measures (Ployhard & Ward, 2011). More objective measures could be having a supervisor or colleague rate certain variables for the participant or measuring physiological indicators of variables such as cortisol for stress.

As a third limitation, the fact that the diary questionnaire got sent out after work may have introduced some retrospective bias (Ohly et al., 2010). Even though the diary study itself, as well as the limited response timeslot from 8 pm to 3 am were implemented to reduce such bias, it may have still impacted responses. As such, the items assessing state mindfulness asked individuals to determine how their experience began with 'At work today...'. However,

as the items assessing time pressure and fatigue asked rather generally about the experience 'Today...!', they most likely were less affected by retrospective bias. Future studies could reduce retrospective bias by using an experience sampling design (Ohly et al., 2010).

Hampering the transferability of the results of this study, the data collection was undertaken during April, May, and June 2020, simultaneously with the pandemic outbreak of Covid-19. Study variables may have been affected in several ways. Fatigue may have been higher than usual during the time of the study, as individuals have been found to have worse sleep quality during the pandemic (Cellini et al., 2020). Additionally, it can be assumed that time pressure may have been affected, as many employees were unable to go about their usual work. Thus, the findings of this study need to be regarded in the context of these conditions.

Conclusion

In conclusion, the findings suggest that time pressure in the workplace is related to heightened fatigue within individuals. Furthermore, experiencing state mindfulness was related to lower fatigue. Thus, the results give the implication that time pressure should be limited as it may impact employee well-being negatively and that state mindfulness should be promoted as it may support employee well-being. As a buffering effect of state mindfulness was not found, future research should focus on investigating emotional demands, using items evoking less negative appraisal as well as investigating samples with higher levels of time pressure to extend this line of research.

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