

Short term effects of workload and extending working hours on exhaustion

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ABSTRACT

Employees exposed to high workload often compensate for this by extending their working hours. This diary study examines the relationship between workload, exhaustion, and two strategies for extending working hours: skipping breaks, and working longer than initially planned. The study analyses a sample of $N = 87$ employees and $N = 639$ measurement points with a multilevel structural equation model to investigate both within and between-person associations. The results showed that on days when the workload is higher than usual, participants were also more exhausted at the end of the working day. Also, the strategies skipping breaks and working longer were used more frequently on these days. However, there is no correlation between daily use of strategies and exhaustion. The study suggests analyzing the two strategies to extend ones working hours as separate constructs. On the between-person level, skipping breaks fully explains the association between workload and exhaustion. In the long run, this might have adverse effects on employees' well-being.

Keywords

Workload – exhaustion – self-endangering work behavior – extending working hours – skipping breaks – working longer

In the modern world of work, the demands on self-regulation are increasing. Employees are increasingly deciding when, where, and how long they work and how they take breaks (Messenger et al., 2017). When working from home, for example, it is very much up to the employees to make sure that they keep to their working hours and take breaks. Employees' choices on taking breaks and on working hours have an impact on both recovery during work and recovery after work. Longer working hours reduce recovery time after work. The current paper investigates two self-regulation strategies employees use to achieve their goals and analyses their associations between workload and exhaustion. The strategies describe two different ways of extending ones working hours. The development towards more self-regulation is supported by (1) a stronger organizational orientation towards goal achievement (e.g., results only work environment (ROWE)) and (2) by the technical possibilities for mobile-flexible working. While the technical possibilities are widely discussed as a component of digitalization in the world of work, the increased orientation towards goal achievement is less reflected in psychology

(Bal & Dóci, 2018). Therefore, we will focus more on this aspect in the following and discuss the ambivalent effects on the health and motivation of employees (e.g., Matta, 2015; Seitz & Rigotti, 2018).

In recent decades, leadership practices such as ROWE, objectives and key results (OKR), management by results (MBR), or management by objectives (MBO) have become more and more prevalent. This may well be because such practices promise higher productivity (Rodgers & Hunter, 1991). For employees, however, these practices mean that success or failure at work is closely linked to how far objectives have (or have not) been achieved. As a result, employees become responsible for their work performance, and economic data become the primary indicator of personal success or goal achievement. Hence, employees are rewarded for achieving their goals but face negative consequences in case of failure. This means that it is no longer enough for employees just to make an effort; goals must also be met. In other words, employees have to behave as if they were self-employed (Bauman, 2000; Peters, 2011; Pongratz & Voß, 2005). This has opposite effects: On the one hand, it means

that employees feel more committed to their goals and can decide for themselves how they want to achieve them: They have higher job autonomy. The job demands-resources theory by Bakker and Demerouti (2017) emphasizes that job autonomy is a significant job resource and may lead to higher motivation and engagement. At the same time, job autonomy may reduce the adverse effects of job demands on strain. Also, the job characteristic model (Hackman & Oldham, 1980) explains the positive relationship between job autonomy and motivation. Drawing on these models, we expect positive effects of these new ways of work on employees' motivation.

On the other hand, new managerial practices confront employees with specific demands; particularly with increased self-regulatory demands (Dettmers & Bredehöft, 2020). In order to meet the goals, employees have to make the right decisions and plan projects efficiently. Self-organization and self-discipline that are important for self-employed people become crucial for employees. Pressures and problems of the organization become the employees' problems (Kratzer & Dunkel, 2015). The responsibility for goal performance leads to pressure to succeed, with a consequence that employees experience a high workload and make unethical decisions (Welsh et al., 2019).

In recent years the way we work has also been changed by new information and communication technologies (ICT) (Demerouti et al., 2014). This digitalization of work brings in more flexibility in terms of time and place of work. Flexibility comes with opportunities and risks. It offers more flexible ways to arrange work and private life hours, which may, for instance, ease childcare responsibilities. Work-related ICT-use offers the possibility of working everywhere and everywhen and thereby extending the working hours substantially. Extended use for work-related ICT may also blur the boundaries between work and private life, increasing the demands on employees' self-regulation (Cooper & Lu, 2019).

To deal with the higher demands on self-regulation (e.g., boundary management), employees may well use strategies that potentially impact negatively on their health. Several strategies with which employees try to cope with increased demands, as well as higher flexibility, have been documented (Krause et al., 2012). On the one hand, these behavior patterns help employees to achieve their goals, but, on the other hand, they are detrimental to health and have been referred to as self-endangering work behaviors (Krause et al., 2015). Such behaviors represent a form of coping strategy with which to deal with heavy workloads and meet the high demands of self-organization (Dettmers, Deci, et al., 2016). Examples of such behaviors are working even when sick (presenteeism), consuming substances (for stimulation or recovery),

and intensifying working hours (e.g., working faster) (Krause et al., 2012).

To sum up: High autonomy and simultaneous pressure for success in combination with the opportunities of modern ICT that allow working almost everywhere and every time, facilitates the extension of working hours to deal with high work demands, i.e., workload. The strategy of extending working hours is highly prevalent in Swiss employees (Krause et al., 2018; Schulthess, 2017).

The positive correlation of workload with exhaustion was described by many researchers (Bowling et al., 2015). This relation not only applies to the between-person level but also to the within-person level (Demerouti et al., 2015; Pindek et al., 2019), meaning that on days when people have a higher workload than usual, they are also more exhausted after work than usual. As far as we know, little is known so far on the processes that might mediate such a relationship on the within-person level (Pindek et al., 2019).

Therefore, in the present study, we focus on the association between daily workload and exhaustion after a working day and the extension of working hours as a possible explanation for this relationship. Working longer is reflected by working unscheduled overtime, lacking sufficient recovery time, being always available for work-related issues, and reducing the time spent on family and private activities (Dettmers, Deci, et al., 2016; Dettmers, Vahle-Hinz, et al., 2016). The concept of extending working hours can be divided into two categories: (1) working longer hours and (2) working instead of engaging in leisure activities (Deci et al., 2016). The first of these categories, working longer hours, can manifest itself in different coping behaviors: For example, it can mean skipping breaks or working longer than planned. However, these two strategies are not necessarily related (Baethge et al., 2019), indicating that a person that uses one of the strategies not automatically uses the other strategy to the same extent. We, therefore, assume that these coping strategies should not be regarded as a shared construct but should be considered independently.

Of the several strategies of extending working hours, we investigate two concrete behaviors in this study. These two strategies might help to extend actual working time in order to get more done and are applicable during a working week: *Skipping breaks* and *working longer than initially planned*. Other strategies that are common to extend one's working hours, such as working during vacation (Fritz & Sonnentag, 2006) and working on weekends (Jamal, 2004), are not in the scope of the current study.

The first aim of the current study is to investigate the prevalence and patterns of these two strategies. In most existing studies, these strategies have been analyzed together as one strategy of extending working

hours (Krause et al., 2015). We are interested in the prevalence of the strategies and in personal preferences of using the two strategies.

Although these two strategies mentioned above might help employees to cope with the high demands at the workplace (at least in the short run), these strategies might well have a negative effect on their well-being. Despite not necessarily leading to the attainment of the goals, these strategies are often used by and considered to be typical coping behavior (Deci et al., 2016).

The two strategies *skipping breaks* and *working longer than initially planned* are a way of extending one's working hours. *Working longer than initially planned* extends hours spent at work and, at the same time, reduces hours spent in the private life domain. The reduced time investment in the private life domain may lead to increased work-family conflict (Adkins & Premeaux, 2012). Furthermore, fewer non-work hours may lead to fewer leisure activities that are beneficial for health, such as doing sports (Bakker et al., 2012). Non-work time is crucial for recovery from work and in the long run for staying healthy.

A break is a specific period within a working day during which there are no work-related tasks to be completed or during which an employee turns his attention away from work tasks (Hunter & Wu, 2016; Trougakos et al., 2008). The positive effects of taking breaks during work on recovery have been shown for decades (Kim et al., 2016). Besides the positive effects on recovery, breaks offer other benefits such as time for social contact with colleagues for communication and information exchange and foster performance and engagement (Kim et al., 2018; Kühnel et al., 2017).

Both strategies have in common that resources (i.e., time and energy) are invested in work goals. That leads to reduced recovery time. According to the effort recovery model by Meijman and Mulder (1998), effort leads to a need for recovery. Therefore, we assume a positive association with these daily work extending strategies and exhaustion at the end of the workday.

The second aim of the current study is to analyze associations between workload, the extending of working hours as self-endangering work behaviors, and exhaustion on the within-person level. Different strategies might have different effects on work-related well-being outcomes (Pindek et al., 2019): For example, the strategy to work longer may correlate more strongly with work engagement than the strategy to skip breaks (Baethge et al., 2019). Self-endangering work behavior strategies might mediate the harmful effects of high workload on subjective well-being, health, and work-related outcomes. We hypothesize that workload is positively associated with self-endangering coping strategies. Furthermore, we assume that self-endangering work behavior might partially ex-

plain the negative association between workload and exhaustion after a workday. We hypothesize that on days with a higher workload than usual, participants of our study will be more exhausted than usual after a working day. Also, we hypothesize that on days with a higher workload than usual, more of these strategies will be used, which partially explains the effect of daily workload on exhaustion. We, therefore, formulated three hypotheses:

Hypothesis 1: There is a positive association between daily workload and exhaustion after a workday.

Hypothesis 2: The positive association between daily workload and exhaustion after a workday is partially explained by skipping breaks.

Hypothesis 3: The positive association between daily workload and exhaustion after a workday is partially explained by working longer than planned.

1 Method

1.1 Sample and procedure

We collected data from 120 employees in Switzerland during two working weeks. Data were assessed via smartphones in a daily diary study on workdays over a period of 2 weeks. A first online questionnaire gathering sociodemographic data as well as some context data was followed by a 2-week daily diary phase. Participants had to answer a questionnaire at the end of each workday. On each workday, we assessed the workload, the use of the two self-endangering work strategies (i.e., *skipping breaks*, *working longer than planned*) and the level of exhaustion after work.

Recruitment took place via personal contact on the one hand and via social media on the other. This procedure resulted in a total of 1.034 data points from 120 employees. We eliminated data if the participants did not fill out the daily questionnaire within one hour after finishing their work to prevent outcome variables from being influenced by leisure activities. Furthermore, we kept only participants who completed five or more daily questionnaires (Bolger & Laurenceau, 2015). As a result, we analyzed 639 observations from 87 individuals.

Of this $N = 87$ employees, 42 were female (48 %), mean age was 36.49 years ($SD = 10.97$, range = 20-64).

1.2 Measures

Due to the study design using daily questionnaires, items had to be kept to a minimum. Self-endangering working strategies were assessed with the following

items adapted from Krause et al.'s subscale *work extension* (Krause et al., 2015):

Self-endangering work behavior 1, *skipping breaks* reads: „Today, during my work I did skip breaks or shortened them significantly.“

Self-endangering work behavior 2, *working longer* reads: „Due to high workload, I worked longer hours today.“

Daily exhaustion was assessed with adjectives from the shortened mood scale from McNair, Looor, and Droppelman (McNair et al., 1971), a sample item reads: „After today's work day, I feel exhausted“. Daily workload was assessed with the German version of the Quantitative Workload Inventory from Spector and Jex (Spector & Jex, 1998). A sample item reads: „I did not have enough time for all my tasks.“

For all scales answering options reached from 1 „applies not at all“ to 5 „fully applies“.

1.3 Statistical analysis

As we were interested in mediation analysis with nested data, we decided to conduct a multilevel structural equation model (MSEM) (Preacher et al., 2011) using Mplus (Version 8).

To distinguish the used variables, we conducted a multilevel confirmatory factor analysis (MCFA). MCFA, unlike single-level CFA, allows researchers to include the two levels of data simultaneously (Dyer et al., 2005). To confirm our hypothesized latent variable factor structure, we conducted the MCFA following the procedure proposed by Dyer et al. (2005). We treated each of the two strategies as a separate factor, which is allowed when the used items measure concrete and distinctive behavior (Petrescu, 2013) as it is the case in our study. We modeled all the factors at both the within-level and the between-level. Our proposed model showed a good fit [$\chi^2(20) = 28.367$, $p < .001$, comparative fit index (CFI) = .992, Tucker Lewis index (TLI) = .982, root mean square error of approximation (RMSEA) = .026, standardized root mean square residual (SRMR) (within) = .020 and SRMR (between) = .041].

Table 1: Means, standard deviations, and correlations.

Variable	M_w	SD_w	M_b	SD_b	ICC(1)	1	2	3	4
1. Workload	2.44	1.05	2.45	0.78	0.49	-	.35**	.49***	.76***
2. Exhaustion	3.06	0.99	3.07	0.67	0.37	.33***	-	.51***	.25*
3. Skipping breaks	2.23	1.40	2.24	0.95	0.40	.41***	.36***	-	.55***
4. Working longer	2.39	1.51	2.42	1.00	0.35	.64***	.27***	.39***	-

Notes: Within level $N = 639$, between level $N = 87$; correlations below the diagonal are within level, above between level. w = within level, b = between level. ICC(1) = intraclass correlation (proportion of the between-person variance compared with the total variance).

2 Results

Means, standard deviations, ICC(1)s, and correlations of all the measures used in the study are presented in table 1. Working longer correlates with skipping breaks on the within and the between level. To reflect the multilevel structure of the data, two-level alpha was calculated (Geldhof et al., 2014). The scale for workload appears to be more reliable between person [$\alpha = .899$, 95 % CI (.848, .950)] than within person [$\alpha = .771$, 95 % CI (.722, .820)]. The scale for exhaustion also is more reliable on the between-level [$\alpha = .877$, 95 % CI (.797, .957)] than on the within-level [$\alpha = .688$, 95 % CI (.615, .750)].

To decide whether a particular strategy was conducted on a day and thus find out more about prevalence, we recoded the answers to the two strategies as follows: If the answer was „does not apply“, we coded the answer with 0, meaning the strategy was not used on this day. In all other cases we coded the answer with 1, meaning the strategy was applied to a certain degree on this workday. Descriptive analyses show that on 355 of the 639 days (55.6 %), the strategy *skipping breaks* was applied and on 358 of the days people did *work longer than planned* (56.0 %). We can therefore say that in the current sample the strategies *skipping breaks* and *working longer than planned* were used about equally often.

We are interested if people use the two strategies in different ways, e.g., if there are differences in the preference for the two work extension strategies. 9 participants used on 0 to 20 % of their working days at least one of the two strategies. 9 participants on 21 to 40 %, 7 participants on 41 to 60 %, 22 participants on 61 to 80 % and 40 participants on 81 to 100 % of the workdays. These results suggest that people differ in the way they use the two strategies.

Results of the multilevel structural equation model are presented in figure 1. We used Preacher et al.'s (2010) M-Plus syntax for a 1-(1-1)-1 mediation with random intercepts and fixed slopes to fit our mediation model. As presented in figure 1 we modelled all

relationships between the variables on both the within-person and the between-person level. Our proposed multilevel model showed good data fit [CFI = .995, TLI = .990, RMSEA = .017, SRMR (within) = .018, SRMR (between) = .038].

We expected a positive association between daily workload and exhaustion after the workday (H1). This relationship is shown in the data ($B = .54, p = .001$), and hypotheses 1 therefore supported. On the within-person level, we expected the positive association between workload and exhaustion after a workday to be partially explained by the two strategies skipping breaks (H2) and working longer (H3). Workload and skipping breaks are related ($B = .60, p < .001$), but skipping breaks and exhaustion are not ($B = .05, p = .278$). There is no indirect effect of skipping breaks on exhaustion [.03 (CI = -.02 to .08)]. Thus, hypotheses 2 is rejected. Workload and working longer are related ($B = .97, p < .001$), but working longer and exhaustion are not ($B = .06, p = .175$). There is no indirect effect of working longer on exhaustion [.06 (CI = -.02 to .14)]. Thus, hypotheses 3 is rejected.

5 Discussion

In the modern world of work, the demands on self-regulation are increasing. Employees assume responsibility in achieving goals and in dealing with the amount

of work involved. A precise understanding of coping strategies for dealing with high workloads and their effects, for example, on recovery and exhaustion, is necessary.

We were able to show that at least two strategies can be distinguished when dealing with high workloads: *skipping breaks* and *working longer than initially planned*. Individuals differ in the extent to which they use the two strategies. Most of the study participants used at least one of the two strategies on almost each workday, while for a minority the strategies are rather the exception.

It is necessary to distinguish between different strategies for dealing with a large amount of work. We suggest that the two strategies have different predictors and different effects. Even if it is specifically about the extension of working time in the context of a high workload, it is worth making a precise distinction. We should, therefore, regard *skipping breaks* and *working longer than initially planned* as separate concepts and examine connections with workload and well-being in a differentiated way. For the first time, these strategies were recorded separately in a diary study.

With regard to the connection between workload and exhaustion, the first hypothesis was confirmed. There is a positive association between daily workload and exhaustion after a workday. The mediation hypotheses on the within level have not been supported. Although on days with a high workload, the study

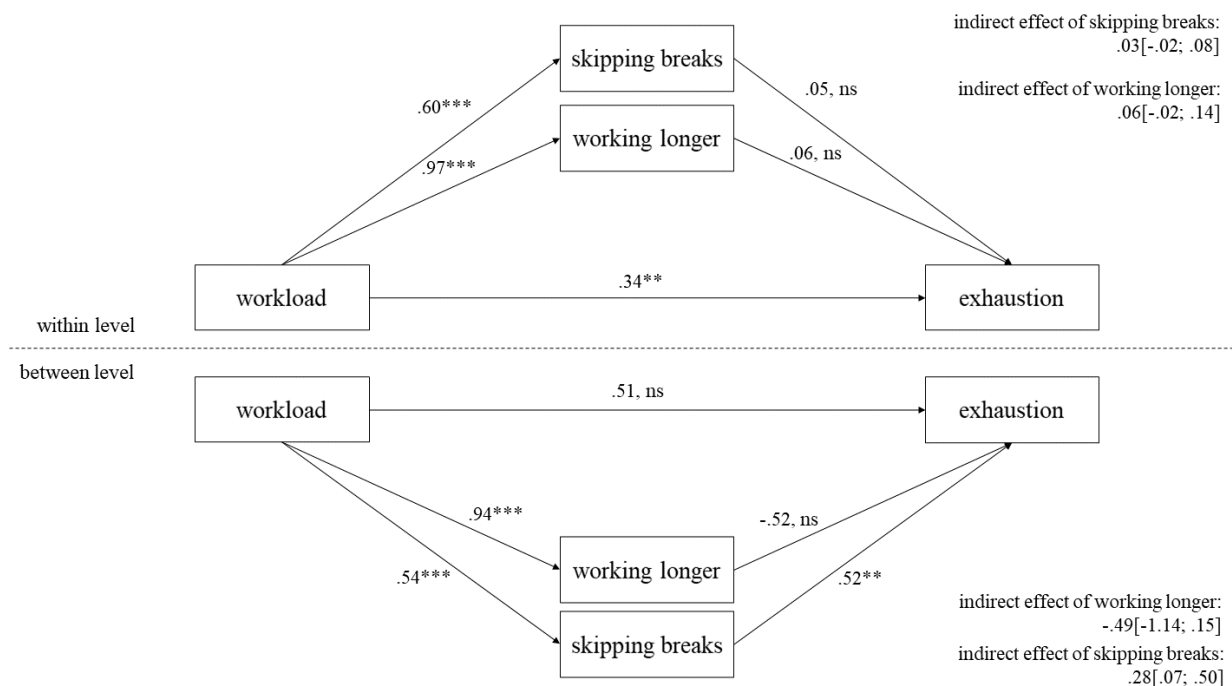


Figure 1: Results of the multilevel structural equation model. Within level $N = 639$, between level $N = 87$; values are unstandardized; values in square brackets represent 95 % confidence interval of indirect effects (Monte Carlo method). * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed).

participants reported, as expected, that they were more likely to avoid breaks and work longer than planned. Neither strategy is related to exhaustion at the end of the working day. Therefore, no mediating effect could be shown in this study. Strategies such as *skipping breaks* do not mediate the effect of high workloads on exhaustion when we consider the within effects. Although on days with high workload, employees skip breaks and work longer hours, and this is not associated with exhaustion that day. It was shown in research on challenge-hindrance stressor framework, that time pressure had a positive short-term effect on work engagement (Podsakoff et al., 2007; Schmitt et al., 2015). When there was increased time pressure over a more extended period, the effect on work engagement became negative. In the short term, time pressure is considered a challenging effect, while in the long term, it is seen as a hindering effect (Baethge et al., 2018). The two strategies examined in this study may have a similar relationship with exhaustion: There is no short-term association because the negative effect of strategies like working longer on exhaustion only becomes apparent after a specific time, i.e., more than two weeks. This is congruent with the results of the meta-analysis of Pindek et al. (2019) that suggest that strain effects might take some time to fully manifest.

Nonetheless, more workload went hand in hand with more exhaustion also on within level. There may be other strategies and processes that need to be considered and which mediate the effects. A more detailed examination of the work-related cognitions can provide answers here (Sonnentag & Fritz, 2015). Michel et al. (2016) showed that threatening emotions like fear could worsen recovery experience. Work-related worries are positively related to exhaustion (Casper & Sonnentag, 2020).

Remarkable is a finding that was not in the focus of our study and refers to between level: Skipping breaks is particularly important to understand the effects of workload on exhaustion. The higher the workload over the study period, the more employees use the strategies working longer and skipping breaks. On the between level, the strategy skipping breaks fully mediates the association between workload and exhaustion in this study. In other words, employees with higher workload over the study period used the strategy skipping breaks to a higher extent, which explains the association between workload and exhaustion. The skipping of breaks seems to be a typical strategy, especially when dealing with high workloads, which in turn is associated with higher exhaustion. It is a well-known phenomenon that breaks are often taken too late when there is a high level of personal responsibility, for example, in the case of working in the field or working from home (Degenhardt et al., 2014). Recently, Bosch

and Sonnentag (2019) have shown that breaks are not taken when they are needed for recreation, but rather as a reward. On the other hand, the positive effects of breaks on health are very well documented (Sianoja et al., 2016).

Sonnentag (2018) classifies this as recovery paradox. Especially under time pressure, we need rest and breaks, but we still do without these recreational activities. We propose to better understand the recovery paradox by looking at the dark side of active coping strategies. Our study shows that employees use active (respectively problem-oriented, promotion-focused) coping strategies to cope with the stressor of a high workload. To skip breaks or to work longer is an active attempt to reduce the work amount. Even if the amount of work can be classified as a challenge stressor comparable to time pressure, which has positive effects on motivation and commitment, negative effects on health dominate (Mazzola & Disselhorst, 2019). The dark side of active coping is a blind spot in coping research. In general, active strategies are supposed to have a positive impact on health (Zhang et al., 2019). Nevertheless, there are active strategies, that are bad for health: We name it self-endangering work behaviors (Dettmers, Deci, et al., 2016; Krause et al., 2015). Sociological approaches help to understand the ambivalent effects of modern forms of work that emphasize employees have to behave as if they were self-employed (Peters, 2011; Pongratz & Voß, 2005). As a result, employees go beyond their performance limits by using active strategies such as extending working hours in order to be successful.

In view of this trend respectively higher personal responsibility, it is also necessary to look at health-promoting and performance-enhancing strategies, which can be expanded in the course of training and encourage self-care. For example, prioritizing and setting boundaries can have positive effects. Such strategies can be used not only individually, but also together in teams (Krause et al., 2017).

We recommend that future diary studies take into account the two strategies considered when referring to work extensification.

3.1 Limitations

A weakness of our study was the lack of explicit consideration of work-related cognitions (e.g., detachment or work-related worries). Abstaining from recording work-related cognitions may make it more challenging to understand the processes leading to exhaustion in diary studies.

A second limitation concerns the operationalization and the number of measurements. We used only one measurement point per day right after work. Exhaustion at bedtime or in the morning would also have

been interesting and might better explain associations between working during leisure and exhaustion. The strategies were assessed only with one item. We recommend the development of an instrument in which the coping strategies *skipping breaks* and *working longer than initially planned* are measured with at least three statements each.

3.2 Strengths

Daily diary studies allow to look at within-person associations. It has been confirmed that the relationship between workload, coping and exhaustion is different depending on whether we consider within or between effects.

Skipping breaks and *working longer than initially planned* are separate concepts. For the first time, these strategies were recorded separately in a diary study. The results speak in favor of a more detailed analysis of health-promoting versus self-endangering coping strategies for dealing with a high workload.

Strategies like skipping breaks may not be critical to health when they are used as a rare exception. But when a high workload is a permanent state, these strategies are used too often and mediate the connection of workload and exhaustion. In the long run, skipping breaks lead to more time being spent working and less recovery time, which may possibly lead to higher exhaustion and to a reduction in subjective well-being after work.

4 Conclusion / Practical implications

A close look at strategies in dealing with high workload might help to understand the recovery paradox (Sonnentag, 2018) and to develop new interventions and trainings to promote self-regulation. In training courses, employees should reflect on and develop their individual strategies. Here, it is essential to promote conscious reflection so that employees think about how they typically deal with a large amount of work and why they may exhibit health-critical behavior. For example, it is not sufficient to point out the high importance of breaks. Employees must also reflect on why they do not take breaks, what the advantages and disadvantages are, and whether they are willing to change their behavior.

Also, an exchange on strategies promotes the development of common strategies in working teams (Krause et al., 2017). A further implication concerns leadership behavior. In the meantime, the effect of management behavior on the health of employees has been well documented (Franke et al., 2014). Exemplary behavior by managers in dealing with their own health and in dealing with stress at work has a positive

effect on their employees. It is, therefore, worthwhile in companies for managers to consciously deal with a high workload, at least if they rely on motivated and healthy employees (Kelly & Moen, 2020). Top management, lower management, and employees must understand that a high workload has adverse effects on health in the long run, for example, because they then increasingly skip breaks. We, therefore, need open, joint communication in companies in times of high workload.

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