








Research paper

Associations between work overload, prolonging working hours, calling and exhaustion: Longitudinal evidence in a teacher sample

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ABSTRACT

Exhaustion in teachers is a widespread phenomenon, but longitudinal studies that examine both personal and situational risk factors longitudinally are rare. This study investigated the relationship between work overload, prolonging working hours, calling and exhaustion among teachers in Switzerland ($N = 385$). We conducted a secondary analysis using data from a larger longitudinal study and applied structural equation modelling across three measurement waves. Results indicated that prolonging working hours (PWH) predicted higher exhaustion six months later. No support was found for an effect of work overload on exhaustion nor for a mediating effect of prolonging working hours on exhaustion. Furthermore, calling was not associated with prolonging working hours, nor did it buffer the negative impact of work overload on exhaustion. The findings highlight the potential of early intervention in monitoring and addressing PWH in teachers and add to our understanding of calling as a potential double-edged sword.

1. Introduction

Nowadays, the profession of teaching comes with a multitude of requirements in addition to the core task of classroom instruction. Apart from teaching and preparing classes, teachers deal with various administrative tasks, meetings with school collaborators and parents, substitute teaching due to teacher shortages, conflict resolution, reorganizations due to structural and curriculum reforms, and familiarization with new technologies (Lauermann, 2014). It is therefore not surprising that exhaustion in teachers is a common phenomenon. Meta-analytical evidence suggests that around 29% of teachers exhibit pronounced levels of exhaustion (Agyapong et al., 2022) and that during the Covid-19 pandemic, every second teacher reported experiences of burnout (Ozamiz-Etxebarria et al., 2023). Exhaustion refers to “physical and psychological fatigue” (Kristensen et al., 2005, p. 197) that is experienced by individuals. It encompasses emotional exhaustion, which is considered a key component of burnout alongside reduced personal efficacy and depersonalization or cynicism (Maslach et al., 2001).

Initial evidence suggests that levels of emotional exhaustion may be

higher in teachers than in other professions (Van Droogenbroeck & Spruyt, 2015). In teachers, exhaustion is associated with a wide range of adverse outcomes, such as lower self-efficacy (Dicke et al., 2015; Kim & Burić, 2020), more turnover intentions (Rajendran et al., 2020) and more ruminative responses (Bianchi et al., 2016). Additionally, teacher exhaustion is associated with unfavourable student-level outcomes such as lower subsequent student motivation (Shen et al., 2015) as well as worse teacher-student relationship quality and literacy skills (Hoglund et al., 2015). Given the prevalence and concomitants of exhaustion, it is crucial to examine risk factors and underlying mechanisms of exhaustion in teachers to refine corresponding preventive and intervention approaches.

1.1. The job demands-resources (JD-R) theory

A well-established framework that allows to scrutinise risk factors of exhaustion in the occupational context is the job demands-resources theory (JD-R; Bakker & Demerouti, 2024). The JD-R theory is a well-established job design theory that aims to explain how work characteristics – *job demands* (e.g., high workload, time pressure, or

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emotionally demanding interactions with others) and *job resources* (e.g., autonomy, feedback, supervisor support, or participation) – impact employee engagement and exhaustion (Bakker & Demerouti, 2007; Demerouti et al., 2001; Van Droogenbroeck & Spruyt, 2015).

As one of its core propositions, JD-R theory posits that work characteristics affect employee well-being through two distinct psychological processes (Bakker & Demerouti, 2017). In the health-impairment process, it is proposed that job demands lead to exhaustion by depleting employees' emotional, cognitive, and physical resources. In contrast, in the motivational process, it is assumed that high job resources lead to work engagement by exerting motivational influence (Bakker et al., 2014). Both pathways may consequently impact important individual (Zhou et al., 2024) and organizational outcomes such as absenteeism, performance, and turnover intention (Bakker et al., 2014; Van Droogenbroeck & Spruyt, 2016).

Cross-sectional and as well as longitudinal studies have supported the notion of these two pathways across different occupations (Bakker & Demerouti, 2017; Bakker et al., 2023; Mijakoski et al., 2022), also within a teaching context (Baeriswyl et al., 2021; Lesener et al., 2019; Sandmeier et al., 2022). For example, a recent meta-analysis correlated several JD-R-related factors with teacher wellbeing – including burnout – (Zhou et al., 2024), and a systematic review identified over 50 studies that adopted a JD-R perspective in researching teacher resilience (Lu et al., 2024). We thus consider the JD-R framework, particularly the health impairment process, suitable for the study of putative risk factors for teachers' exhaustion.

Despite the existing body of research investigating exhaustion in teachers from a JD-R perspective, three important research gaps remain. First, the understanding of the temporal nature of the health impairment process is still limited (Hatch et al., 2019). From a theoretical viewpoint, it seems clear that exhaustion (as a consequence of job demands) will build over time. Less clear, however, are the specific time lags in which those changes take place (Guthier et al., 2020). Initial evidence suggests that job demands predict well-being both in the short term (i.e., days and weeks, Basinska & Gruszczynska, 2020) and over longer periods of time (i.e., months and years, de Beer et al., 2016). For example, in a diary study, Simbula (2010) found that daily fluctuations in teachers' job demands predicted day-level-exhaustion, while another study showed that job demands predicted exhaustion over a period of three years (Hakanen et al., 2008). Within the teaching context, the number of studies investigating time lagged effects of job demands on exhaustion remains small, with many studies relying on cross-sectional designs (e.g. García-Arroyo & Osca Segovia, 2019; Hakanen et al., 2008; Zhai et al., 2025) While such designs fall short of providing information about the time frame in which the health-impairment process unfolds, they also do not allow to assess potential causal risk factors, but only concomitants (Kraemer, 1997). Thus, more longitudinal research is needed to deepen the understanding of the role of job demands as putative risk factors in the health-impairment process in teachers.

Second, the underlying mechanisms linking job demands to exhaustion warrant further investigation (Bakker & De Vries, 2021). Preliminary evidence suggests that coping style plays an important role in the development of exhaustion in teachers (e.g. Antoniou et al., 2013; García-Arroyo & Osca Segovia, 2019). To advance this line of research, more studies are needed that move beyond broad coping styles (e.g. reactive vs. proactive, Bermejo-Toro et al., 2016; problem-focused vs. emotion-focused, Pogere et al., 2019) and examine the effects of specific coping strategies in greater detail.

Third, it is important to consider the moderating role of personal factors in the health-impairment process. The “person x situation approach” (Bakker et al., 2023, p. 37) relies on the assumption that both job demands and personal factors – such as personality traits or beliefs – contribute to emotional exhaustion, and scholars call for more research examining the potential moderating effects of such factors (Bakker et al., 2023). In teaching contexts, personal beliefs such as self-efficacy (Arvidsson et al., 2019) and sense of calling (Zhao et al., 2022) have

been proposed as important factors in the health-impairment process. To advance the understanding of the health impairment process in a teaching context, the aim of this study is to investigate long-term time lagged effects of job demands (i.e. work overload), individual behaviour (i.e. prolonging working hours) and beliefs (i.e. sense of calling) on exhaustion, thereby adopting a longitudinal process oriented as well as a “person x situation approach”.

1.2. Work overload and subsequent exhaustion

One job demand that has received particular interest as a putative risk factor for exhaustion in teachers is excessive workload or work overload (Kokkinos, 2007; Schaufeli & Bakker, 2004; Skaalvik & Skaalvik, 2010; for a review of longitudinal studies, see Mijakoski et al., 2022). Work overload refers to the perception that the requirements for completing work tasks surpass one's available resources, particularly regarding time and energy. As such, work overload is often conceptualised as increased time pressure and/or quantitative demands (Baeriswyl et al., 2021; Skaalvik & Skaalvik, 2018). In contrast to workload, which usually manifests as a challenging demand, work overload can be understood as a hindering job demand as it interferes with goal achievement by creating an imbalance between necessary and available resources (Van Den Broeck et al., 2010). In line with JD-R theory, higher workload has repeatedly been shown to be associated with higher exhaustion in teachers (Bettini et al., 2017; Dorman, 2003; Santavirta et al., 2007; Van Droogenbroeck et al., 2014; for meta-analytical evidence, see Alarcon, 2011; Bowling et al., 2015).

First prospective studies demonstrate that the association between work overload and subsequent exhaustion can be observed over several months (Barbier et al., 2013; Prieto et al., 2008; Vera et al., 2012). Extending these findings to a larger temporal scale, a study by Sandmeier and colleagues (2022) found that higher levels of work overload were associated with higher levels of exhaustion one year later, and this association remained when controlling for initial levels of exhaustion. These findings suggest that work overload may act as a long-term predictor of exhaustion, reflecting its capacity to persist as a chronic job demand. Bakker and Demerouti (2024) argue that with continuous exposure to adverse job demands (such as work overload), chronic exhaustion states may arise and persist for a longer time span. When work overload is carried over time because “the pile of tasks” cannot be minimised, work overload can become such a continuous exposure. Preliminary evidence supports this assumption: job demands such as time pressure show substantial temporal stability over three years (30-35% of variance; Brauchli et al., 2013). Consistent with this, longitudinal studies have found that time pressure predicted increased emotional exhaustion almost two years later (Feuerhahn et al., 2013), that higher work strain is linked to larger increases in exhaustion over the subsequent 18 months (Fan et al., 2019), and that the strongest associations between job demands and exhaustion might be observed after almost four years (Guthier et al., 2020).

Based on these considerations, we expect work overload to predict exhaustion over a long-term period and formulate our first hypothesis.

Hypothesis 1. Work overload is positively associated with subsequent exhaustion.

1.3. Prolonging working hours as a mediator between work overload and exhaustion

In addition to examining the direct relationship between work overload and exhaustion over time, we investigate the (maladaptive) coping strategy of prolonging working hours (PWH) as a potential mediator. PWH encompasses behaviours such as working on weekends or during vacation, omitting rest breaks and working long hours (Dettmers et al., 2016). As such, PWH is an example of self-endangering work behaviour, which describes coping strategies aimed at overcoming

excessive job demands such as work overload in the short term (Dettmers et al., 2016; Mülder et al., 2021), but that favour adverse health outcomes if employed in the long term (Dettmers et al., 2016; Krause et al., 2012). For example, if individuals aim to tackle work overload by working longer hours, less time remains for mental and physical recovery, fostering higher levels of exhaustion (Baeriswyl et al., 2021; Hockey, 1997).

PWH is a common coping strategy in the teaching profession (Hoefsmitt & Cleef, 2018). In a British study, 91% of school leaders reported to often work extra hours, while 74% gave up leisure activities in favour of work and 63% sacrificed sufficient sleep (Marchant et al., 2024). In line with the notion of a maladaptive strategy, prolonging working hours has been associated with higher levels of emotional exhaustion in teachers (Baeriswyl et al., 2021; Sandmeier et al., 2022). Sandmeier and colleagues (2022) provided initial evidence that PWH may mediate the association between work overload and exhaustion. Specifically, this study showed that work overload was associated with higher PWH 12 months later which itself was associated with higher concurrent exhaustion. As recovery impairments imposed by PWH may be buffered by existing resources, thereby delaying the development of exhaustion, it is plausible that an increase in exhaustion following PWH will also be observed after a few months. Therefore, we propose that prolonging working hours contributes to the health impairment process by mediating the relationship between work overload and exhaustion.

Hypothesis 2. Prolonging working hours mediates the positive association between work overload and subsequent exhaustion.

1.4. Calling as a potential double-edged sword

We further examine sense of calling as a personal factor that may help to better understand the association between work overload and exhaustion, thereby extending our reasoning to include a “person x situation perspective”. Calling “reflects seeking a sense of overall purpose and meaning and is used to help others or contribute to the common good, motivated by an external or internal summons” (Duffy et al., 2018, p. 426). Calling has long been regarded as explicitly positive, with studies demonstrating its associations with a wide range of desirable individual and organizational level outcomes such as higher work engagement (Ehrhardt & Ensher, 2021), job satisfaction (Duffy et al., 2013), career commitment (Duffy et al., 2014), organizational embeddedness (Muehlhausen et al., 2023) and lower turnover intentions (Esteves & Lopes, 2017).

Recently, however, potential negative effects of calling have received increasing attention in research (Cardador & Caza, 2012; Dobrow et al., 2023). This line of research feeds on the notion that calling might be a “double-edged sword”, fostering beneficial as well as detrimental work- and health-related outcomes (Hirschi et al., 2019). In their Work as a calling theory, Duffy and colleagues (2018) argue that a sense of calling may be linked to negative outcomes such as burnout and workaholism because individuals with a sense of calling are vulnerable to overinvestment in their work. Preliminary evidence from quantitative (Creed et al., 2014; Keller et al., 2016) as well as qualitative studies (Duffy et al., 2012) supports this claim. Within a teaching context, however, research examining negative effects of calling is scarce, and to the best of our knowledge, no study so far has investigated calling as a potential double-edged sword in teachers. A better understanding of the complex and potentially ambivalent nature of calling is warranted given that calling seems to be a common experience in teachers (Bullough & Hall-Kenyon, 2012). To close this gap, we examine beneficial as well as potential negative effects of calling.

For a potential negative effect, we argue that calling might be positively associated with prolonging working hours. For instance, Bunderson and Thompson (2009) found that a sense of calling helped zookeepers find meaning and significance in their work, whilst also increasing the sacrifices they made in terms of pay and personal time. In

line with that, another study showed that a sense of calling motivated church ministers to work longer hours, subsequently impairing detachment from work (Clinton et al., 2017). The inclination to work longer hours when experiencing a calling has also been documented in teachers: Serow (1994) found that teachers who experience a calling are more willing to accept extra duties tied to their professional role and tend to work more. Given that a sense of calling holds a strong motivational aspect (Duffy et al., 2017), that it can come with the belief that one's work fulfils a moral duty (Park & Sohn, 2024) and be seen as an integral part of one's life (Wrzesniewski et al., 1997), it seems plausible that a high sense of calling might drive teachers to prolong their working hours, with calling predicting PWH beyond temporally preceding workload and PHW. Based on the results presented above, we propose a positive relationship between the two.

Hypothesis 3. Higher levels of calling are positively associated with prolonging working hours.

In line with the notion of calling being a double-edged sword, we extend our reasoning by proposing that calling may alternatively serve as a protective moderating factor in the health-impairment process. People who experience a sense of calling report higher occupational self-efficacy (Hirschi, 2012), proactive, problem-solving behaviour (Creed et al., 2014; Jin et al., 2023) and clear goal-setting (Wu et al., 2019). Moreover, a sense of calling is associated with higher resilience when facing challenges (Elangovan et al., 2010) and has therefore been conceptualised as a personal resource in previous studies (i.e. Creed et al., 2014; Jin et al., 2023; Wu et al., 2019). According to JD-R theory, personal resources can buffer the impact of job demands on exhaustion (Bakker & Demerouti, 2024) by altering individuals' perceptions of job demands, their response to them and the resulting impact on their health (Lazarus & Folkman, 1984). In line with this notion, calling has been found to buffer the negative relationship between role ambiguity and exhaustion (Wu et al., 2019) and environmental demands and burnout, respectively (Creed et al., 2014).

Building on these findings, we argue that calling may act as a buffer, attenuating the negative impact of job demands (specifically, work overload) on exhaustion. When faced with work overload, teachers with high calling might, for example, mentally discount the current burden in favour of an expected long-term sense of purpose or be more willing to accept work overload as part of their professional experience. Furthermore, given that teachers with high calling tend to display high intrinsic motivation (Kim et al., 2023), they might evaluate their behavioural response of prolonging working hours differently, viewing it as a sacrifice they are willing to make (Bunderson & Thompson, 2009). Consequently, we propose the following two hypotheses.

Hypothesis 4. The positive association between work overload and subsequent exhaustion is moderated by calling. The association is weaker for individuals with higher levels of calling (vs. lower levels of calling).

Hypothesis 5. The positive association between prolonging working hours and subsequent exhaustion is moderated by calling. The association is weaker for individuals with higher levels of calling (vs. lower levels of calling).

1.5. The present study

The present study aims to investigate underlying mechanisms of exhaustion in teachers by examining a mediated moderation model. Fig. 1 illustrates the proposed hypotheses. Building on prior evidence (e.g., Sandmeier et al., 2022), we investigate the longitudinal relationship between work overload, prolonging working hours – as a mediating variable – and exhaustion in teachers using a three-wave temporally sequenced design. Dovetailing with the notion of calling as a “double-edged sword” for occupational mental health, we furthermore examine calling as a concomitant of prolonging working hours and moderator on

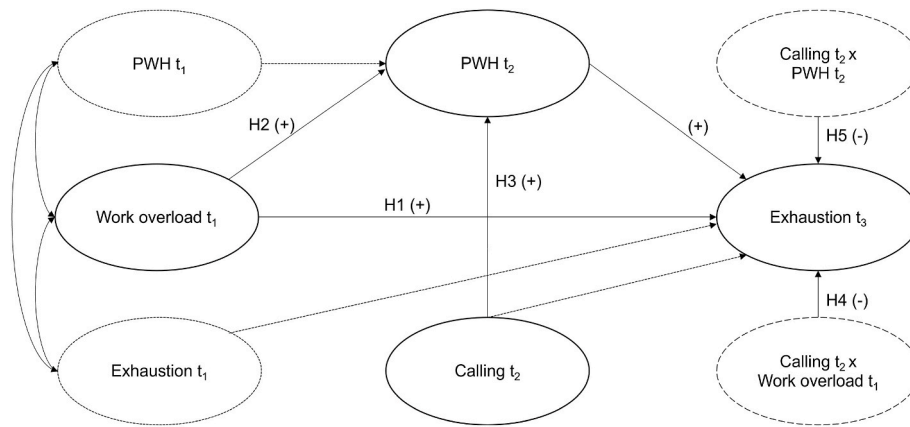


Fig. 1. Proposed indirect conditional effects model for the association between work overload and subsequent exhaustion. *Note.* The time lag between t_1 and t_2 was 12 months, and the time lag between t_2 and t_3 was 6 months, resulting in an overall interval of 18 months between t_1 and t_3 . PWH = Prolonging working hours.

relationships between work overload, prolonging working hours, and exhaustion. In doing so, we contribute to a better understanding of the role that calling and self-endangering coping strategies play in the relationship between work overload and exhaustion.

2. Methods

2.1. Sample and procedure

This study made use of data collected within a larger web-based longitudinal research project on occupational health within educational staff in primary and secondary schools in the German-speaking part of Switzerland (see also Sandmeier et al., 2022). Data collection was conducted in three waves using online questionnaires: the first in autumn 2017 (t_1), the second in autumn 2018 (t_2), and the third at the end of the school year in summer 2019 (t_3). School principals were informed about the research project and its aims and subsequently distributed the invitation to participate to all school staff. This indirect approach aimed to enhance the acceptance of the study and potentially increase response rates. Participants were assured of the confidentiality of their responses, and no personally identifiable data was collected.

Overall, $N = 1167$ participants had provided any data at t_1 . During data cleaning, we excluded observations of $n = 8$ participants ($n = 7$ due to repeated participation, $n = 1$ due to invalid age (age below 18 years or above 69 years)). Of these eligible 1159 participants, $n = 1087$ participants provided relevant data at t_1 (93.79% of eligible participants), $n = 660$ participants provided relevant data at t_2 (56.95% of eligible participants), and $n = 523$ participants provided relevant data at t_3 (45.13% of eligible participants). $N = 385$ individuals (33.22% of eligible participants) completed all relevant data for all three time points, which serves as the final dataset for this study. This sample constituted of teachers from 62 schools of nine cantons in Switzerland. An overview of differences between the final sample and excluded participants can be found in Supplemental Materials S1.

The study was conducted in accordance with the ethical principles and professional guidelines of the German Educational Research Association (GERA), particularly regarding informed consent, confidentiality, anonymity, and the minimization of potential risks for participants. Given the non-invasive, anonymous nature of the study and the absence of foreseeable psychological or social harm, an ethics committee review was not required under applicable institutional and disciplinary standards. Prior to accessing the questionnaire, all participants were provided with detailed information on the study's aims, procedures, data protection measures, and their rights as participants. Informed consent was obtained via the first page of the online survey; only participants who explicitly agreed to the informed consent statement were able to proceed.

2.2. Measures

2.2.1. Work overload

Work overload was assessed at t_1 using eight items capturing teaching-specific work overload. The items were derived following Van Der Doef & Maes' (2002) approach and were answered along a five-point Likert scale (ranging from 1 = 'do not agree at all' to 5 = 'completely agree'). An example item reads "I need more time to do my job well as a teacher." A total score was derived by averaging all item scores. Internal consistency of this scale was acceptable ($\alpha_{t1} = 0.78$, $\omega_{t1} = 0.85$).

2.2.2. Prolonging working hours

Prolonging working hours (PWH) was assessed at t_2 using the 6-item prolonging working hours scale of the German self-endangerment questionnaire (Krause et al., 2015). All items asked respondents to answer them regarding the past three months, using a five-point Likert scale (ranging from 1 = 'rarely/never' to 5 = 'very often'). An example item reads "How often do you give up enough sleep in favour of work?". A total score was derived by averaging all item scores. To later control for autoregressive effects, PWH values as assessed at t_1 were also kept. Internal consistency of this scale was acceptable ($\alpha_{t1} = 0.76$, $\omega_{t1} = 0.85$; $\alpha_{t2} = 0.78$, $\omega_{t2} = 0.84$).

2.2.3. Calling

Calling was assessed at t_2 using the 12-item calling scale by Dobrow and Tosti-Kharas (2011). Following the idea of this scale being occupation-specific, the items were adapted to the profession of a teacher. As the scale is explicitly designed to be applicable to different domains and occupations, the target activity in each item was replaced with wording related to being a teacher (e.g., "teacher", "teaching"), while preserving the original structure and meaning. A translation-back-translation procedure was applied. The original English items were translated into German and linguistically adapted to the educational context. A bilingual researcher then back-translated the items into English. The back-translation was compared with the original version, and minor wording adjustments were made to ensure semantic equivalence. The number of items, response format, and underlying construct of the scale remained unchanged. All items were answered along a seven-point Likert scale (ranging from 1 = 'strongly disagree' to 7 = 'strongly agree'). An example item reads "Being a teacher gives me immense personal satisfaction." A total score was derived by averaging all item scores. Internal consistency of this scale was good ($\alpha_{t2} = 0.89$, $\omega_{t2} = 0.92$).

2.2.4. Exhaustion

Exhaustion was assessed at t_3 using the six-item personal burnout scale from the Copenhagen Burnout Inventory (Kristensen et al., 2005).

Participants were asked to indicate how frequently they experience exhaustion states along a five-point Likert scale (ranging from 1 = 'almost never/never' to 5 = 'always'). An example item reads "How often are you emotionally exhausted?". To later control for autoregressive effects, exhaustion values as assessed at t_1 were also kept. A total score was derived by averaging all item scores. Internal consistency of this scale was good ($\alpha_{t1} = 0.89$, $\omega_{t1} = 0.92$; $\alpha_{t3} = 0.89$, $\omega_{t3} = 0.92$).

2.3. Statistical analyses

Given the hierarchical nature of the data, we first evaluated the dependency of observations by inspecting the intraclass correlation coefficient (ICC) for major outcomes. The ICC denotes the proportion of total variance in the outcome variable that is attributable to the grouping structure of the data. Therefore, a low ICC indicates that little variance is attributable to the grouping structure and indicates that a multilevel model is not necessarily implied. In this study, ICC values were calculated based on the grouping variable "school". All ICC values were below 0.05, implying that a model accounting for clustering was not necessary.

The proposed hypotheses were tested using structural equation modelling. The specified model accounted for an autoregression between exhaustion at t_1 and exhaustion at t_3 as well as an autoregression between prolonging working hours at t_1 and prolonging working hours at t_2 . The latent interactions were operationalised by using a product-indicator approach using all cross-products between indicators of the two latent variables and double mean centering for the product term of the indicators (Lin et al., 2010; semTools R package, Jorgensen et al., 2012). To reduce the number of product indicators, we used parcel allocation to aggregate the product indicators into three parcels that served as indicators of the latent interaction term (Little et al., 2002). Robust maximum likelihood estimation (MLR) was used to account for potential deviations from multivariate normality. Although skewness and kurtosis values were within acceptable ranges (skewness: -1.52 to 0.97 ; kurtosis: -1.13 to 1.75), these indices only reflect univariate normality and do not guarantee multivariate normality (Kline, 2023). To evaluate the model fit, we relied on several model fit criteria as suggested by Kline (2024). We extracted confidence intervals for the indirect effect using Monte Carlo simulations with 20'000 replications (Preacher & Selig, 2012). Specifically, we inspected the χ^2 test, CFI, RMSEA and SRMR, basing our evaluation on the following recommendations for a good fit: CFI >0.95 , RMSEA <0.06 and SRMR <0.08 (Cho et al., 2020; Hu & Bentler, 1999; Schermelleh-Engel et al., 2003). For this model, both unstandardised and standardised estimates of parameters are reported.

Data analysis was conducted using R (R Core Team, 2024) and relied upon $p < .05$ for hypotheses testing. All anonymised data have been made publicly available and can be accessed via the Open Science Framework website (<https://osf.io/fxczn>).

3. Results

3.1. Demographic and descriptive data

Sociodemographic data of the sample are presented in Table 1. Descriptive results of major study variables are presented in Table 2. Results of a correlation analysis involving sociodemographic data and major study variables can be found in Supplemental Materials S2.

3.2. Conditional effects model

The initial conditional effects model indicated a good fit to the data ($\chi^2(1143) = 1994.4$, $p < .001$, $\chi^2/df = 1.75$, CFI = 0.95, RMSEA = 0.044 (CI = 0.041 – 0.047), SRMR = 0.068). The full model's parameter estimates are presented in Supplemental Materials S3. The measurement model fit is presented in Supplemental Materials S4.

Table 1
Sociodemographic characteristics of the full sample.

Characteristic	Mean (SD)/n (%)
Age, in years	40.71 (10.15)
Sex	
Women	300 (77.92%)
Men	85 (22.08%)
Professional experience, in years	16.34 (9.86)
Duration of current employment, in years	10.13 (8.72)
No. of individuals in current employment ^a	
Kindergarden	59 (15.33%)
Primary school – regular class without IF/IS	21 (5.46%)
Primary school – regular class with IF/IS	222 (57.66%)
Primary school – small class(es)	3 (0.78%)
Secondary school – regular class without IF/IS	47 (12.21%)
Secondary school – regular class with IF/IS	57 (14.81%)
Secondary school – small class(es)	7 (1.82%)
Other type	50 (12.99%)
Work pension, in % (maximum 100% employment)	74.34 (24.98)
No. of individuals with previous career change	70 (18.18%)

Note. Values for Age, Professional experience and Duration of current employment (all in years) represent Mean (SD). All other values represent n (%). SD = Standard deviation.

^a Multiple choice possible.

Regarding Hypothesis 1, we found that the direct effect of work overload at t_1 on exhaustion at t_3 was not significant ($b = 0.10$, $SE = 0.09$, $p = .23$, $\beta = 0.08$). Correspondingly, the effect of work overload at t_1 on exhaustion at t_3 was not mediated by PWH at t_2 (indirect effect = -0.01 , $SE = 0.01$, $p = .62$, $\beta = -0.01$), thus not aligning with Hypothesis 2. However, the association between prolonging working hours at t_2 and exhaustion at t_3 was significant ($b = 0.18$, $SE = 0.09$, $p < .05$, $\beta = 0.14$). The total effect of work overload on exhaustion was $b = 0.10$ ($p = .31$, $SE = 0.10$, $\beta = 0.08$). Fig. 2 shows the resulting path coefficients for the conditional effects model.

Investigating associations with calling, the results indicated that calling at t_2 was not associated with PWH at t_2 ($b = -0.03$, $SE = 0.03$, $p = .36$, $\beta = -0.04$), rejecting Hypothesis 3. Moreover, we failed to find evidence that calling moderated the association between work overload and exhaustion ($b = -0.05$, $SE = 0.06$, $p = .38$, $\beta = -0.05$; Hypothesis 4) or the association between PWH and exhaustion ($b = 0.01$, $SE = 0.04$, $p = .91$, $\beta = 0.01$; Hypothesis 5). To illustrate this, Figs. 3 and 4 show simple slopes analyses of the moderating effect of calling at t_2 , based on linear prediction models. The association between calling at t_2 and exhaustion at t_3 was not significant ($b = -0.07$, $SE = 0.04$, $p = .08$, $\beta = -0.08$).

In total, the model explained 69.35% of variance of prolonging working hours at t_2 and 54.4% of variance of exhaustion at t_3 . Removing all workload-related paths reduced explained variance in exhaustion at t_3 by 0.05%, and removing all prolonging working hours-related paths reduced explain variance by 1.38%.

4. Discussion

The aim of this study was to investigate the role of work overload, prolonging working hours, and calling in predicting exhaustion in a longitudinal sample. By examining personal factors alongside work overload, the study advances the understanding of the health impairment process. Moreover, it is the first to test competing hypotheses on calling as a potential double-edged sword in teachers.

Contrary to our hypotheses, this study did not find that work overload predicted teachers' exhaustion over a prolonged period of time. This is not in line with the theoretical propositions of JD-R theory (Bakker et al., 2023) and with previous studies that found work overload to predict exhaustion both longitudinally (Lesener et al., 2019) and in teacher samples (Mijakoski et al., 2022). It also contrasts with the findings of Sandmeier et al. (2022) who report a longitudinal association between workload and teachers' exhaustion one year later. One possible

Table 2
Descriptive statistics and bivariate correlations for major variables.

	Characteristic	Mean	SD	Range	1	2	3	4	5
1	Work overload t_1	2.79	0.53	1 – 4					
2	Exhaustion t_1	2.44	0.73	1 – 4.67	0.42***	-			
3	PWH t_1	2.95	0.74	1.17 – 5	0.41***	0.32***	-		
4	PWH t_2	2.87	0.76	1 – 5	0.32***	0.27***	0.75***	-	
5	Calling t_2	4.65	1.02	1.67 – 7	0.06	-0.06	0.21***	0.17***	-
6	Exhaustion t_3	2.42	0.72	1 – 4.67	0.42***	0.66***	0.27***	0.31***	-0.05

Note. Range describes all observed values. SD = Standard deviation, PWH = Prolonging working hours.

*** $p \leq .001$.

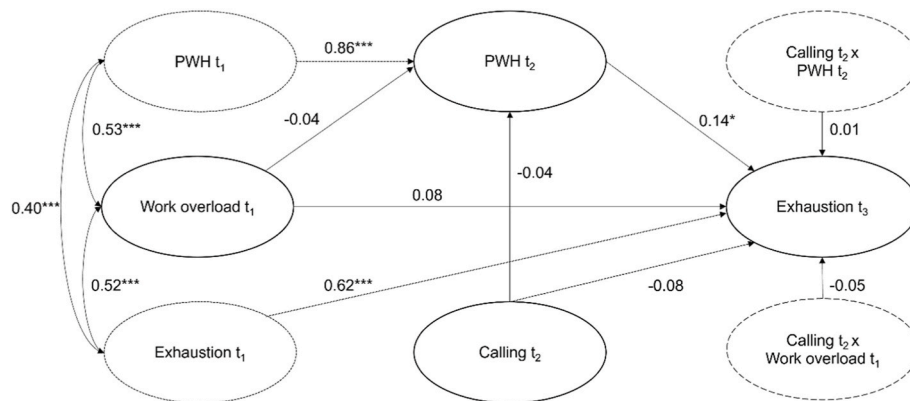


Fig. 2. Resulting path coefficients for the conditional effects model. Note. Standardised estimates are reported. The time lag between t_1 and t_2 was 12 months, and the time lag between t_2 and t_3 was 6 months, resulting in an overall interval of 18 months between t_1 and t_3 . PWH = Prolonging working hours. * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

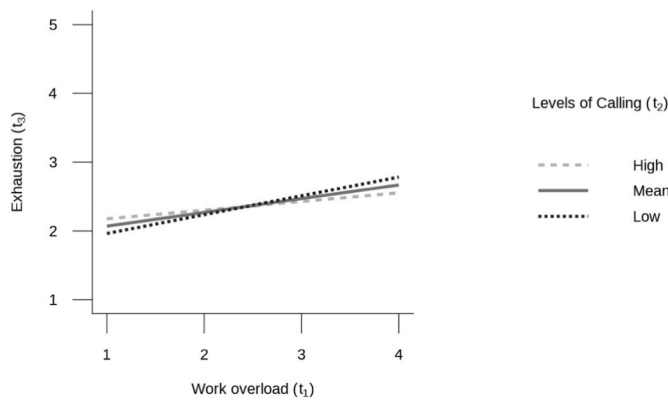


Fig. 3. Calling at t_2 moderating the association between work overload at t_1 and exhaustion at t_3 (non-significant; H4). Note. Lines represent predicted values based on observed data. The predicted values are derived from a linear model without a product-indicator parcelling based moderator construct to increase interpretability of the figure. This depiction therefore does not equal the SEM model estimates. High and low levels of calling represent values that are one standard deviation below or above the sample's average calling value.

explanation is that the 18-month time frame in our study was too long to detect a direct effect of workload on exhaustion. Additionally, the null finding may partly reflect the fact that most of the variance in exhaustion was explained by baseline levels of exhaustion, indicating a strong autoregressive effect.

We further examined the coping strategy of prolonging working hours as a potential mediator in the health-impairment process. Unexpectedly, while PWH itself was associated with subsequent exhaustion, work overload was not associated with higher PWH 12 months later, and the tested mediation effect, of work overload on exhaustion via PWH was not supported either. This contrasts with previous research

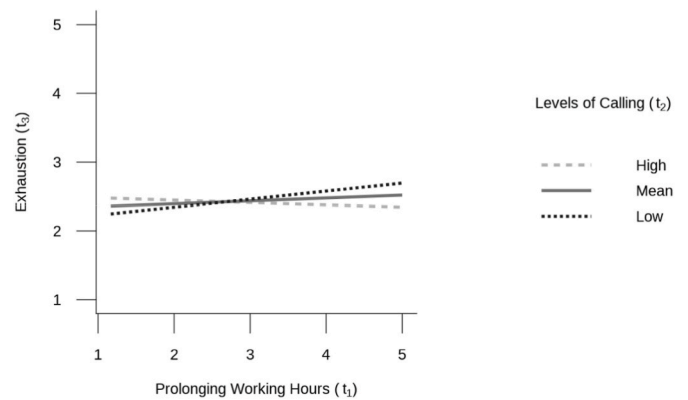


Fig. 4. Calling at t_2 moderating the association between prolonging working hours at t_2 and exhaustion at t_3 (non-significant; H5). Note. Lines represent predicted values based on observed data. The predicted values are derived from a linear model without a product-indicator parcelling based moderator construct to increase interpretability of the figure. This depiction therefore does not equal the SEM model estimates. High and low levels of calling represent values that are one standard deviation below or above the sample's average calling value.

demonstrating that prolonging working hours mediates the association between job demands and exhaustion (Baeriswyl et al., 2021; Sandmeier et al., 2022). A possible explanation for this finding lies in methodological differences between our and prior studies. By controlling for baseline levels of PWH, we accounted for potential trait-like components of this construct.

Regarding the finding that PWH predicted exhaustion several months later, the results show that prolonging working hours may be associated with a small but meaningful increase in subsequent exhaustion. This result dovetails with research on self-endangering work

behaviour which shows that such behaviours contribute incrementally to emotional exhaustion beyond the effects of job demands, and both engagement and disengagement coping strategies (Deci et al., 2016).

In addition to the coping strategy of prolonging working hours, we analysed the potentially ambivalent role of calling in the association between work overload and exhaustion. Contrary to our expectations, calling was not associated with prolonging working hours at t_2 while controlling for PWH and workload at t_1 . This finding contrasts early work by Serow (1994) who reported that teachers who experience a calling are more willing to accept extra duties associated with their role. However, empirical evidence on potentially maladaptive behaviours as indicators of a dark side of calling remains mixed. While one study reported a positive association between calling and hours worked (Clinton et al., 2017), work by Duffy and colleagues (Duffy et al., 2016) did not find evidence linking calling to workaholism. Moreover, emerging evidence suggests that calling may be associated with both adaptive and maladaptive coping strategies (Seol et al., 2023). These findings indicate that the relationship between calling and maladaptive coping strategies may be contingent on additional factors. More research is needed to clarify under which conditions calling encourages specific coping strategies – such as prolonging working hours – and how these strategies, in turn, relate to teachers' well-being or exhaustion.

Contrary to our last hypotheses, calling did not moderate the association between work overload and exhaustion or prolonging working hours and exhaustion. Research examining calling as a moderator in the health-impairment process has yielded inconsistent results so far. Jin et al. (2023) found higher levels of calling to weaken the relationship between job stressors and exhaustion, whereas Wu et al. (2019) reported that higher levels of calling strengthened the relationship between role conflict and exhaustion but weakened the relationship between role ambiguity and exhaustion. One explanation for these inconsistent findings may lie in a possible (unmodelled) reciprocal relationship between job demands and calling. Preliminary evidence suggests that job demands such as work overload can undermine a sense of calling (Uzunbacak et al., 2023). It therefore seems possible that persistent high job demands gradually undermine teachers' sense of calling, which in turn diminishes its potential to buffer against exhaustion.

4.1. Theoretical and practical implications

Our study contributes to the theoretical understanding of work overload, PWH as a coping strategy, sense of calling, and “person \times situation” interactions in the JD-R framework. While we did not find evidence for a direct effect of work overload on exhaustion, this result should not be interpreted as evidence against a workload–exhaustion link per se. Rather, our results underscore the temporal sensitivity of this relationship and suggest that its detection depends critically on the timing of measurement. Consistent with this interpretation, the review by Che Mat et al. (2025) suggests that the direct effects of workload on burnout-related experiences are most consistently observed over shorter, micro-to meso-level time frames.

PWH has been suggested to be a form of self-endangering work behaviour that impairs health in the long term (Dettmers et al., 2016). This assumption was partially supported by our results which yielded a small positive association between PWH and subsequent exhaustion as measured six months later. One possible interpretation is that repeatedly prolonging working hours limits opportunities for recovery and psychological detachment from work, thereby maintaining elevated levels of activation, which may accumulate and manifest in slightly higher exhaustion at a later point (Sonntag et al., 2022). In this sense, PWH can be understood as a behavioural mechanism that undermines recovery processes and thereby contributes to the health-impairment pathway. Consistent with this interpretation, our findings extend prior research demonstrating that prolonging working hours is associated with higher levels of concurrent exhaustion (Sandmeier et al., 2022). Sandmeier and colleagues (2022) report on a larger standardised effect

size than the one observed in the present study, suggesting that the strength of the association may depend on the temporal proximity between PWH and exhaustion. Specifically, the effect of PWH on exhaustion may be more pronounced over shorter time intervals and attenuate over longer lags. From a methodological perspective, approaches such as continuous-time modelling (e.g., Voelkle et al., 2012) may help identify the time window within behaviours such as PWH predict subsequent exhaustion, thereby informing early risk detection considerations.

Moreover, we observed a high autoregressive effect of PWH over 12 months, implying that PWH reflects not only a temporary coping response to job demands but also includes more stable, trait-like elements. The stability of PWH and the non-existent mediation effect observed in our data suggests that prolonging working hours may extend beyond a situational coping response and reflect a more habitualised coping style; for example, this could be due to personality factors (Samfira & Palos, 2021) or chronically elevated job demands other than work overload assessed one year before. Our study was not designed to capture such chronic processes, but this possibility highlights the need for designs that start early in teachers' careers to better understand how persistent work overload fosters habitualised coping pattern.

At the same time, evidence from diary studies indicates that self-endangering work behaviours are responsive to short-term fluctuations in workload and time pressure, pointing to dynamic within-person processes on shorter time scales (Baethge et al., 2026). In contrast, longer-term panel designs may capture more stable, habitualised components of these behaviours. Thus, seemingly divergent findings may partly reflect differences in time frame and level of analysis (within-vs. between-person) rather than substantive contradictions. Future research should therefore distinguish more explicitly between interindividual stability and intraindividual change in PWH to clarify their respective effects on teacher exhaustion. To examine intraindividual changes in PWH, it might be beneficial to employ experience sampling techniques that allow to study short-term within-person dynamics in organisational contexts (Fisher & To, 2012). In addition, it may be useful to differentiate between distinct facets of prolonging working hours, such as extending working time versus sacrificing leisure activities (Mustafić et al., 2023), as these components may differ in their stability and their associations with working conditions and well-being.

Furthermore, our findings contribute to the understanding of sense of calling as a potential double-edged sword. Regarding potential downsides, we examined the link between calling and prolonging working hours. The finding that we observed no significant association is partly consistent with Work as a calling theory (Duffy et al., 2018), which posits that calling may leave some individuals vulnerable to workaholism and overinvestment in their work, but that this does not necessarily have to be the case for all employees. However, our findings should be interpreted carefully as we controlled for PWH and workload at t_1 , which may have left little variance to be explained by calling at t_2 . The bivariate correlation between calling at t_2 and PWH at t_2 indicated a small yet statistically significant association. This implies that the incremental value of calling as a predictor of concurrent PWH is negligible but that cross-sectionally, both constructs are at least mildly linked to each other.

Regarding potential benefits, we adopted a “person \times situation perspective” and tested whether calling buffers the association between work overload, prolonging working hours, and exhaustion. Our analyses did not support this buffer hypothesis. If future research corroborates these findings, this would bear several theoretical implications: First, it would suggest that not all personal resources linked to positive outcomes in the JD-R model necessarily protect against negative outcomes. Second, it would underscore that the role of calling as a personal resource may be context dependent. Future research should therefore clarify under which conditions calling may serve as a resource and when it may fail to do so.

Moreover, the findings from the present study have practical relevance. Our study did not demonstrate a direct effect of work overload on

exhaustion over 18 months. Yet, as prolonging working hours can predict exhaustion six months later, this may present an opportunity for early detection and intervention. This implies that prevention and interventions should thus also target work-related habits, not just work overload. Monitoring extended working hours can provide important early warning signs, particularly for schools that want to identify signs of impending exhaustion among teaching staff at an early stage. However, as it might not always be possible to prevent temporarily increased prolonged working hours in the teaching profession, practitioners should pay further attention to whether teachers' persistently prolong working hours. As the efficiency and adaptiveness of coping strategies are dependent on context (e.g. Lindqvist, 2019) and individual characteristics (e.g. Herman et al., 2020), teachers should be supported in reflecting and identifying potential compensation techniques (e.g., deliberately scheduling recovery time following intensive work phases or setting clearer boundaries between work and non-work time) that are appropriate to the demands they face.

Furthermore, practitioners should be aware that calling may not automatically protect teachers from exhaustion. At the same time, our findings do not support the notion that calling may constitute a risk factor for exhaustion in teachers. Specifically, we found no evidence for an association between calling and either prolonging working hours or exhaustion, accounting for prior PWH behaviours.

4.2. Limitations and directions for future research

The present study has several limitations. First, because the measurement points were 12 and 18 months apart to capture long-term effects, we cannot draw conclusions about fine-grained temporal dynamics of exhaustion. However, this was not the scope of our study, which aimed at scrutinizing long-term risk factors. Still, future studies might benefit from employing more frequent assessments with shorter time intervals to examine how exhaustion unfolds over time. As work overload is likely to fluctuate across different phases of the school year, denser measurement designs would provide insights into when exhaustion tends to accumulate. For example, future designs may examine the associations at hand within the same school year (as opposed to over two school years as in this study), deliberately choosing the assessment point of potential predictors to account for the different phases of a school year.

Second, there was a substantial dropout across measurement waves. However, attrition analyses revealed differences between included and excluded participants with very small effects only. This reduces the concerns about systematic bias due to selective attrition. Nevertheless, the reduced sample size may have limited statistical power and future longitudinal studies should aim to minimise attrition to strengthen the robustness of findings.

Third, we did not differentiate between perceiving and living a calling. According to Work as a calling theory (Duffy et al., 2018), it is not merely perceiving a calling, but rather being able to live one's calling that yields benefits such as increased job and life satisfaction (Duffy et al., 2022). In teachers, living a calling has been negatively associated with strain, whereas simply having a calling showed no relationship with strain (Ehrhardt & Ensher, 2021). Future research might explore whether living a calling – but not perceiving a calling – acts as a buffer within the health-impairment process. In addition, it would be interesting to explore possible cross-lagged effects of job demands on one's ability to live out a calling.

Moreover, all variables were assessed via self-report, which may introduce common method bias and inflate associations between constructs. Although this study's longitudinal design reduces this concern, future studies could complement self-reports with objective indicators (e.g., objective workload data) or multi-informant assessments. Also, the sample consisted of primary and lower secondary teachers from German-speaking Switzerland which limits generalizability of our findings. Specific contextual characteristics, such as comparatively high

professional autonomy, and school-level organisational differences, may have shaped their experiences of work overload and prolonging working hours. Therefore, further research within other educational systems is encouraged.

As another direction for future research, we recommend examining additional work-related and personal characteristics to clarify the role of PWH in the health-impairment process. Beyond separating trait-like from state-like variance in PWH, future research could explore the conditions under which PWH does – or does not – predict subsequent exhaustion. Specifically, PWH may translate into higher exhaustion primarily when longer working hours co-occur with reduced recovery opportunities and/or greater work–family conflict, which are both established correlates of exhaustion in teachers (Liu et al., 2024; Seibt & Kreuzfeld, 2021). Another fruitful research avenue would be to consider other potential mechanisms around PWH: More recent research suggests that self-endangering work behaviours are shaped by contextual conditions such as time pressure, performance-oriented work contexts, and organisational culture, and may even contribute to the maintenance of quantitative stressors over time (Baethge et al., 2026; Knecht et al., 2017; Vahle-Hinz et al., 2024), underscoring the need to examine such dynamic processes more closely in future research.

5. Conclusion

In summary, our study adds to the existing body of research examining risk factors for exhaustion in teachers. First, our results confirm prior findings by demonstrating a mid-term longitudinal association between self-endangering work behaviour (i.e. prolonging working hours) and exhaustion. While PWH predicted exhaustion in teachers, we did not find evidence that temporally preceding work overload predicts exhaustion or that an indirect effect via PWH exists on this temporal level. This points to the necessity for further research into the underlying mechanisms of the health-impairment process.

Second, we extend the knowledge of calling as a potential double-edged sword. Calling did not act as buffer in the health-impairment process. Although calling has been associated with a variety of positive outcomes, the results of our study suggest that its potential to mitigate adverse outcomes may be limited. At the same time, we found no evidence for a potential dark side of calling, as a high sense of calling did not lead to a prolongation of working hours in teachers. Taken together, our findings extend existing evidence on the complex nature of self-endangering behaviours and a sense of calling, paving the way for further investigations of both phenomena in teachers.

CRedit authorship contribution statement

Doris Hofer: Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis, Conceptualization. **Sarah A.K. Kuhn:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis, Conceptualization. **Daniel Spurr:** Writing – review & editing, Conceptualization. **Andreas Krause:** Writing – review & editing, Conceptualization. **Anita Sandmeier:** Writing – review & editing, Resources, Methodology, Investigation, Data curation, Conceptualization.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.tate.2026.105652>.

Data availability

The processed data required to reproduce the above findings are available via https://osf.io/fxczn/overview?view_only=32bc604979184f75a5d0fd456126e6a9.

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