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A longitudinal study of health-impairment and motivational processes in the psychosocial work environment and the subsequent influence on teachers' intention to remain at their workplace

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ABSTRACT

This study examines the concurrent influence of health-impairment and motivational processes proposed by the Job Demands-Resource model on teachers' intention to remain at their workplace at 12 and 24 months among 308 certified teachers in Sweden. Teachers' perceptions of job demands (quantitative demands, emotional demands, work pace) and job resources (possibilities for development, social support from supervisor, social support from colleagues, recognition) were measured at baseline whereas exhaustion, work engagement, and retention intention were measured at 12 months and 24 months. Data was analysed using structural equation modelling and subsidiary analyses explored the moderating effects of job resources on the health-impairment process at 12 and 24 months. The findings indicate that the health-impairment process is a stronger predictor of teachers' retention intention at 12 and 24 months than the motivational process and that the primary focus of teacher retention policies should be optimising teachers job demands rather than enhancing teachers' job resources.

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Teacher retention; teacher turnover; work engagement; job resources; job demands-resource model

1. Introduction

The European Commission (2021) has highlighted teacher shortages as a contributing factor to the vocational crisis in the teaching profession and many European countries report increasing levels of teacher shortages which translates into a number of challenges for policymakers. The Swedish National Agency for Education (2021) estimates that there will be a shortage of 12,000 qualified teachers by 2035. Although the teacher labour force in Sweden has on average increased by 2% since 2016, this has occurred parallel with a yearly 5% loss of teachers resulting in a net loss of teachers (Statistics Sweden, 2023). Despite teacher shortages being a complex macro-level problem, its implications requires addressing on the school-level as shortages translate into teacher staffing difficulties, which are in turn compounded by teacher turnover (OECD, 2020). Teacher turnover captures both migration between schools and attrition however, schools must deal with the quantitative loss of

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teachers regardless of turnover behaviour (Donitsa-Schmidt & Zuzovsky, 2016). Estimates have suggested that the average yearly teacher turnover rate in Sweden between 2014 and 2021 ranged from 26% to 30% (Lindvall, 2022). High levels of teacher turnover cause instability in schools and have substantial educational, financial, social, and societal implications (Kelchtermans, 2017). It disrupts the social fabric and relational continuity needed in schools (Gibbons et al., 2021), and negatively impacts the instructional quality as teaching vacancies are often filled by unqualified teachers (Brill & McCartney, 2008; Hanushek et al., 2016), which has a negative ripple effect on student achievement and further perpetuates shortages (Allen et al., 2017; Gibbons et al., 2021; Sorensen & Ladd, 2020). Therefore the exacerbating influence of teacher turnover on teacher shortages, and the subsequent implications of teacher staffing difficulties for schools, has consolidated teacher retention at the forefront of Swedish educational policy (Swedish National Agency for Education, 2023).

Despite there being a multitude of factors influencing teachers' career decisions (Räsänen et al., 2020), the cumulative body of evidence has strongly linked teachers' work-related ill health and health-impairing aspects of teachers' psychosocial work environment to teacher turnover (European Commission, 2021). Due to this, a proportion of teacher turnover can be regarded as health-based voluntary turnover that can be prevented to a certain degree (Madigan & Kim, 2021). The teaching profession in Sweden is consistently ranked as one of the professions with the highest levels of work-related ill health (The Swedish Work Environment Authority, 2021, 2023), which has been attributed to schools' inability to adequately safeguard employees from psychosocial risk factors and provide healthy work environments (The Swedish Work Environment Authority, 2017). Occupational health research intersects with the study of teachers' career decisions as it aims to promote health and well-being at workplaces (Järvholm et al., 2009) and understanding teacher retention from this perspective requires an examination of the organisation of teachers' work and their surrounding social and organisational context. Studies have shown that improvements in teachers' work environment can be an effective tool for retention (Burge et al., 2021), however, further research examining the longitudinal relationships between job characteristics and teacher retention is needed as these investigations provide the basis for school-level retention interventions (De Witte et al., 2023; See et al., 2020). The aim of the present study is to examine the factors that facilitate teachers' intention to remain at their workplace over a 12- and 24 month period using the Job Demands-Resource model (hereafter JD-R). Specifically, this study examines the concurrent influence of the health impairment, and motivational processes proposed by the JD-R model to investigate the durable influence of psychosocial work factors on teachers' intention to remain at their workplace. Examining the long-term effects of psychosocial work factors on teachers' intention to remain at their workplace is of practical use for schools as the identification of facilitative job resources can inform the development of better retention policies and practices (Burge et al., 2021). Additionally, given the established relationship between teacher burnout and turnover, there is a need for further studies examining aspects of teachers' psychosocial work environment that can counteract work-related ill health among teachers (Mijakoski et al., 2022). Therefore, this study also explores whether job resources moderate the relationship between job demands and exhaustion at 12- and 24 months. Examining the moderating effects of job resources on teacher burnout is also of practical use for schools as it can provide an insight into organisational practices that can safeguard and promote teachers' health and well-being in schools.

2. Background

2.1 Operationalising teachers' career decisions

The literature concerning teachers' career decisions is multidisciplinary as the implications of teacher turnover intersects with disciplinary interests from education, economics, sociology, psychology and medicine. As such, the literature is characterised by methodological and theoretical plurality which on one hand is a strength of the field but on the other hand also adds to the conceptual and methodological ambiguity found in the literature. A recent review by Grant and

Brantlinger (2023) provided an overview of the operationalisation and measures used in the teacher retention literature and further examined which measures were the most predictive of actual retention. Their review illustrated the conceptual and methodological challenges found in the literature reflected by the various designs, variable conceptualisations, and temporal focus of teacher turnover and teacher retention. This poses significant challenges pertaining to the validity and specificity of the measures used as it becomes difficult to disentangle turnover from retention and various types of turnover behaviour (e.g., migration between schools or attrition). The preferred approach is the use of polychotomous measures of turnover behaviours or separate measures for retention and various turnover behaviours (e.g., Van Eycken et al., 2024); however, a major challenge in the literature is the sourcing of objective turnover data (Grant & Brantlinger, 2023). As such, the widespread difficulty in sourcing turnover data provides some justification for the continued use of intention-based measures and the conceptual and statistical pragmatism found in the literature (Dalton et al., 1999). The results of Grant and Brantlinger's (2023) review showed that intention-based measures are only tenuously associated with actual teacher retention behaviour but that continuous Likert scales of teachers' retention intentions, which align with occupational and organisational commitment, are more accurate in capturing teachers' career decisions.

2.2 Theoretical framework

The study of employee turnover is rooted in organisational theory and centres around the dynamic interaction between the individual and the wider organisational context (Holtom et al., 2008). The importance of stress- and change-related attitudes in organisational theory is one aspect of this dynamic interaction that has laid the foundation for the occupational stress theories used in occupational health research (Näswall et al., 2014). Organisational theory typically conceptualises the turnover process as the behavioural outcome in a sequence initiated by distal antecedents (e.g., job characteristics) which influences proximal attitudinal antecedents such as turnover intention (Hom et al., 2012). Occupational stress theories align with this sequence however, as these theories are based on transactional stress models, health-appraisals are conceptualised as a mediator in the relationship between job characteristics and work-related attitudes such as turnover intention (Näswall et al., 2014). The use of occupational stress models such as the JD-R model has provided studies with a conceptual framework for understanding the interplay between job characteristics, health-appraisals and organisational outcomes (Bakker et al., 2023). The central tenet of the JD-R model is the distinction between job demands and job resources and their differential influence on occupational strain and work engagement (Demerouti et al., 2001). Job demands can be regarded as occupational stressors and involve job characteristics or tasks that require a sustained effort and which are associated with a physical and/or psychological costs such as burnout and distress (Demerouti et al., 2001). Conversely, job resources involve aspects of the work environment that constitute an individual's reservoir of energy and helps employees manage job demands and their associated costs, which in turn facilitates a range of favourable organisational outcomes such as work engagement and job satisfaction (Demerouti et al., 2001). Burnout is the central pathogenic health indicator in the JD-R model and is a multifaceted construct that is typically operationalised as exhaustion, which is the consequence of physical, affective, and cognitive strain (Demerouti et al., 2001). Work engagement is the central salutogenic health indicator and refers to a work-related mental state characterised by vigour, dedication, and absorption (Schaufeli et al., 2002). The JD-R model proposes that job demands, and job resources influence organisational outcomes via a dual-pathway process: a health-impairment process where job demands uniquely predicts burnout and negatively influences organisational outcomes, and a motivational process wherein job resources uniquely predict work engagement and positively influences organisational outcomes (Demerouti et al., 2001). In addition to the dual-pathway process, the JD-R model proposes interaction effects between job demands and job resources. Job resources are hypothesized to possess a compensatory effect, in terms of helping employees better manage their job demands by mitigating

the impact of job demands on job strain, and a boosting effect as job resources are hypothesized to be particularly useful and needed when job demands are high (Demerouti et al., 2001). The initial JD-R model represents a top-down theoretical perspective of how psychosocial work environment factors unfold within organisations however, newer conceptualisations of the JD-R model provide a more comprehensive understanding of the interaction between employees and their psychosocial work environment by including bottom-up processes such as job crafting (Bakker & Demerouti, 2017). The initial JD-R model features prominently in the research concerning teachers' career intentions and has been more commonly used as it aligns with the employers organisational responsibility to design and manage the psychosocial work environment (Rugulies, 2019).

2.3 Teachers' turnover intention and teacher burnout

The teacher turnover research field primarily examines the health-impairment process proposed by the JD-R model and its subsequent association with teachers' turnover intention. The literature has established a strong link between job demands such as student misbehaviour, time pressure, emotional demands and workload, and the development of burnout symptoms (Arvidsson et al., 2019; Tuxford-Adams & Bradley, 2014). In Madigan and Kim's (2021) meta-analytic examination of the relationship between burnout and teachers' turnover intention, it was found that burnout accounted for 63% of the explained variance in teachers' turnover intention. Furthermore, exhaustion was the predominant burnout dimension that predicted teachers' turnover intention, accounting for 37% of the explained variance. Cross-sectional and longitudinal studies have also consistently shown that exhaustion mediates the impact of job demands on teachers' turnover intention (e.g., Skaalvik & Skaalvik, 2020; Van Eycken et al., 2024). As such, the findings from the teacher turnover literature point to the prevention of exhaustion being an important part of addressing teacher turnover (Torenbeek & Peters, 2017). Based on the JD-R model and previous findings, this study tests the following hypotheses:

H1: Quantitative demands, emotional demands, and work pace at baseline will positively predict exhaustion at 12 months (a) and 24 months (b).

H2: Possibilities for development, social support from supervisor, social support from colleagues, and recognition at baseline will negatively predict exhaustion at 12 months (a) and 24 months (b).

H3: Exhaustion will negatively predict teachers' intention to remain at their workplace at 12 months (a) and 24 months (b).

2.4 Facilitating teacher retention through the lens of the JD-R model

In contrast to the teacher turnover research field, the teacher retention research field seeks to identify psychosocial work factors that can help teachers flourish at work. In line with the motivational process in the JD-R model the aims of this research field is twofold: (a) to identify factors that enhances teachers work engagement and facilitates teacher retention and (b) to identify factors that can buffer against teacher burnout and facilitate teacher well-being (Granziera et al., 2020). Studies in this research field have shown that a favourable balance between job demands and job resources is facilitative of teacher retention (Björk et al., 2019). Certain job resources have been highlighted as particularly important for teachers' retention intention such as professional development opportunities (Van den Borre et al., 2021) and social resources such as collegiality and support from supervisors (Miller et al., 2020). Being supported and socially connected to one's colleagues is believed to facilitate retention by influencing their job attitudes and perceptions of their job demands (Struyve et al., 2016; Thomas et al., 2021). Several school leadership practices and behaviours that enhance teachers job resources have been identified and shown to positively influence teachers' job attitudes, perceptions of their work environment and retention intention (Boyd et al., 2011; Hulpia et al., 2009; Thomas et al., 2020). In this study, we focus on two leadership

behaviours: social support and recognition. Based on the JD-R model and previous findings, this study tests the following hypotheses:

H4: Possibilities for development, social support from supervisor, social support from colleagues, and recognition at baseline will positively predict work engagement at 12 months (a) and 24 months (b).

H5: Quantitative demands, emotional demands, and work pace at baseline will negatively predict work engagement at 12 months (a) and 24 months (b).

H6: Work engagement will positively predict teachers' intention to remain at their workplace at 12 months (a) and 24 months (b).

Studies in the teacher retention research field have also examined the potential moderating effect of job resources, such as social support from colleagues and school leadership, on teacher burnout. Some studies have provided support for the buffering effect of social support from colleagues and the school leadership on job demands such as quantitative workload (Houkes et al., 2001; Pomaki et al., 2010), emotional demands (Kinman et al., 2011), and burnout (Avanzi et al., 2018; Van Droogenbroeck et al., 2014). However, other studies have not found support for the buffering hypothesis (e.g., Maas et al., 2021). Research exploring the buffering hypothesis within the teacher retention research field is still scarce and there is a need for further studies identifying potential moderators of teacher burnout given its subsequent influence on teachers' turnover intention (Pietarinen et al., 2021). Based on the JD-R model and the available research concerning the buffering hypothesis this study proposes the following hypothesis:

H7: Possibilities for development, social support from supervisor, social support from colleagues, and recognition at baseline will moderate the impact of job demands on exhaustion at 12 months (a) and 24 months (b).

2.5 Aims of the study

This study explored the concurrent relations between three job demands (*quantitative demands, emotional demands, work pace*) and four job resources (*possibilities for development, social support from supervisor, social support from colleagues, recognition*) measured at time 1 (baseline) with exhaustion, work engagement, and teachers' intention to remain at their workplace measured at time 2 (12 months) and time 3 (24 months). Furthermore, the study also examined whether job resources moderate the relationship between job demands and exhaustion at 12 and 24 months. The study's hypotheses are illustrated in [Figure 1](#).

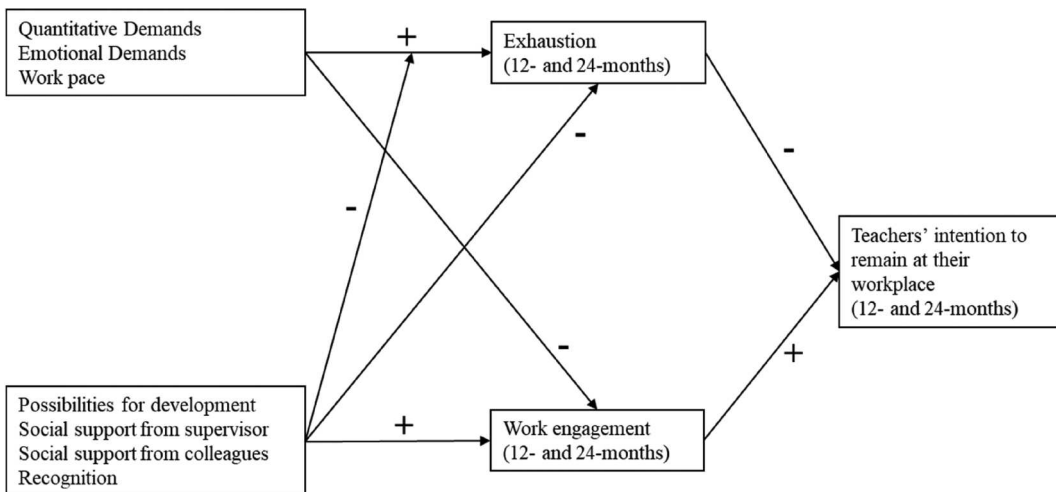


Figure 1. Conceptual model for the relations between job demands, job resources, exhaustion, work engagement and teachers' intention to remain at their workplace. Note: "+" indicates a positive and "-" a negative hypothesized association.

3. Method

3.1 Participants and research design

This study uses data from a randomized controlled trial that evaluated the implementation process of the *Guideline for the prevention of mental ill-health at the workplace* in 20 municipal elementary schools in 2 Swedish municipalities (Kwak et al., 2019). The randomized controlled trial was registered in ClinicalTrials.gov (NCT03322839, date assigned: August 2017) and was approved by the Swedish Ethical Review Authority (Dnr. 2017/984-31/5). Additional ethical approval for the research questions in the current study was provided by the Swedish Ethical Review Authority (Dnr. 2022-04661-01). The questionnaire was administered in Swedish and consisted of validated questions assessing organisational and social work environment factors and health. Participation was voluntary and written informed consent was obtained from all participants. A detailed overview of the data collection procedure and participant eligibility criteria can be found in Kwak et al. (2019).

The current study used a closed-cohort sub-sample consisting of 308 certified elementary-year teachers (ISCED levels 1–2) working in public comprehensive schools. The two municipalities provided a good geographical variation of school contexts as eight schools were located in a large metropolitan city whereas the remaining twelve schools were situated in a rural municipality. The longitudinal research design includes a 24 month follow-up with two measurement times: time 1 (12 months, $n = 308$) and time 2 (24 months, $n = 197$). We selected these two time-points as recent investigations have shown that Swedish teachers spend on average 3 years at the same school (Lindvall, 2022). The drop-out rate between 12 and 24 months ($n = 111$) reflects the teachers who left their school and/or the profession (see Toropova et al., 2022). However, as the study focuses on the teachers who remained at their school this data attrition did not affect the aim of the study. Drop-out analysis was, however, conducted using Welch's t -test for the baseline predictors and age whereas descriptive analysis were used for gender, teaching experience and years at current school. Among the baseline predictors, statistically significant mean differences were observed for recognition ($t(201.4) = 2.07, p < .05$; sample mean = 3.54, $sd = .76$; drop-out mean = 3.34, $sd = .85$). Statistically significant mean differences were also observed for work engagement at 12 months ($t(204) = 2.24, p < .05$; sample mean = 6.08, $sd = .81$; drop-out mean = 5.85, $sd = .91$) and intention to remain at the workplace at 12 months ($t(187.6) = 2.66, p < .05$; sample mean = 3.36, $sd = .97$; drop-out mean = 3.01, $sd = 1.17$). Descriptive statistics further showed slight differences between the sample and the drop-outs with regard to gender (sample: female 79.3%, male 20.7% compared to drop-outs: female 81.7% male 18.3%), teaching experience (sample = 18.2% with 5 years or less teaching experience compared to 24.1% among the drop-outs), and years spent at their current school (sample = 56.8% with 5 years or less years at their current school compared to 61% among the drop-outs). A descriptive overview of the sample is presented in Table 1.

Table 1. Descriptive overview of the study sample.

	Baseline ($n = 308$)	12 months ($n = 308$)	24 months ($n = 197$)
Gender, n (%)			
Women	246 (80.1%)	242 (79.9%)	156 (79.6%)
Men	61 (19.9%)	61 (20.1%)	40 (20.4%)
Age m (sd)	47.3 (10.8)	48.2 (10.9)	49.2 (10.6)
Teaching experience, n (%)			
≤5 years	62 (20.3%)	47 (15.4%)	28 (14.3%)
≥5 years	244 (79.7%)	259 (84.6%)	168 (85.7%)
Years at current school, n (%)			
≤5 years	172 (58.3%)	162 (55.9%)	90 (48.1%)
≥5 years	123 (41.7%)	128 (44.1%)	97 (51.9%)
Group, n (%)			
Intervention	142 (46.1%)		
Control	166 (53.9%)		

3.2 Measurements

Organisational and social work environment factors were assessed using the Copenhagen Psychosocial Questionnaire II, which is a validated instrument that is widely used for research purposes (COPSOQ II; Pejtersen et al., 2010). Previous studies have shown that the COPSOQ scales can be well integrated into the JD-R framework (Berthelsen et al., 2018) and it has been validated in a teacher sample (Berthelsen et al., 2020). The COPSOQ scales were used to assess job demands (quantitative demands, emotional demands, work pace), job resources (possibilities for development, social support from supervisor, social support from colleagues, and recognition), and intention to remain at the workplace. All the COPSOQ scales used for the baseline predictors in the present study are assessed using a 5-point Likert scale ranging from 1 = Never to 5 = Always or from 1 = Very low to 5 = To a very high extent (Pejtersen et al., 2010). Table 2 provides a descriptive overview of the measures used in the study. The Cronbach's alpha for all the scales used are reported in Table 2 and ranged from 0.77 to 0.84 indicating good reliability (Nunnally, 1978).

3.2.1 Job demands and job resources

Three dimensions of demands at work were assessed: Quantitative demands (four questions e.g., “*Is your workload unevenly distributed so it piles up?*”), emotional demands (four questions e.g., “*Is your work emotionally demanding?*”) and work pace (three questions e.g., “*Do you work at a high pace throughout the day?*”). Job resources included possibilities for development assessed using two questions (e.g., “*Does your work give you the opportunity to develop your skills?*”); social support from supervisor assessed using three questions (e.g., “*How often do you get help and support from your nearest superior?*”); social support from colleagues assessed using two questions (e.g., “*How often do you get help and support from your colleagues?*”); and recognition assessed using three questions (e.g., “*Is your work recognised and appreciated by the management?*”). In line with recent revisions to the COPSOQ that modified items in the possibilities for development scale due to lack of clarity (Burr et al., 2019), two items on the possibilities for development scale (*Does your work require you to take the initiative?* And *Can you use your skills or expertise in your work?*) were excluded after reliability testing as they performed poorly in the scale due to low inter-item correlation (Tavakol & Dennick, 2011). The Cronbach's alpha with the excluded items was 0.60 which is below the acceptable range (Nunnally, 1978), and after revising the scale Cronbach's alpha improved to 0.80. The original support from colleague's scale consists of three items however one item (*How often do your colleagues talk with you about how well you carry out your work?*) was excluded after reliability testing as it performed poorly in the scale (Tavakol & Dennick, 2011). The Cronbach's alpha with the excluded item was 0.65 which is below the acceptable range (Nunnally, 1978), and after revising the scale Cronbach's alpha improved to 0.80.

3.2.2 Work engagement

Work engagement was assessed using the ultra-short version of the Utrecht Work Engagement Scale consisting of three items (e.g., “*I am enthusiastic about my job*”) on a 7-point scale ranging from 1 = never to 7 = always (UWES-3; Schaufeli et al., 2017).

3.2.3 Exhaustion

Exhaustion was assessed using four negatively worded items (e.g., “*After my work, I usually feel worn out and weary*”) on a 4-point Likert scale ranging from 1 = Strongly disagree to 4 = Strongly agree from the OLBI exhaustion scale (Demerouti et al., 2010).

3.2.4 Teachers' intention to remain at their workplace

Teachers' intention to remain at their workplace was assessed using a single-item question (“*How often do you consider looking for work elsewhere?*”) from the commitment to the workplace scale in the COPSOQ II using a 5-point Likert scale ranging from 1 = Always to 5 = Never.

3.2.5 Covariates

As age, gender, and teaching experience are significantly related to teachers' retention intention (Grissom et al., 2016), they were entered as covariates in both models and served as controls for the main outcome factor (teachers' intention to remain at their workplace). Intervention group was also included as a covariate in order to control for any effects due to the intervention. Age and teacher experience were measured in years. Gender was coded 1 (female teacher) and 2 (male teacher). The intervention group was coded 1, and the control group was coded 2.

3.3 Analytic strategy

Previous studies have conceptualised job demands and job resources as second-order factors (e.g., Hakanen et al., 2006); however, this approach can mask the nuanced influence of different job demands and job resources on exhaustion, work engagement and teachers' intention to remain at their workplace thus diminishing the practical implications of such analysis (Hakanen et al., 2021). Therefore, we conducted our confirmatory factor analysis (CFA) and structural equation modelling (SEM) analysis using first-order factors using R version 4.2.1 and the structural equation modelling package Lavaan (Rosseel, 2012). The CFA was used to test the hypothesised JD-R factor structure of the included variables. A model of relations between the latent variables was then assessed using SEM analysis and the SEM package Lavaan with maximum likelihood estimation. We tested a model in which the three job demands, and four job resource factors were specified as exogenous variables and the model included paths from all job demands and job resources to exhaustion, work engagement and teachers' intention to remain at their workplace. Exhaustion and work engagement were also entered as predictors of teachers' intention to remain at their workplace. Age, gender, teaching experience and intervention group were entered as covariates in the model and served as controls for the main outcome factor. This procedure was repeated for outcomes at time 1 (12 months) and at time 2 (24 months) in separate models. Model fit was assessed using the well-established indicators such as the comparative fit index (CFI), Tucker–Lewis index (TLI), the standardised root mean square residual (SRMR), and the Root Mean Square Error of Approximation (RMSEA). CFI and TLI values greater than .90 indicate an acceptable fit whereas RMSEA and SRMR values less than 0.08 indicate an acceptable model fit (Byrne, 2012). We used the PROCESS macro version 4 developed by Hayes (2013) in SPSS 28 to test for potential moderating effects of job resources on the impact of the three job demands on exhaustion at 12 and 24 months (H7a and H7b). As PROCESS is an observed-variable modelling tool, the latent factors were reduced to mean centred observable variable proxies, i.e., sum scores (Hayes et al., 2017). The PROCESS macro model 1 with bias-corrected 95% confidence intervals ($n = 5000$) was used to identify potential moderating effects.

4. Results

Table 2 provides an overview of the mean, standard deviation, and Cronbach alpha for the scales used in the study. Table 3 provides the correlations between the observed variables. Most of the correlations indicated weak to moderate relationships (Field, 2018). Job demands were moderately correlated with exhaustion at 12 and 24 months and were not significantly correlated with work engagement at 12 and 24 months. Job resources demonstrated weak negative correlations with exhaustion at 12 and 24 months and weak positive correlations with work engagement at 12 and 24 months. Teachers' intention to remain at their workplace at 12 and 24 months demonstrated weak correlations with job demands, job resources, and work engagement at 12 and 24 months but was moderately correlated with exhaustion at 12 and 24 months.

Table 2. Descriptive overview of the scales and measures.

	Baseline		12 months		24 months	
	Mean, sd	α	Mean, sd	α	Mean, sd	α
Job demands						
Quantitative Demands ^a	3.35 (0.75)	0.84	3.30 (0.71)		3.16 (0.72)	
Emotional Demands ^a	3.77 (0.68)	0.77	3.72 (0.69)		3.59 (0.68)	
Work Pace ^a	3.90 (0.67)	0.79	3.88 (0.69)		3.86 (0.74)	
Job Resources						
Possibilities for development ^b	3.34 (0.82)	0.80	3.38 (0.88)		3.42 (0.87)	
Social support from supervisor ^b	3.18 (0.78)	0.78	3.13 (0.87)		3.37 (0.82)	
Social support from colleagues ^b	3.89 (0.75)	0.83	3.91 (0.77)		4.01 (0.80)	
Recognition ^b	3.46 (0.79)	0.81	3.41 (0.83)		3.61 (0.79)	
Exhaustion ^a			2.75 (0.67)	0.81	2.67 (0.66)	0.78
Work Engagement ^b			5.99 (0.85)	0.82	6.07 (0.78)	0.82
Intention to remain at the workplace ^b			3.24 (1.06)		3.45 (1.08)	

Note: ^aHigher scores indicate more unfavourable outcomes, ^bHigher scores indicate more favourable outcomes.

Table 3. Correlations between job demands, job resources at baseline and exhaustion, work engagement, and intention to remain at the workplace at 12- and 24-months.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Quantitative Demands	1												
2. Emotional Demands	.43**	1											
3. Work Pace	.47**	.40**	1										
4. Possibilities for development	-.10	-.03	-.10	1									
5. Social support from supervisor	-.23**	-.15**	-.10	.32**	1								
6. Social support from colleagues	-.02	-.04	-.04	.21**	.28**	1							
7. Recognition	-.26**	-.16**	-.08	.42**	.69**	.35**	1						
8. Exhaustion 12-months	.25**	.38**	.32**	-.20**	-.16**	-.13*	-.23**	1					
9. Exhaustion 24-months	.27**	.41**	.25**	-.13	-.13	-.07	-.24**	.59**	1				
10. Work Engagement 12-months	-.07	-.02	.01	.26**	.15**	-.01	.22**	-.29**	-.18*	1			
11. Work Engagement 24-months	-.05	.01	.06	.21**	.14*	-.05	.23**	-.24**	-.37**	.57**	1		
12. Intention to remain 12-months	-.16**	-.17**	-.18**	.20**	.22**	.17**	.31**	-.50**	-.31**	.35**	.18*	1	
13. Intention to remain 24-months	-.15*	-.20**	-.17*	.12	.21**	.12	.27**	-.41**	-.56**	.21**	.34**	.51**	1

Note: * Correlation is significant at the 0.05 level (2-tailed); ** Correlation is significant at the 0.01 level (2-tailed).

4.1 Predictors of teachers' intention to remain at their workplace at 12 months

Confirmatory factor analyses were conducted to test the measurement model for the baseline predictors and outcomes at 12 months. The measurement model showed an acceptable fit to the data (χ^2 (333, $n = 270$) = 615.322, $p < .001$, CFI = 0.919, TLI = 0.901, RMSEA = 0.056 (CI 0.049-0.063) and SRMR = 0.062). The first SEM analysis tested a model of relations between job demands, job resources, exhaustion, work engagement, and teachers' intention to remain at their workplace at 12 months. None of the covariates were significantly related with teachers' intention to remain at their workplace at 12 months. Therefore, we present a model in which the covariates were omitted. The model showed an acceptable fit (χ^2 (334, $n = 270$) = 624.749, $p < .001$, CFI = 0.916, TLI = 0.898, RMSEA = 0.057 (CI 0.050-0.064) and SRMR = 0.066). Figure 2 displays the significant paths with standardised regression weights for the model at 12 months. Non-significant paths are illustrated with dashed lines. All the standardised regression estimates for the model at 12 months can be found in Table 4.

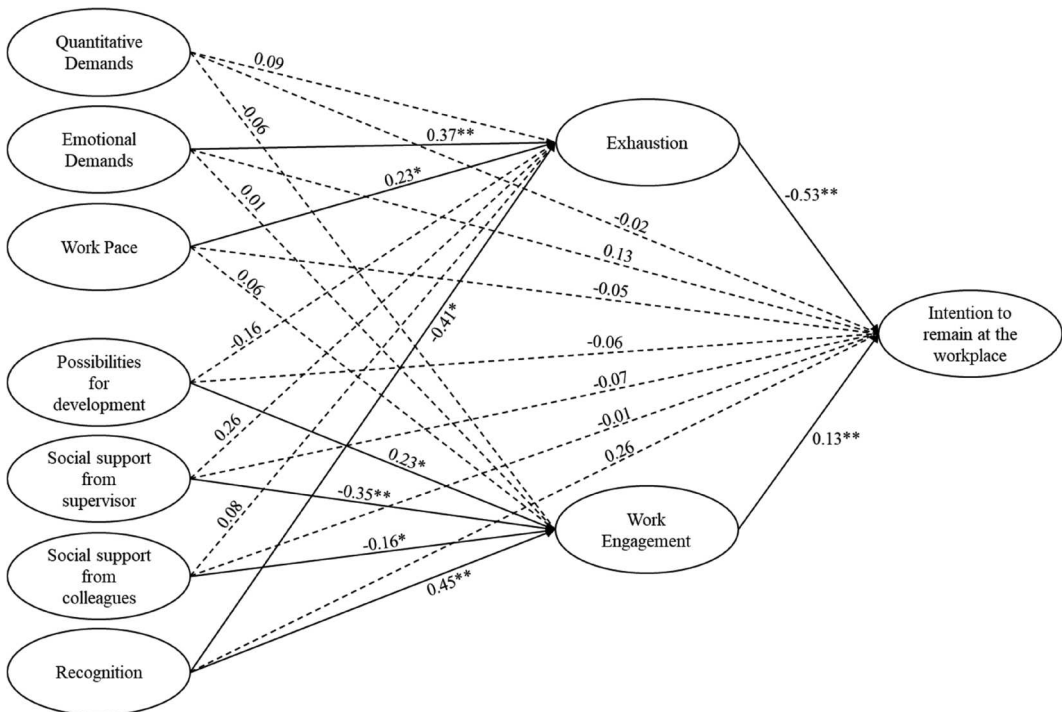


Figure 2. Standardised regression estimates for the structural model of relations between job demands, job resources, and exhaustion, work engagement and teachers' intention to remain at their workplace at 12 months.

Note: * significant at the 0.05 level; ** significant at the 0.01 level. Dashed lines indicate non-significant paths.

Exhaustion at 12 months was significantly predicted by emotional demands ($\beta = 0.37$, $p < .01$) and work pace ($\beta = 0.23$, $p < .05$). The other job demand, quantitative demands, did not significantly predict exhaustion at 12 months (H1a). In addition to this, one job resource, recognition, negatively predicted exhaustion at 12 months (H2a; $\beta = -0.41$, $p < .05$). Higher levels of exhaustion at 12 months were related to a lower retention intention at 12 months (H3a; $\beta = -0.53$, $p < .01$). Work engagement at 12 months was significantly predicted by all the job resources; however, social support from supervisor ($\beta = -0.35$, $p < .01$) and social support from colleagues ($\beta = -0.16$, $p < .05$) negatively predicted work engagement at 12 months (H4a). Work engagement at 12 months was not significantly predicted by any of the job demands (H5a). Higher levels of work engagement at 12 months were related to a higher retention intention at 12 months (H6a; $\beta = 0.13$, $p < .01$). The analysis revealed no direct effect of job demands and job resources on teachers' retention intention at 12 months. However, indirect effects were found between emotional demands, work pace, and teachers' intention to remain at their workplace via exhaustion. No indirect effects were found between the four job resources and retention intention at 12 months via work engagement (see Table 5). The moderation analysis revealed no significant moderating effects of the four job resources on the relationship between the three job demands and exhaustion at 12 months (H7a; see Table 6).

4.2 Predictors of teachers' intention to remain at their workplace at 24 months

Confirmatory factor analyses were conducted to test the measurement model for the baseline predictors and outcomes at 24 months. The measurement model showed an acceptable fit to the data (χ^2 (333, $n = 308$) = 555.126, $p < .001$, CFI = 0.935, TLI = 0.921, RMSEA = 0.047 (CI 0.040–0.053))

Table 4. Standardised regression estimates for SEM analysis at 12 and 24 months.

	Exhaustion		Work engagement		Intention to remain at the workplace	
	12 months	24 months	12 months	24 months	12 months	24 months
Job demands						
Quantitative Demands	-0.09 (CI -0.26-0.09)	0.06 (CI -0.20-0.31)	-0.06 (CI -0.26-0.14)	-0.11 (CI -0.32-0.11)	-0.02 (CI -0.31-0.26)	0.11 (CI -0.13-0.50)
Emotional Demands	0.37** (CI 0.22-0.61)	0.43** (CI 0.24-0.77)	0.01 (CI -0.21-0.24)	-0.01 (CI -0.23-0.22)	0.13 (CI -0.08-0.55)	0.14 (CI -0.10-0.62)
Work Pace	0.23* (CI 0.03-0.46)	-0.01 (CI -0.26-0.25)	0.06 (CI -0.14-0.29)	0.24* (CI 0.02-0.47)	-0.05 (CI -0.41-0.22)	-0.08 (CI -0.46-0.19)
Job resources						
Possibilities for development	-0.16 (CI -0.29-0.03)	-0.01 (CI -0.18-0.16)	0.23* (CI 0.04-0.39)	0.20* (CI -0.001-0.30)	-0.06 (CI -0.27-0.12)	0.02 (CI -0.18-0.24)
Social support from supervisor	0.26 (CI -0.01-0.42)	0.38* (CI 0.00-0.63)	-0.35** (CI -0.54 - -0.06)	-0.49** (CI -0.66 - -0.08)	-0.07 (CI -0.42-0.25)	0.13 (CI -0.24-0.59)
Social support from colleagues	0.08 (CI -0.05-0.17)	0.08 (CI -0.09-0.23)	-0.16* (CI -0.27 - -0.02)	-0.16 (CI -0.26-0.01)	-0.01 (CI -0.16-0.13)	-0.01 (CI -0.22-0.18)
Recognition	-0.41* (CI -0.65 - -0.07)	-0.52* (CI -0.92 - -0.04)	0.45** (CI 0.10-0.80)	0.67** (CI 0.15-0.98)	0.26 (CI -0.12-0.86)	0.08 (CI -0.45-0.68)
Work Engagement	-	-	-	-	0.13** (CI 0.04-0.35)	0.07 (CI -0.15-0.38)
Exhaustion	-	-	-	-	-0.53** (CI -1.16 - -0.57)	-0.66** (CI -1.36 - -0.73)
Covariates						
Age	-	-	-	-	-	-
Gender	-	-	-	-	-	-
Teaching experience	-	-	-	-	-	0.21** (CI 0.08-0.29)
Intervention group	-	-	-	-	-	-

Note: * significant at the 0.05 level; ** significant at the 0.01 level. Significant effects highlighted in bold.

Table 5. Indirect effects of job resources and job demands on teachers' intention to remain at their workplace at 12 and 24 months.

	Estimate	SE	95% CI		<i>P</i>
			Lower	Upper	
12-months					
QuantD-Exh-IntentRemain	0.05	0.08	-0.09	0.23	.36
EmoD-Exh-IntentRemain	-0.19	0.10	-0.56	-0.16	.00
WorkP-Exh-IntentRemain	-0.12	0.10	-0.42	-0.01	.04
PossDev-Eng-IntentRemain	0.03	0.03	-0.01	0.09	.10
SuppSup-Eng-IntentRemain	-0.05	0.03	-0.12	0.01	.05
SuppColl-Eng-IntentRemain	-0.02	0.02	-0.06	0.01	.10
Recog-Eng-IntentRemain	0.06	0.05	-0.01	0.18	.05
24-months					
QuantD-Exh-IntentRemain	-0.04	0.14	-0.33	0.21	.66
EmoD-Exh-IntentRemain	-0.28	0.16	-0.84	0.27	.00
WorkP-Exh-IntentRemain	0.01	0.14	-0.26	0.27	.02
PossDev-Eng-IntentRemain	0.01	0.02	-0.03	0.06	.43
SuppSup-Eng-IntentRemain	-0.03	0.05	-0.15	0.06	.40
SuppColl-Eng-IntentRemain	-0.01	0.02	0.05	0.02	.42
Recog-Eng-IntentRemain	0.05	0.08	-0.09	0.22	.39

Table 6. Moderation analysis.

	B	SE	95% Confidence Interval		<i>t</i>	<i>p</i>
			Lower	Upper		
Quantitative Demands – Exhaustion						
12 months						
Possibilities for development	0.11	0.09	-0.08	0.29	1.17	.24
Social support from supervisor	0.10	0.06	-0.03	0.22	1.57	.12
Social support from colleagues	0.11	0.07	-0.02	0.24	1.62	.11
Recognition	0.08	0.06	-0.04	0.20	1.28	.20
Emotional Demands – Exhaustion						
12 months						
Possibilities for development	-0.01	0.10	-0.21	0.19	-0.11	.92
Social support from supervisor	0.03	0.07	-0.11	0.16	0.36	.16
Social support from colleagues	0.10	0.07	-0.04	0.24	1.44	.15
Recognition	-0.02	0.07	-0.15	0.11	-0.29	.77
Work Pace – Exhaustion						
12 months						
Possibilities for development	0.01	0.11	-0.20	0.23	0.13	.90
Social support from supervisor	0.06	0.07	-0.08	0.20	0.82	.41
Social support from colleagues	-0.01	0.07	-0.14	0.14	-0.01	.99
Recognition	0.06	0.07	-0.08	0.20	0.90	.37
Quantitative Demands – Exhaustion						
24 months						
Possibilities for development	-0.05	0.11	-0.27	0.18	-0.40	.69
Social support from supervisor	0.04	0.08	-0.12	0.19	0.47	.64
Social support from colleagues	0.02	0.08	-0.14	0.18	0.26	.80
Recognition	0.03	0.08	-0.12	0.18	0.39	.70
Emotional Demands – Exhaustion						
24 months						
Possibilities for development	0.04	0.12	-0.19	0.28	0.36	.72
Social support from supervisor	0.11	0.08	-0.05	0.27	1.35	.18
Social support from colleagues	0.04	0.08	-0.11	0.19	0.54	.59
Recognition	0.16	0.08	-0.01	0.32	1.94	.05
Work Pace – Exhaustion						
24 months						
Possibilities for development	0.04	0.13	-0.22	0.30	0.28	.77
Social support from supervisor	-0.01	0.09	-0.19	0.18	-0.05	.96
Social support from colleagues	-0.09	0.08	-0.26	0.08	-1.08	.28
Recognition	0.02	0.09	-0.16	0.19	0.18	.86

and SRMR = 0.062). The second SEM analysis tested a model of relations between job demands, job resources, exhaustion, work engagement, and teachers' intention to remain at their workplace at 24 months. Teaching experience was the only covariate that showed a significant relationship with teachers' intention to remain at their workplace at 24 months. Therefore, we present the model including teaching experience as a covariate whereas the other covariates were omitted. The model showed an acceptable fit ($\chi^2(362, n = 308) = 639.970, p < .001, CFI = 0.920, TLI = 0.904, RMSEA = 0.050$ (CI 0.044–0.056) and SRMR = 0.068). Figure 3 displays the significant paths with standardised regression weights for the model at 24 months. Non-significant paths are illustrated with dashed lines. All the standardised regression estimates for the model at 24 months can be found in Table 4.

Exhaustion at 24 months was significantly predicted by emotional demands ($\beta = 0.43, p < .01$). The other job demands, quantitative demands and work pace, did not significantly predict exhaustion at 24 months (H1b). In addition to this, social support from supervisor ($\beta = 0.38, p < .05$) significantly predicted exhaustion at 24 months and recognition ($\beta = -0.52, p < .05$) negatively predicted exhaustion at 24 months (H2b). Higher levels of exhaustion at 24 months were related with a lower retention intention at 24 months (H3b; $\beta = -0.66, p < .01$). Work engagement at 24 months was significantly predicted by possibilities for development ($\beta = 0.20, p < .05$), social support from supervisor ($\beta = -0.49, p < .01$), and recognition (H4b; $\beta = 0.67, p < .01$). One of the job demands, work pace ($\beta = 0.24, p < .05$), was also a significant predictor of work engagement at 24 months (H5b). No significant association between work engagement at 24 months and teachers' retention intention at 24 months was found (H6b). The analysis revealed no direct effects of job demands and job resources on teachers' teachers' intention to remain at their

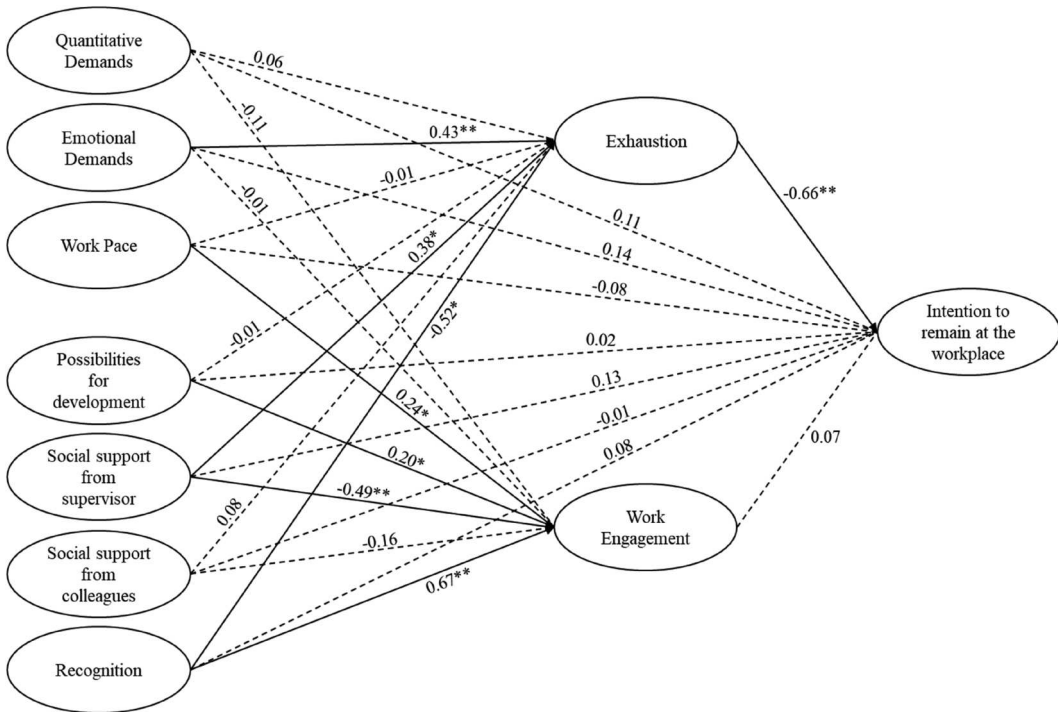
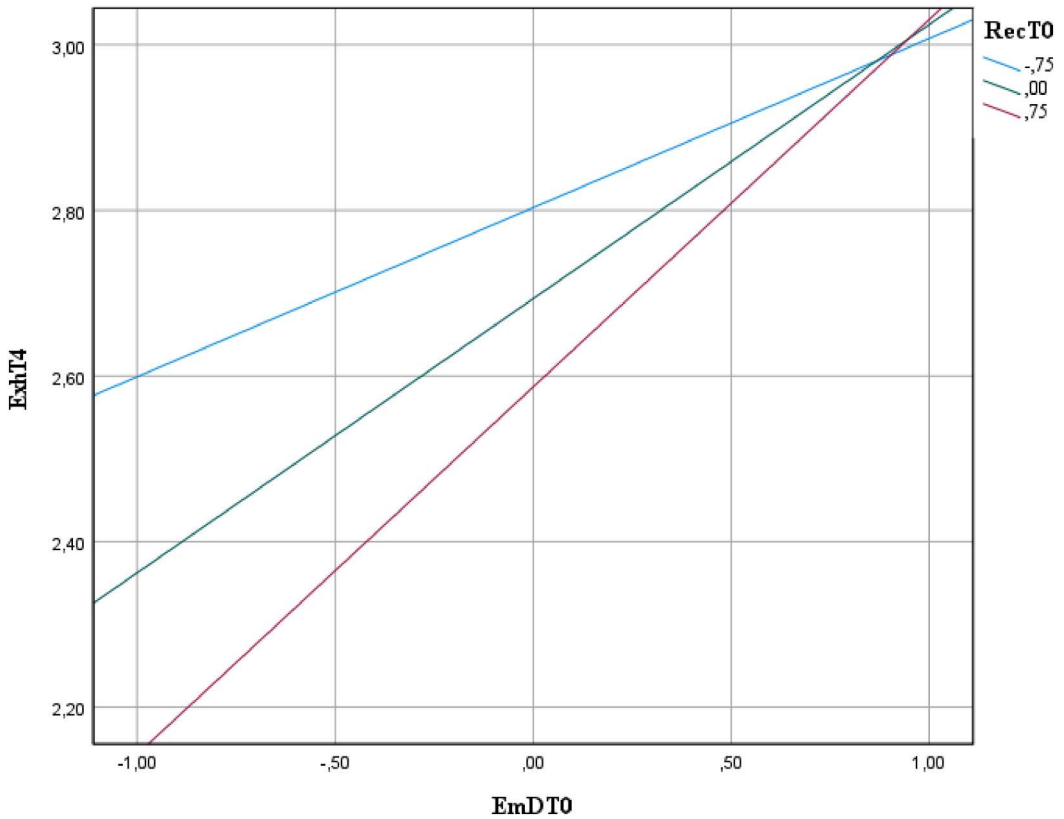


Figure 3. Standardised regression estimates for the structural model of relations between job demands, job resources, and exhaustion, work engagement and teachers' intention to remain at their workplace at 24 months.

Note: * significant at the 0.05 level; ** significant at the 0.01 level. Dashed lines indicate non-significant paths.

Table 7. Conditional effects of recognition.

Recognition	Effect	SE	t	p	95% CI	
					Lower	Upper
-1 SD	.21	.09	2.18	.03	.02	.39
Mean	.33	.06	5.20	.00	.20	.45
+ 1 SD	.45	.08	5.49	.00	.29	.61

**Figure 4.** Conditional effects of recognition on the relationship between emotional demands and exhaustion at 24 months.

workplace at 24 months. However, indirect effects were found between emotional demands, work pace and teachers' intention to remain at their workplace via exhaustion. No indirect effects were found between the four job resources and retention intention at 24-months (see Table 5). The moderation analysis revealed only one significant moderating effect of the four job resources on the relationship between the three job demands and exhaustion at 24 months (H7b). The results revealed a positive and marginally significant moderating effect of recognition on the relationship between emotional demands and exhaustion at 24 months ($b = 0.161$, $SE = 0.083$, $p < 0.05$, 95% CI = $-0.01, 0.32$) (see Table 6). The conditional effect of recognition on the relationship between emotional demands and exhaustion at 24 months is displayed in Table 7 and in Figure 4.

5. Discussion

The current study explored the concurrent relations between three job demands and four job resources with exhaustion, work engagement, and teachers' intention to remain at their workplace

at 12 and 24 months. Subsidiary analyses were also conducted to explore indirect associations from job demands and job resources to teachers' intention to remain at their workplace via the health-impairment and motivational processes. The study also explored potential moderating effects of job resources on the health-impairment process at 12 and 24 months. In the following sections, we discuss the influence of the health-impairment and motivational processes on teachers' intention to remain at their workplace at 12 and 24 months.

5.1 The influence of the health-impairment and motivational processes on teachers' retention intention at 12 and 24 months

Our hypothesis were supported as the results at 12 months provided support for both the health-impairment process and the motivational process. However, the results at 24 months only provided support for the health-impairment process. Similar to studies in the teacher turnover literature, our findings confirm the strong influence of the health-impairment process on teachers' intention to remain at their workplace (Madigan & Kim, 2021). In line with the JD-R model, emotional demands and work pace both predicted exhaustion at 12 months, which in turn was strongly associated with a lower retention intention at 12 months. As there are conceptual similarities between work pace, a construct that measures the intensity of quantitative demands at the workplace, and the related construct time pressure, our findings align with previous studies showing an association between teachers' perceived time pressure and exhaustion (Skaalvik & Skaalvik, 2018). Unlike previous studies (e.g., Räsänen et al., 2020), quantitative demands did not significantly predict exhaustion at 12 or 24 months. Unexpectedly, work pace positively predicted work engagement at 24 months which aligns with some previous findings (e.g., Collie, 2023). A potential explanation for this could be that time pressure can to a certain extent be viewed as a motivating job challenge (Van den Broeck et al., 2010), a notion further supported by the curvilinear relationship between time pressure and work engagement observed in other studies (Schmitt et al., 2015). This unexpected finding gives credence to calls for differentiation among different types of job demands as the influence of job demands may not be as homogenous as proposed by the JD-R model (Podsakoff et al., 2007). Our findings showing a strong relationship between emotional demands and exhaustion at 12 and 24 months suggests that it is a salient job demand in the teaching profession. The teaching profession requires substantial emotional activity in terms of managing challenging interpersonal situations involving students, parents, colleagues and supervisors while simultaneously having to regulate personal emotions to adhere to the organisational and professional expectations placed upon them (Chang, 2009). In line with this, emotionally demanding aspects of the teaching profession has been found to be a salient predictor of teachers' well-being in several studies (Wang et al., 2019).

Our results provide partial support for our hypotheses relating to the motivational process as it was only weakly associated with teachers' intention to remain at their workplace at 12 months and showed no significant association at 24 months. A statistical explanation for this unexpected finding is that the high mean score on the work engagement scale indicates the presence of a ceiling effect which produces low variances. As such, the values in work engagement are not adequately reflected in the lower response range of the dependent variable which is expected to reduce the correlation. Therefore, we urge caution in the interpretation of this result. However, previous studies has shown that exhaustion pervades all the other aspects of teachers work-related perceptions and is the strongest determining factor for teachers' retention intention (Madigan & Kim, 2021). As such, the results of the current study cautiously questions whether high levels of job resources are sufficient to counteract the health-impairing effect of job demands and its subsequent influence on teachers' intention to remain at their workplace and suggests that teacher retention policies should focus on optimising job demands, particularly teachers' emotional demands, rather than primarily focusing on enhancing teachers' job resources. Recognition and opportunities for professional development displayed durable influences on work engagement at 12 and 24 months which provides support for

professional development opportunities being an important factor for work engagement (Crawford et al., 2010; Halbesleben, 2010). Social support from supervisors and social support from colleagues were negatively associated with work engagement at 12 and 24 months. Furthermore, the negative association between social support from supervisors and work engagement becoming stronger at 24 months and higher levels of support was related to higher levels of exhaustion at 24 months. This finding was unexpected given that numerous studies have identified social support from colleagues and supervisors as key job resources that positively influences teachers' job attitudes (Struyve et al., 2016; Thomas et al., 2020) and which lowers the risk of burnout (Avanzi et al., 2018; Temam et al., 2019). Although surprising, some studies have shown that social support, even if ostensibly helpful, may in some cases have a negative effect on employees (Beehr et al., 2010). Furthermore, a recent systematic review of longitudinal studies examining the determinants of teacher burnout by Mija-koski et al. (2022) found that the strongest evidence of the association between social support and exhaustion was in fact contradictory, as teachers and principals who reported higher levels of community support were also more susceptible to community stress (Beausaert et al., 2016). Moreover, further research is needed to clarify reversed and reciprocal effects as the unidirectional relationships proposed by the initial JD-R model may not solely explain the relationship between job characteristics, well-being, and organisational outcomes (Lesener et al., 2018; Schaufeli & Taris, 2014). It is possible that the observed reverse effects in our findings are indicative of the person-situation approach found in the newer conceptualisations of the JD-R model which captures self-undermining behaviour and job crafting processes (Bakker et al., 2023).

5.2 Delving further into the motivational process

We hypothesized that job resources would moderate the impact of job demands on exhaustion at 12 and 24 months; however, our results only revealed one moderation which contradicted our hypothesis. The moderation analysis found that recognition, which strongly positively predicted work engagement and strongly negatively predicted exhaustion, actually strengthened the relationship between emotional demands and exhaustion at 24 months. A potential explanation for this unexpected finding could be that high levels of recognition could potentially intensify the emotional demands teachers experience at work, as it may lead to them over-exerting themselves which results in higher levels of exhaustion. Therefore, it is possible that this finding is indicative of self-undermining behaviour found in the newer conceptualisations of loss spirals in the JD-R model (Bakker et al., 2023). This unexpected finding calls for further examinations of the interaction between job resources and job demands and their subsequent influence on teacher well-being using a person-centred approach as it could provide further information about the co-occurrence of burnout and engagement in teachers and how this in turn relates to gain and loss spirals proposed in the JD-R model (Abós et al., 2019). Although some studies have provided evidence for the buffering effects of job resources (e.g., Dicke et al., 2018), the lack of other buffering effects observed in our study aligns with previous studies suggesting that the buffering hypothesis needs further development (Fagerlind Ståhl et al., 2018; Hu et al., 2013; Maas et al., 2021; Mathieu et al., 2018).

5.3 Limitations

The study has several limitations that should be acknowledged. The first limitation is the drop-out rate between 12 and 24 months ($n = 111$) which reflects the teachers who left their school and/or the profession. Although the use of a closed-cohort sample is a strength as the study focuses on factors that facilitate teachers' retention intention, the reduced sample size at the 24-month follow-up increases the risk for type II error. Another limitation is the use of shortened measures of exhaustion (Demerouti et al., 2010) and the ultra-short version of work engagement (UWES-3; Schaufeli et al., 2017). Although validated instruments, the use of these measures may prevent comparisons with other studies measuring exhaustion with both positive and negative items and the full Utrecht

Work Engagement scale. However, previous studies have demonstrated acceptable reliability for the negatively worded exhaustion scale (Sedlar et al., 2015) and the UWES-3 (Schaufeli et al., 2017). In addition to this, the study relied on self-report data for both the independent and dependent variables which is prone to common method biases and thus may limit the reliability and validity of our measurement (Podsakoff et al., 2003). However, the longitudinal study design may reduce the influence of common method bias due to the temporal separation of the studied measures (Jordan & Troth, 2020). The use of a subjective intention-based measure of retention is another limitation of the study. Although intention-based measures have been found to be a strong predictor of actual turnover (Rubenstein et al., 2018), recent empirical data has shown a weak relationship between teachers' retention intentions and their actual retention (Grant & Brantlinger, 2023). This tenuous link with actual retention behaviour questions the validity of intention-based measures as it is unclear whether they capture behavioural antecedents or psychological traits. However, Likert scale measures of retention intention that align with commitment, as used in the current study, have been found to be the most predictive measure of actual teacher retention (Grant & Brantlinger, 2023). Lastly, a more robust test of the hypothesized relationships proposed by the JD-R model would consider the dynamic nature of job demands and job resources, as teachers' perceptions of their work environment may change over time, and that this change may in turn have an independent effect on the studied outcomes. As such, future studies should take this temporal aspect into account and examine whether temporal changes can have an independent effect on teachers' work-related health, engagement and intention to remain at the workplace using autoregressive modelling.

5.4 Conclusion and practical implications

The main implication of our results is the importance of workplace interventions targeting the reduction of teachers' emotional demands and work pace and enhancing teacher recognition to facilitate better work-related health and teacher retention. Although Swedish schools are required to actively engage in the systematic work environment management to protect the health and safety of their employees (The Swedish Work Environment Authority, 2015), many schools struggle with their work environment management (The Swedish Work Environment Authority, 2017). Our results suggest that schools should strengthen the implementation of their systematic work environment management and that teacher retention policies should address job demands, particularly teachers' emotional demands, rather than primarily focusing on enhancing teachers' job resources.

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Disclosure statement

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Data availability statement

The dataset used in the current study is not publicly available in line with the Swedish ethical review approval.

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