Received: 8 March 2022 | Revised: 11 July 2022 | Accepted: 19 August 2022

DOI: 10.1002/pits.22788

RESEARCH ARTICLE

WILEY

Investigating teachers' job satisfaction, stress and working environment: The roles of self-efficacy and school leadership

Armin Jentsch[1] | Frances Hoferichter[1] | Sigrid Blömeke[2] | Johannes König[3] | Gabriele Kaiser[4,5]

[1]Department of Education, University of Greifswald, Greifswald, Germany

[2]Centre for Educational Measurement Oslo (CEMO), University of Oslo, Oslo, Norway

[3]Faculty of Human Sciences, University of Cologne, Cologne, Germany

[4]Faculty of Education, University of Hamburg, Hamburg, Germany

[5]Faculty of Education and Arts, Nord University, Bodø, Norway

Correspondence

Armin Jentsch, Department of Education, University of Greifswald, Ernst-Lohmeyer-Platz 3, 17489 Greifswald, Germany.
Email: armin.jentsch@uni-greifswald.de

Funding information

Bundesministerium für Bildung und Forschung

Abstract

This study investigates the relations between working environment and teachers' job satisfaction, perceived work-related stress, as well as work-related self-efficacy. The sample consisted of 226 mathematics teachers from German secondary schools. About 55% were female and they had been teaching for 13 years on average. We used self-reported measures to assess how teachers perceived their working environment (regarding autonomy, feedback, and social support by colleagues), administrative leadership and teachers' work-related self-efficacy, as well as job satisfaction and work-related stress. Structural equation modeling demonstrates that teachers' job satisfaction and stress were significantly associated with self-efficacy (moderate to large effects) and an administrative leadership at the corresponding schools (small to moderate effects). The effect of social support on teachers' job satisfaction and stress was fully mediated by teachers' self-efficacy. Our findings underscore the importance of self-efficacy and a positive working environment for teachers' job satisfaction and stress.

KEYWORDS

job satisfaction, perceived stress, self-efficacy, structural equation modeling, working environment

1 | INTRODUCTION

This study investigates the relations between working environment and teachers' job satisfaction, perceived work-related stress, as well as work-related self-efficacy. Former studies have often restricted themselves to either school-level or individual protective factors when investigating teachers' job satisfaction and perceived stress. To do so, however, we are convinced that it is necessary to take both perspectives into account. Thus, we consider the interplay between contextual factors, such as the perceived working environment (e.g., autonomy, feedback, and support) and an administrative leadership, as well as teachers' work-related self-efficacy as an individual factor.

Smetackova et al. (2019) presented a large-scale study with 2394 teachers in which they discussed the crucial role of teachers' job satisfaction as a resource for burnout prevention. In a recent study with 511 German school teachers Dreer (2021) also found that satisfied teachers reported more positive emotions and were less likely to quit their jobs than their less satisfied colleagues. On the contrary, teachers who regularly experience high levels of stress, emotional exhaustion, as well as burnout tend to leave the profession (Leung & Lee, 2006; Richards et al., 2019; Skaalvik & Skaalvik, 2011). Various studies have indicated that the stress teachers experience is transmitted to school students and colleagues. As such, stressed teachers seem to support their students less (Tikkanen et al., 2021) which ultimately leads to decreased student motivation and academic performance (Madigan & Kim, 2021). At the same time, prevalence of colleagues' perceived burnout relates strongly to individual teachers' burnout (Bakker & Schaufeli, 2000).

However, to enhance teachers' job satisfaction on the one hand and inhibiting work-related stress on the other hand, it is essential to investigate protective factors within the working environment (e.g., autonomy, support, and feedback) that could act as psychological resources. Thereby, the working environment refers particularly to the quality of personal relationships at the working place and includes support as well as feedback from colleagues, but also other conditions that may affect teachers' job satisfaction, such as work-related autonomy. By autonomy we refer to teachers' independence in making decisions on their teaching practices and material (e.g., free choice of teaching content and material, Barbieri et al., 2019; Hoy & Miskel, 1982). Teachers with higher autonomy are usually also more satisfied with their jobs (Dou et al., 2017; see also Moen et al., 2013). If teachers receive social support by others, they feel more related (Wentzel, 1998), less exhausted (Betoret, 2006; Collie et al., 2012), and report higher job satisfaction (Harris et al., 2007). Feedback from fellow teachers is understood as an indicator of teacher collaboration (Kelchtermans, 2006; Shah, 2012) and positively associated with job satisfaction (Nias, 1999), but also professional development (Hausman & Goldring, 2001; Retallick & Butt, 2004), as well as school effectiveness (Barth, 2006; Marks & Louis, 1997).

Teachers' self-efficacy is seen as an important individual protective factor to prevent them from feeling chronically stressed and eventually, suffering from burnout (e.g., Ballantyne & Retell, 2020; Skaalvik & Skaalvik, 2007). Self-efficacy is defined as an individual's belief in his or her ability to overcome challenging situations (Bandura, 1977). Teachers with high work-related self-efficacy are convinced that they can manage activities such as lesson planning or organizing a classroom discussion. They are also convinced to have a positive impact on their students' development (Guskey & Passaro, 1994) and are more satisfied with their jobs (Smetackova et al., 2019). Some studies also show that self-efficacy could act as a mediator between contextual factors and teachers' job satisfaction or perceived stress (Benevene et al., 2019; Lazarus & Folkman, 1984; Malinen & Savolainen, 2016).

Another factor that contributes to how teachers perceive their working environment is the schools' administrative leadership. With this term we refer to a particular behavior of the school managers which is perceived by the teachers at the corresponding schools as supportive, communicative, and efficient (e.g., being clear about their goals for school development, see also DeMartino & Weiser, 2021). As such, policy research stresses that the working conditions, including school leadership, teacher autonomy and collegiality present essential factors for teachers' mental health (Béteille & Loeb, 2009; Ingersoll, 2001; Ladd, 2011). In a similar vein, Blömeke and Klein (2013) demonstrate that the role of the school's principal is of great importance for teachers' perceptions on their

work environment. For this reason, we intend to add to the body of research by investigating into the effect of an administrative leadership.

2 | HYPOTHESES

Figure 1 presents a conceptual model summarizing the investigated relationships of how teachers' job satisfaction and stress (outcomes) relate to teachers' working environment (predictor) as well as work-related self-efficacy (mediator) and administrative leadership, which is described in detail in the following. As various studies point in the direction that teachers' job satisfaction is negatively associated with the stress they perceive (Dreer, 2021; Skaalvik & Skaalvik, 2011; Tikkanen et al., 2021), we hypothesize:

H1: *Teachers' job satisfaction and perceived work-related stress are negatively correlated.*

To get a better understanding of how teachers perceive their working environment, we asked teachers how autonomous they felt at their schools, as well as whether they received feedback or social support from their colleagues on a regular basis. Teachers reporting a higher amount of psychological resources are assumed to be more satisfied with their jobs, and at the same time perceive less stress (Bakker & Demerouti, 2007; Lazarus & Folkman, 1984; Magnano et al., 2014; Moen et al., 2013). Thus, we propose a hypothesis on teachers' working environment:

H2: *The perceived working environment, that is, perceived autonomy, support, feedback is positively related to job satisfaction and negatively related to work-related stress.*

Beyond the role of the working environment, this study aims at a better understanding of both individual (i.e., work-related self-efficacy) and school-level factors (i.e., administrative leadership) which can preserve teachers' job satisfaction and support them in coping with stressful situations at work (Lazarus & Folkman, 1984). In line with suggestions from the literature, we study the effects of self-efficacy (Ballantyne & Retell, 2020; Benevene et al., 2019; Smetackova et al., 2019) and an administrative leadership (Blömeke & Klein, 2013; DeMartino & Weiser, 2021). In particular, the findings of Malinen and Savolainen (2016) indicate that teachers' self-efficacy could be a mediator between a positively perceived working environment and their job satisfaction. We therefore investigate hypotheses H3–H5, but we do not propose a hypothesis regarding an administrative leadership. Even though the

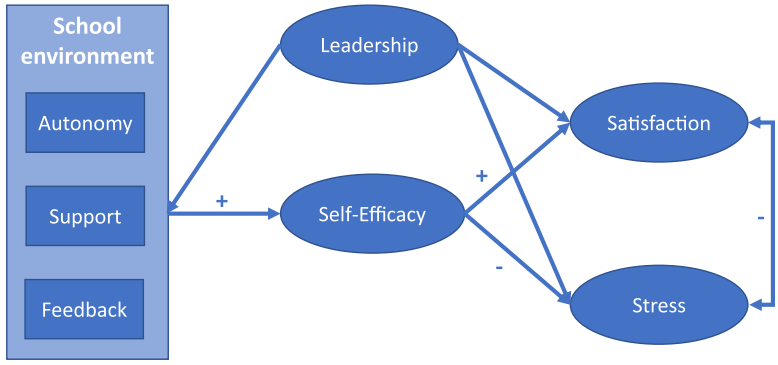

FIGURE 1 Conceptual model for the relations between perceived school environment and leadership, teachers' self-efficacy, stress, as well as job satisfaction. "+" indicates a positive and "-" a negative hypothesized association.

direction of the effects on working environment and teachers' job satisfaction or perceived stress could be derived from experience, there is still limited empirical evidence.

H3: *Teachers' perceived work environment, that is, autonomy, feedback, and support, is positively related to their work-related self-efficacy.*

H4: *Teachers' self-efficacy is positively related to their job satisfaction and negatively related to their work-related stress.*

H5: *Teachers' self-efficacy mediates the relationship between their perceived work environment on one hand, as well as job satisfaction and stress on the other hand.*

3 | MATERIALS AND METHODS

3.1 | Study design and participants

The teachers in our study were sampled conveniently and participated either in research project 1 or its successor research project 2 (blinded for peer review). Whereas research project 1 took place in a German metropolitan area, research project 2 focused on more provincial areas in Germany. Data were collected from 226 mathematics teachers at secondary schools. The study participants had been teaching for med = 13 years (min = 1, max = 40). A little less than half of them were male (45%) and about the same proportion of the sample taught in a higher-track school "Gymnasium" (48%), which is the school track in Germany that prepares students particularly for an academic career. The participants in our study finished their university degrees with good grades (GPA med = 3.0, min = 1.0, max = 4.0).

Our research was conducted under the guidelines for safeguarding good research practice by the German Research Foundation (2013). Teachers gave their informed consent to participate in our study, that is, they took part in the study on a voluntary basis. The questionnaires were administered online, so the teachers were free to decide on the time and location of their participation. In addition, all study participants were informed about the research goals of the studies and received the same instructions. Finally, anonymity was assured during all steps of data procession.

3.2 | Measures

All measures were constructed from self-reported data. *Job satisfaction* was assessed with 12 items prompted by the phrase "Overall, my job is …" (Oshagbemi, 1999). Examples of the items we used include "enjoyable" and "fulfilling," and teachers had to agree or disagree with these statements on 4-point Likert scales. Teachers' perceptions of *work-related stress* were assessed with nine items which were initialized by the phrase "What are some of the difficulties or challenges that you have encountered in your current teaching position?" (Blömeke & Klein, 2013). The participants received examples such as "Classroom management/student behavior" or "Working with parents or guardians" which they had to rate on 4-point Likert scales ranging from "not a problem" to "major problem."

Autonomy was captured by three items which were prompted by the question "How much control do you feel you have in your classroom over each of the areas below?" (OERI, 1991). Some examples included "Selecting content, topics and skills to be taught" and "Determining the amount of homework to assign." Teachers answered how much autonomy they perceived on four-point Likert scales that ranged from "none" to "a great deal." *Feedback* was assessed with three items that were initialized by the question "How often have you received appraisal and/or feedback from the following people about your work as a teacher?" (e.g., headmaster, teachers' colleagues, OECD,

2010). Study participants answered on six-point Likert scales ranging from "never" to "more than once a month." *Social support* was assessed with two items on 4-point Likert scales. Similarly, teachers were asked whether they were supported in their daily work by headmasters and colleagues with answers ranging from "not at all" to "frequently."

Work-related self-efficacy was captured with five items (Blömeke & Klein, 2013). These were initialized by the phrase "In the course of a year in the classroom, a teacher is expected to complete a diverse array of tasks. How easy was it for you to complete the following tasks?" Examples included "Knowing/understanding mathematics content" or "Planning mathematics lessons," and we used five-point Likert scales ranging from "very difficult" to "very easy," where a higher rating indicated that teachers were more convinced to complete the task successfully. Finally, *administrative leadership* was assessed with eight items (OECD, 2010), and captures the principal's quality as a school leader for instance "The principal sets priorities, makes plans and sees that they are carried our" or "The principal knows what kind of school they want and have communicated it to the staff." Teachers' were asked to express their agreement with these statements on 4-point Likert scales.

3.3 | Statistical analysis

Statistical analysis was performed using IBM SPSS 25 and Mplus 8.1 (Muthén & Muthén, 2017). In a first step, we report descriptive statistics and bivariate correlations for all variables. We also calculated split-half reliabilities based on the Spearman-Brown formula for our measures, which is a more adequate estimate than Cronbach's α in the case of two items or parcels (Eisinga et al., 2012). In a second step, we checked for measurement invariance across several groups. Finally, we used structural equation modeling to answer our research questions.

Because the sample size in our study was borderline, we tried to keep our models as parsimonious as possible. Little et al. (2002) recommend item parceling as a convenient method to decrease the number of estimated parameters as long as the main research interest is to investigate relations between the latent variables (as opposed to estimating item parameters or finding a measurement model). Because this was the case in the present study, both outcome variables (job satisfaction, work-related stress), administrative leadership and work-related self-efficacy were statistically modeled by two item parcels each. The item parcels were built by randomly assigning each item of the corresponding scales to one of the two parcels. Factor loadings were fixed to one except for one loading for administrative leadership which was estimated freely to maintain acceptable model fit. However, autonomy, social support and feedback could not be modeled as latent variables, because the number of items available was too small to build item parcels. As a result, we used the mean scores of the corresponding scales in our final model.[1]

Because we deal with a convenience sample, we additionally decided to test for measurement invariance across several groups (i.e., study 1 vs. study 2, academic vs. nonacademic track, males vs. females). A set of multigroup confirmatory factor analyses was carried out (Meredith, 1993; Millsap, 2011) which involved all the latent variables in our study. We first specified baseline models (configural invariance) such that the latent variables were modeled by the same indicators across groups. We then gradually increased the number of restrictions by constraining the factor loadings (metric invariance) and finally the intercepts to be equal across groups (scalar invariance). It should be noted again that metric invariance in this case was reached by equating just one loading. The models were evaluated by the usual fit indices (Hu & Bentler, 1999), that is, the χ^2 test statistic, the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA). For good model fit, the χ^2 test should be insignificant, CFI ≥ 0.98 and RMSEA < 0.05. For an acceptable model fit at least CFI ≥ 0.95 and RMSEA < 0.08 should apply. Nested models were compared by χ^2 difference tests (e.g., when testing for measurement invariance).

[1]An exploratory factor analysis involving autonomy, competence, and relatedness items was performed to ensure construct validity. It yielded the expected three-dimensional solution, that is, items that were intended to capture the same latent construct loaded on the same factors.

TABLE 1 Pearson correlations and descriptive statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1. JS_1	–										
2. JS_2	0.67**	–									
3. ST_1	−0.39**	−0.27**	–								
4. ST_2	−0.43**	−0.27**	0.51**	–							
5. SE_1	0.23**	0.27**	−0.24**	−0.21**	–						
6. SE_2	0.34**	0.28**	−0.28**	−0.29**	0.46**	–					
7. AL_1	0.12**	−0.03	−0.11	−0.22**	0.01	0.02	–				
8. AL_2	0.26**	0.12*	−0.17**	−0.36**	0.06	0.10	0.77**	–			
9. AU	0.22**	0.21**	−0.14*	−0.15*	−0.14*	0.07	0.10	0.12*	–		
10. FB	0.18***	0.13*	−0.21**	−0.30**	−0.13*	0.10	0.20**	0.33**	0.02	–	
11. SS	0.16*	0.12*	−0.23**	−0.20**	0.06	0.16*	0.40**	0.43**	−0.03	0.24**	–
M	3.29	2.89	2.71	2.47	2.67	2.90	2.88	3.00	3.35	3.41	2.29
SD	0.44	0.70	0.44	0.36	0.50	0.39	0.59	0.65	0.52	1.10	0.72
Min	2.00	1.00	1.33	1.67	1.50	1.67	1.00	1.25	2.00	1.00	1.00
Max	4.00	4.00	3.67	3.50	4.00	4.00	4.00	4.00	4.00	6.00	4.00

Abbreviations: AL, administrative leadership; AU, autonomy; FB, feedback; JS, job satisfaction; SE, self-efficacy; SS, social support; ST, perceived stress; XX_1, first item parcel; XX_2, second item parcel.

*$p < .05$; **$p < .01$.

Regarding our final model, it should be noted that the correlation between leadership and teachers' self-efficacy was suppressed in the model specification because we wanted to separate the effects of individual and school-level resources. A saturated model still confirmed a nonsignificant association between administrative leadership and self-efficacy (not presented here, effect size as shown in Table 1). We also investigated whether the effects of teachers' perceived feedback, social support and autonomy were mediated by their self-efficacy. By doing so, we estimated the indirect effects for each of the three manifest variables. Because for indirect effects the normality assumption typically does not hold (MacKinnon et al., 2012), we applied bootstrapping with 2000 replications and estimated confidence intervals to check for statistical significance.

The type-1 error level was set to 5% during all steps of statistical analysis. To classify effect sizes, we use Cohen's approach (Cohen, 1992). Missing data were not perceived as a major problem in the present study. Less than 5% of the data were missing. However, we took missingness into account by applying the *Full Information Maximum Likelihood* (FIML) method implemented in Mplus.

4 | RESULTS

4.1 | Descriptives and correlations

In Table 1 we present descriptive statistics and bivariate correlations for all variables. It should be noted that most of the correlations are statistically significant. However, work-related self-efficacy in particular seems to be related only to job satisfaction and work-related stress, but not to the working environment. Surprisingly, autonomy is

neither associated with social support nor feedback. Split-half reliability coefficients were acceptable in most cases, but borderline for self-efficacy and autonomy (job satisfaction: 0.80, work-related stress: 0.68, work-related self-efficacy: 0.63, leadership: 0.87, autonomy: 0.57, feedback: 0.65, and social support: 0.71).

4.2 | Measurement invariance across groups

To ensure that our measurement models hold across different subsamples, we checked for invariance with regard to three control variables. The results are presented in Table 2. Model 1 focuses on teachers' responses collected in study 1 or study 2, respectively. The baseline model assuming configural invariance has a good fit to the data ($\chi^2 = 45.4$, $df = 38$, $p = .19$, CFI = 0.99, RMSEA = 0.04). Further restrictions to metric or scalar invariance do not yield a statistically significant result (see also Figure 1). We can therefore conclude that the measurement of latent variables in our study was found to work similarly well across the two study samples. Models 2 and 3 test for measurement invariance across school track and gender. Similarly, the baseline models show at least acceptable fit to the data (Model 2: $\chi^2 = 35.3$, $df = 38$, $p = .59$, CFI = 1.00, RMSEA = 0.00, Model 3: $\chi^2 = 64.5$, $df = 38$, $p < .01$, CFI = 0.96, RMSEA = 0.08). Again, the analysis yields nonsignificant results for restricting factor loadings and intercepts (see Table 2).

4.3 | Structural equation model (SEM)

We finally present the results of a SEM with both manifest and latent variables to investigate the hypotheses. The model presented in Figure 2 shows acceptable fit to the data ($\chi^2 = 79.4$, $df = 44$, $p < .01$, CFI = 0.96, RMSEA = 0.06). It explained about 29% of the variability in teachers' job satisfaction and more than 45% of the variability in their stress perceptions. First, it should be noted that the outcomes of interest are moderately correlated (H1). As expected, teachers who feel more stressed with their work are less satisfied with their jobs (see Figure 2).

As depicted in Figure 2, receiving feedback from colleagues was negatively associated with teachers' perceived work-related stress, but not with their job satisfaction (H2). On the contrary, autonomy was weakly related to job satisfaction, but not to perceived work-related stress (H2). Perceived support was positively related to self-efficacy (H3) and self-efficacy was moderately positively associated with job satisfaction (H4). Teachers who report less self-efficacy are more stressed accordingly. Regarding the indirect effects of feedback, social support, and autonomy with teachers' self-efficacy, job satisfaction, and stress (H5) we found that only the effects of social support on both outcome variables were mediated by self-efficacy (see Figure 2). However, the indirect effect on job satisfaction and stress was small (job satisfaction: $\beta = .08$, 95% CI = [0.01−0.18], stress: $\beta = -.09$, 95% CI = [−0.20 to −.01]).

TABLE 2 Testing for measurement invariance across different subgroups

	χ^2			*df*			$\Delta\chi^2$			Δdf		
Model	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Configural	45.4	35.3	64.5	38	38	38	–	–	–	–	–	–
Metric	46.7	38.7	64.6	39	39	39	1.3	3.4	0.1	1	1	1
Scalar	56.3	46.7	68.2	43	43	43	9.6	8.0	3.6	4	4	5

Note: $^*p < .05$, $^{**}p < .01$. Subgroups: Model 1 = two groups (study 1 vs. study 2), Model 2 = two groups (academic vs. nonacademic track), Model 3 = two groups (male vs. female teachers). Model comparisons: metric versus configural, scalar versus metric based on the Satorra-Bentler scaled χ^2 difference test implemented in Mplus using the scaled χ^2 test statistic and the scaling correction factor.

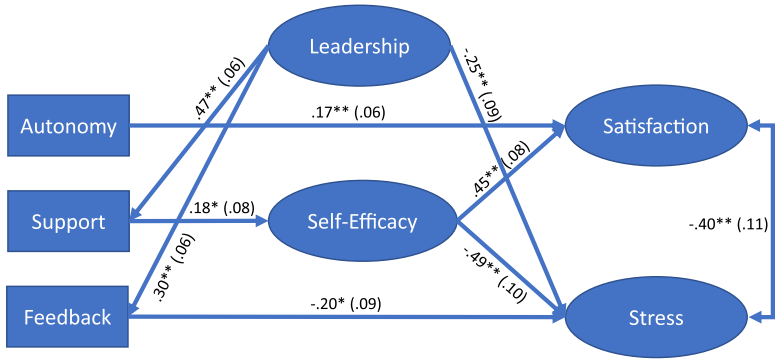

FIGURE 2 SEM for the relations between perceived school environment and leadership, teachers' self-efficacy, stress, as well as job satisfaction. For improved readability we present only statistically significant standardized coefficients with standard errors (*$p < .05$, **$p < .01$). SEM, structural equation model.

In addition, teachers who positively evaluated their administrative school leadership reported less stress and teachers who received frequent feedback were in turn more likely to evaluate their administrative school leadership positively. Similarly, the association between social support and an administrative leadership was positive and moderately sized. We did not find any effects of teachers' job satisfaction in relation to how teachers perceived their school's leadership. There were no significant relationships between teachers' autonomy and an administrative leadership.

5 | DISCUSSION

This study investigates the associations between German secondary school mathematics teachers' perceived work environment (i.e., feedback, support, and autonomy), their job satisfaction, and work-related stress. We assessed how well teachers perceived their working environment and studied the effects of how teachers rated the administrative leadership—as a school-level factor—and teachers' work-related self-efficacy—as an individual factor—to contribute to their job satisfaction and stress. We used questionnaires of teachers' self-reports and structural equation modeling to test our hypotheses H1–H5. The results demonstrate that teachers' job satisfaction and work-related stress were significantly correlated (H1).

The second hypothesis (H2) suggested a positive association between teachers' working environment (i.e., autonomy, feedback, and social support) and their job satisfaction, as well as perceived stress. In detail, the results show that social support is indeed associated with both job satisfaction and work-related stress, as found in various empirical studies (Collie et al., 2012; Harris et al., 2007). Teachers who feel they have autonomy in their work are more satisfied with their job, which was also found by Dou et al. (2017). Similarly, the frequency of perceived feedback is negatively related to work-related stress. Teachers receiving regular feedback from their peers thus feel less stressed in their workplace. In general, however, feedback among teachers is still rather rare—unless they find themselves in an examination situation—as often teachers' time is limited to teaching, planning lessons, educating, and diagnosing students, as well as administrative work. Giving positive and constructive feedback that encourages and supports others in their professional development needs to be practiced, otherwise feedback can even be perceived as discouraging, as the results of some studies indicate (e.g., Hercz & Pozsonyi, 2019; Hoferichter, 2019).

Regarding hypotheses H3-H5, our results underscore the importance of teachers' work-related self-efficacy. Both job satisfaction and work-related stress are moderately associated with self-efficacy, suggesting once more that teachers' beliefs in their own abilities might prevent burnout and preserve mental health (e.g., Lazarus &

Folkman, 1984; Skaalvik & Skaalvik, 2007). As such, work-related self-efficacy could act as an individual resource to cope with work-related stress and to strengthen job satisfaction (e.g., Ballantyne & Retell, 2020; Smetackova et al., 2019). Focusing on self-efficacy as mediator between teachers' working environment and their job satisfaction as well as perceived stress, the current study finds that the relations between social support and both job satisfaction as well as stress were fully mediated. This suggests that teachers' work-related self-efficacy explains a great share of the relationships between social support, job satisfaction, and perceived stress. Relating these findings to the professional development of teachers, the current study suggests strengthening work-related self-efficacy during the professionalization of teachers. This can be achieved during multifaceted mentored school internships (e.g., peer mentors, university mentors, and teacher mentors who received mentorship training), where preservice teachers are given the opportunity to apply different teaching methods, experience and reflect on their self-efficient behavior (Eisfeld et al., 2020).

Based on the present findings, an administrative school leadership could be a major factor to foster a productive working environment among teachers. We found that an administrative leadership had small to moderate effects on how teachers perceived their working environment in terms of autonomy, feedback, and social support, as well as teachers' stress. In detail, teachers who rated the administrative work of their school leaders to be of high quality, were less likely to experience work-related stress and more likely to receive both social support and regular feedback from their colleagues. As such, administrative leaders have an important role to play when it comes to teachers' job satisfaction and perceived stress, which has frequently been underscored by policy research (Béteille & Loeb, 2009; Ingersoll, 2001; Ladd, 2011). Finally, even though our results do not indicate a direct effect of the schools' leadership on teachers' self-efficacy, they suggest a mediated relation through the working environment, which could be further investigated in future studies. In line with Blömeke and Klein (2013) we argue that school leadership has the power to shape teachers' working environment in a positive manner, which could then in turn enhance their work-related self-efficacy (Malinen & Savolainen, 2016).

The present study is unfortunately not without limitations. First, our measures were constructed exclusively from teacher self-reports that can sometimes lack reliability, as it was observed in particular for our measures of autonomy and self-efficacy. We addressed this issue by performing structural equation modeling which takes measurement error in the latter case adequately into account (Kline, 2011). However, effect sizes of correlations between measures with mediocre reliabilities could have been underestimated. Second, a self-selection bias might have been introduced because we were not able to implement randomization nor a longitudinal design in our study. To maintain some external generalizability, we sampled teachers from different schools and German federal states. Third, we have only investigated mathematics classrooms. Future studies could therefore investigate how our findings depend on the study design either by conducting randomized interventions (e.g., with regard to causal interpretations of the reported effects) or large-scale assessment (Barbieri et al., 2019), and also by exploring different subjects or classrooms.

6 | CONCLUSIONS

This study finds that how well mathematic teachers perceive their working environment relates positively to their job satisfaction, and negatively to their work-related stress. As part of the working environment, administrative leadership may contribute to minimizing teachers' stress levels, as long as administrative work entails transparency and follows clear frameworks on the values, rules, and social interaction at school. Beyond the working environment, teachers' work-related self-efficacy presents an individual resource that contributes to their job satisfaction and perceived stress. Therefore, self-efficacy should be emphasized and strengthened as a matter of teachers' professionalization and lifelong learning.

ACKNOWLEDGMENT

This study was funded by the German Federal Ministry for Education and Research [BMBF] under grant numbers 01PK15006A and 01PK15006B.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the authors. The data are not publicly available because they contain information that could compromise the privacy of research participants.

ORCID

Armin Jentsch http://orcid.org/0000-0002-2423-3955
Johannes König http://orcid.org/0000-0003-3374-9408

REFERENCES

Bakker, A. B. & Demerouti, E. (2007). The job demands-resources model: State of the art. *Journal of Managerial Psychology*, *2*, 309–328.

Bakker, A. B. & Schaufeli, W. B. (2000). Burnout contagion processes among teachers. *Journal of Applied Social Psychology*, *30*(11), 2289–2308.

Ballantyne, J. & Retell, J. (2020). Teaching careers: Exploring links between well-being, burnout, self-efficacy and praxis shock. *Frontiers in Psychology*, *10*, 2255.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioural change. *Psychological Review*, *84*(2), 191–215.

Barbieri, B., Sulis, I., Porcu, M., & Toland, M. D. (2019). Italian teachers' well-being within the high school context: Evidence from a large scale survey. *Frontiers in Psychology*, *10*, 1926.

Barth, R. S. (2006). Improving relationships within the schoolhouse. *Educational Leadership*, *63*(6), 8–13.

Benevene, P., De Stasio, S., Fiorilli, C., Buonomo, I., Ragni, B., Maldonado Briegas, J. J., & Barni, D. (2019). Effect of feachers' happiness on teachers' health. The mediating role of happiness at work. *Frontiers in Psychology*, *10*, 2449.

Béteille, T. & Loeb, S. (2009). Teacher quality and teacher labor markets. In G. Sykes, B. Schneider, D. N. Plank, & T. G. Ford (Eds.), *Handbook on education policy research* (pp. 596–612). American Educational Research Association.

Betoret, F. D. (2006). Stressors, self-efficacy, coping resources, and burnout among secondary school teachers in Spain. *Educational Psychology*, *26*, 519–539.

Blömeke, S. & Klein, P. (2013). When is a school environment perceived as supportive by beginning mathematics teachers? Effects of leadership, trust, autonomy and appraisal on teaching quality. *International Journal of Science and Mathematics Education*, *11*, 1029–1048.

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*(1), 155–159.

Collie, R. J., Shapka, J. D., & Perry, N. E. (2012). School climate and social-emotional learning: Predicting teacher stress, job satisfaction, and teaching efficacy. *Journal of Educational Psychology*, *104*, 1189–1204.

DeMartino, L. & Weiser, S. G. (2021). Administrative leadership in times of a global health crisis: Voices and images from the field. *Frontiers in Education*, *6*, 617857.

Dou, D., Devos, G., & Valcke, M. (2017). The relationships between school autonomy gap, principal leadership, teachers' job satisfaction and organizational commitment. *Educational Management Administration & Leadership*, *45*, 959–977.

Dreer, B. (2021). Teachers' well-being and job satisfaction: The important role of positive emotions in the workplace. *Educational Studies*, *1*(17), 1–17. https://doi.org/10.1080/03055698.2021.1940872

Eisfeld, M., Raufelder, D., & Hoferichter, F. (2020). Wie sich lehramtsstudierende in der entwicklung ihres berufsbezogenen selbstkonzepts und ihrer selbstwirksamkeitserwartung in neuen reflexiven praxisformaten von studierenden in herkömmlichen schulpraktika unterscheiden—Empirische ergebnisse einer landesweiten studie in Mecklenburg-Vorpommern [how student teachers differ in the development of their career-related self-concept and self-efficacy expectations in new reflexive practice formats from students in conventional school internships—Empirical results of a state-wide study in Mecklenburg-Western pomerania]. *Herausforderung Lehrer_innenbildung – Zeitschrift zur Konzeption, Gestaltung und Diskussion (HLZ)*, *3*(1), 48–66.

Eisinga, R., Te Grotenhuis, M., & Pelzer, B. (2012). The reliability of a two-item scale: Pearson, Cronbach or Spearman-Brown? *International Journal of Public Health 58*, (4)637–642.

German Research Foundation. (2013). *Proposals for safeguarding good scientific practice. Memorandum. Recommendations of the commission on professional self regulation in science*. Wiley-VCH.

Guskey, T. R. & Passaro, P. D. (1994). Teacher efficacy: A study of construct dimensions. *American Educational Research Journal*, *31*, 627–643.

Harris, J. I., Winskowski, A. M., & Engdahl, B. E. (2007). Types of workplace social support in the prediction of job satisfaction. *Career Development Quaterly*, *56*, 150–156.

Hercz, M. & Pozsonyi, F. (2019). Assessment and feedback as a factor of teachers' well-being. *Training & Practice*, *17*(1), 151–162.

Hoferichter, F. (2019). Stressbewältigung bei lehramtsstudierenden im schulpraktikum. ergebnisse zum mentoring [coping with stress in student teachers during school internships. results on mentoring]. *Journal für LehrerInnenbildung*, *3*, 98–104.

Hoy, W. K. & Miskel, C. G. (1982). *Educational administration: Theory, research, and practice*. Random House.

Hu, L. & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55.

Ingersoll, R. M. (2001). Teacher turnover and teacher shortages: An organizational analysis. *American Educational Research Journal*, *38*(3), 499–534.

Kelchtermans, G. (2006). Teacher collaboration and collegiality as workplace conditions. A review. *Zeitschrift für Pädagogik*, *52*, 220–237.

Kline, R. B. (2011). *Principles and practice of structural equation modeling*. Guilford.

Ladd, H. F. (2011). Teachers' perceptions of their working conditions: How predictive of planned and actual teacher movement? *Educational Evaluation and Policy Analysis*, *33*(2), 235–261.

Lazarus, R. & Folkman, S. (1984). *Stress, appraisal, and coping*. Free Press.

Leung, D. Y. P. & Lee, W. W. S. (2006). Predicting intention to quit among Chinese teachers: Differential predictability of the component of burnout. *Anxiety, Stress, & Coping*, *19*(2), 129–141.

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling: A Multidisciplinary Journal*, *9*(2), 151–173.

MacKinnon, D. P., Cheong, J., & Pirlott, A. G. (2012). Statistical mediation analysis. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), *APA Handbook of research methods in psychology, Vol. 2. Research designs: Quantitative, qualitative, neuropsychological, and biological* (pp. 313–331). American Psychological Association.

Madigan, D. J., & Kim, L. E. (2021). Does teacher burnout affect students? A systematic review of its association with academic achievement and student-reported outcomes. *International Journal of Educational Research*, *105*, 101714. https://doi.org/10.1016/j.ijer.2020.101714

Magnano, P., Santisi, G., & Ramaci, T. (2014). Does the metacognitive attitude predict work motivation in Italian teachers? *Open Journal of Social Science*, *2*, 96–105.

Malinen, O.-P. & Savolainen, H. (2016). The effect of perceived school climate and teacher efficacy in behavior management on job satisfaction and burnout: A longitudinal study. *Teaching and Teacher Education*, *60*, 144–152.

Marks, H. M., & Louis, K. S. (1997). Does teacher empowerment affect the classroom? The implications of teacher empowerment for instructional practice and student achievement. *Educational Evaluation and Policy Analysis*, *19*(3), 245–275.

Meredith, W. (1993). Measurement invariance, factor analysis and factorial invariance. *Psychometrika*, *58*, 525–543.

Millsap, R. E. (2011). *Statistical approaches to measurement invariance*. Routledge.

Moen, P., Kelly, E. L., & Lam, J. (2013). Healthy work revisited: Does reducing time strain promote women's and men's well-being? *Journal of Occupational Health Psychology*, *18*, 157–172.

Muthén, L. K. & Muthén, B. O. (1998–2017). *Mplus User's Guide* (8th Edition). Muthén & Muthén.

Nias, J. (1999). Teachers' moral purposes: Stress, vulnerability, and strength. In R. Vandenberghe, & A. M. Huberman (Eds.), *Understanding and preventing teacher burnout* (pp. 223–237). Cambridge University Press.

OECD. (2010). *TALIS 2008: Technical report*. OECD.

OERI. (1991). Teacher survey. Retrieved February 2, 2022, from http://www.stanford.edu/group/suse-crc/cgi-bin/drupal/sites/default/files/survey/OERI-teacher-survey1991.pdf

Oshagbemi, T. (1999). Overall job satisfaction: How good are single versus multiple-item measures? *Journal of Managerial Psychology*, *14*(5-6), 388–403.

Retallick, J., & Butt, R. (2004). Professional well-being and learning: A study of teacher-peer workplace relationships. *Journal of Educational Enquiry*, *5*(1), 85–99.

Richards, K. A. R., Washburn, N. S., & Hemphill, M. A. (2019). Exploring the influence of perceived mattering, role stress, and emotional exhaustion on physical education teacher/coach job satisfaction. *European Physical Education Review*, *25*(2), 389–408.

Shah, M. (2012). The importance and benefits of teacher collegiality in schools – A literature review. *Procedia Social and Behavioural Sciences*, *46*, 1242–1246.

Skaalvik, E. M., & Skaalvik, S. (2007). Dimensions of teacher self-efficacy and relations with strain factors, perceived collective teacher efficacy, and teacher burnout. *Journal of Educational Psychology*, *99*, 611–625.

Skaalvik, E. M., & Skaalvik, S. (2011). Teacher job satisfaction and motivation to leave the teaching profession: Relations with school context, feeling of belonging, and emotional exhaustion. *Teaching and Teacher Education*, *27*(6), 1029–1038.

Smetackova, I., Viktorova, I., Martanova, V. P., Pachova, A., Francova, V., & Stech, S. (2019). Teachers between job satisfaction and burnout syndrome: What makes difference in Czech elementary schools. *Frontiers in Psychology*, *10*, 2287.

Tikkanen, L., Pyhältö, K., Soini, T., & Pietarinen, J. (2021). Crossover of burnout in the classroom—Is teacher exhaustion transmitted to students? *International Journal of School & Educational Psychology*, *9*(4), 326–339.

Wentzel, K. R. (1998). Social relationships and motivation in middle school: The role of parents, teachers, and peers. *Journal of Educational Psychology*, *90*, 202–209.

How to cite this article: Jentsch, A., Hoferichter, F., Blömeke, S., König, J., & Kaiser, G. (2022). Investigating teachers' job satisfaction, stress and working environment: The roles of self-efficacy and school leadership. *Psychology in the Schools*, 1–12. https://doi.org/10.1002/pits.22788