International Journal of Educational Research 133 (2025) 102698

Contents lists available at ScienceDirect

International Journal of Educational Research

journal homepage: www.elsevier.com/locate/ijedures

Same job title, same stress? Insights from an analysis of stress profiles of school principals in Switzerland

Ariana Garrote, Ella Grigoleit *, Pierre Tulowitzki

FHNW University of Applied Sciences and Arts Northwestern Switzerland, Switzerland

ARTICLE INFO

Keywords:
Educational leadership
Work-related stress
Stress profiles
Professional Development
Self-Efficacy

ABSTRACT

The job of a school principal can be highly demanding, with stress levels depending on the individual's perception (i.e. perceived work overload) and coping behaviors (i.e. intensification and extension of working hours). To provide adequate support to school principals, it is imperative to identify those who are more at risk and to examine the related factors. We examine stress profiles of principals in Switzerland and their association with factors at the school (i.e., level, size) and principal level, such as individual characteristics (i.e., workload, qualification, self-efficacy) and professional development activities (i.e., coaching, peer mentoring, networks, informal exchange, conferences). Data from 1095 principals in pre-primary, primary, and lower-secondary schools were collected with questionnaires. Using latent profile analysis (LPA), profiles of principals with high, average, and low levels of stress were identified. The results show that most school principals were in the average profile and only a small group reported low levels of stress. The high-stress profile included one-third-of school principals, who were more likely responsible for pre-primary and primary level schools. Their levels of stress were associated with lower levels of self-efficacy beliefs but also with more frequent participation in professional development activities, such as coaching and peer mentoring. School size, official workload, and the qualification were not associated with stress profile membership. The findings highlight the importance of considering the school context as well as individual characteristics when investigating school principals' stress to develop tailored measures.

Introduction

School principals play a key role in ensuring school quality and can influence various school-level factors (Wu & Shen, 2022). In many countries, their responsibilities encompass multiple areas, such as administration, organizational management, school improvement, quality management, and development (Ärlestig et al., 2016). As intermediaries between local authorities, teachers and parents and as public figureheads of schools, they are confronted with a multitude of expectations from various stakeholders.

International evidence suggests that school principals face increasing demands and hence higher levels of stress (Jong et al., 2017; Marsh et al., 2023). Some may experience feelings of work overload and attempt to get more work done (intensification of working hours) and/or potentially work longer hours (extension of working hours) to cope with the demands of work. With the perception of extraordinary demands and such potentially self-endangering responses to them (Dettmers et al., 2016) comes the risks of professional frustration, burnout and leaving the position of principal or even the educational profession altogether. More than a fifth of the

* Corresponding author.
E-mail address: ella.grigoleit@fhnw.ch (E. Grigoleit).

https://doi.org/10.1016/j.ijer.2025.102698
Received 6 June 2024; Received in revised form 30 May 2025; Accepted 1 July 2025

principals in the United States quit after one year (Hansen, 2018; Swen, 2020); in the French-speaking part of Switzerland, a similar proportion regularly consider resigning from the principalship (Denecker, 2019), thereby creating a significant turnover risk for this position. Frequent principal turnover has been demonstrated to negatively affect school culture and student achievement (Boyce & Bowers, 2016; Jong et al., 2017; Mahfouz, 2020; Tran, 2016).

Despite sharing the same job title, individuals can perceive and cope with work-related demands differently (Folkman, 2013). Against this backdrop, we aimed to identify whether multiple stress profiles exist among school principals in the German-speaking part of Switzerland. Whereas identifying school principals reporting high levels of stress can help pinpoint risk factors, analyzing the context and characteristics of school principals experiencing low levels of stress provides insights into facilitating factors for managing this highly demanding job. We therefore sought to understand the factors that might be associated with the likelihood of belonging to a particular stress profile. Gaining more insights into the various factors that contribute to school principals' stress levels is essential to ensure that they are equipped with the necessary tools and knowledge to be successful and satisfied in their profession. It is also vital to design fitting support efforts and policies that eliminate or mitigate the factors that cause stress.

School principals and their relevance for the quality of schools

Educational-leadership research has a long tradition in English-speaking countries, which still influences current international discourses in the field (Ärlestig et al., 2016). In many non-English-speaking countries, school principals and their practices only drew significant scholarly interest starting in the 1990s. Whereas earlier discourses reflected the assumption that school principals might directly influence students' academic achievements, more contemporary perspectives reveal a broader view, acknowledging diverse, indirect, and reciprocal patterns of influence (Day et al., 2016; Leithwood et al., 2020). As a result, school leadership has come to be understood as indirectly influencing student learning, mediated by a range of contextual factors, which in turn may influence school leaders' practices (Hallinger & Heck, 2011; Leithwood et al., 2017). The meta-analysis by Grissom et al. (2021) of 395 US studies underscores the complex, bidirectional relationships among school leadership, context, and student achievement and outlines principal behaviors influencing school effectiveness, including building culture, teamwork, and strategic oversight.

Like in the US context, albeit more slowly and on a smaller scale, school leadership practices have progressively garnered increased attention from German-speaking educational policy, research, and practical discourses. Particularly with the emergence of altered governance and management paradigms, encapsulated under the term "new public management," leading to expanded autonomy and heightened accountability at the individual school level, school principals have gained significance as central actors in the educational system (Altrichter & Maag Merki, 2016; Tulowitzki & Grigoleit, 2023). Despite being comparably limited in number and scope, studies from German-speaking countries largely underpin results from research in Western English-speaking countries, indicating that school leadership considerably influences various aspects, such as teachers' commitment (Pietsch et al., 2019), professional self-image, well-being, teaching practices (Pietsch & Tulowitzki, 2017), and school culture (Schreier & Ammann, 2023). Therefore, there is also evidence from German-speaking countries highlighting the important role school principals play in determining school quality (Pietsch et al., 2016).

Stress and school leadership

Stress can be understood as a "transactional process occurring when an event is perceived as relevant to an individual's well-being, has the potential for harm or loss, and requires psychological, physiological, and/or behavioral efforts to manage the event and its outcomes (Lazarus & Folkman, 1984)" (Salomon, 2013, p. 1886). Such an understanding "emphasizes the relationship between the person and the environment, which takes into account characteristics of the person on the one hand, and the nature of the environmental event on the other" (Lazarus & Folkman, 1984, p. 21). Lazarus and Folkman (1984) proposed that appraisal and coping act as mediators in the relationship between an individual and their environment (Folkman, 2013). Appraisal consists of evaluating the demands of a situation vis-à-vis the individual's capabilities and available resources. Coping "refers to the thoughts and actions people use to manage distress (emotion-focused coping), manage the problem causing the distress (problem-focused coping), and sustain positive well-being (meaning-focused coping)" (Folkman, 2013, p. 1914). Situational control appraisals, according to Lazarus and Folkman, refer to an "individual's evaluations of the demands of the situation, as well as his or her coping resources and options and ability to implement the needed coping strategies" (1984, p. 69). These appraisals closely align with Bandura's concept of self-efficacy, particularly in terms of efficacy expectancy – the belief in one's capacity to implement necessary coping strategies to achieve desired outcomes. How sudden demands are perceived and coped with can vary from person to person and their contexts. Therefore, studies on stress often consider the characteristics and backgrounds of the individuals as well as the job characteristics (Folkman, 2013).

Dettmers et al. (2016) built on the transactional stress model, situating self-endangering work behaviors within problem-focused coping. They posit that managers and leaders often use functional behaviors to deal with high work demands (e.g., perceived work overload) and to achieve work goals. However, these behaviors are dysfunctional regarding health and recovery (Dettmers et al., 2016). These self-endangering behaviors include trying to work longer (extension of working hours) and trying to accomplish more than previously in the same amount of time (intensification of working hours) (Dettmers et al., 2016; Knecht et al., 2017).

The current state of research suggests that school principals experience significant work-related stress attributed to their work demands (Mahfouz, 2020). Additionally, ties between well-being and job performance as well as school principal turnover can be identified (Snodgrass Rangel, 2018). School principal roles and levels of perceived job stress seem to be influenced by school-specific factors (Collie et al., 2020; Marsh et al., 2023; Su-Keene & DeMatthews, 2022) and personal factors, such as professional self-image (Warwas, 2009). Although school principals' job profiles and domains of responsibility may exhibit some similarities between

nations, significant variations can exist among their education systems (Ärlestig et al., 2016), potentially impacting the well-being and stress school principals experience. Therefore, findings on the professional experiences of school principals in German-speaking countries are presented.

School level factors of stress

A large-scale study involving approximately 4300 participants in Germany (Dadaczynski & Paulus, 2016), focusing on school principals' well-being, showed that about a quarter of the surveyed school principals exhibited signs of diminished well-being, 12 % of whom were assumed to experience depressive symptoms. Moreover, Dadaczynski and Paulus (2016); Dadaczynski et al., (2020) identified disparities between primary and secondary school principals: primary school principals reported more teaching obligations and received less support from administrative staff or extended leadership teams than their secondary school counterparts, leading to increased workload.

Evidence from Switzerland suggests similar structural and staffing differences between school levels, likely affecting school principal's perceived stress, even though – unlike in Germany – school principals in Switzerland are not required to also teach. For example, Pekruhl et al. (2011) showed that primary schools have significantly higher rates of part-time employment and less administrative staff than secondary schools. In addition, primary school principals are predominantly challenged by demands, such as increased parental involvement and pedagogical challenges (Brauckmann & Herrmann, 2013; Nido et al., 2008). Such work-related demands have been found to affect school principals' well-being (Dadaczynski & Paulus, 2016), underscoring the impact of cumulative demands and activities on perceived stress levels and resulting self-endangering behaviors. These findings are consistent with other studies from German-speaking countries that have reported more critical levels of satisfaction and stress among primary school principals (Harazd et al., 2009) than among their colleagues in secondary schools.

Another school level factor is school size. A recent study found differences based on school size, indicating that principals serving larger student populations (501–1000 students) were more likely to report lower job satisfaction, which increases the risk of stress (Groß et al., 2024). However, there is a lack of research on this relationship, particularly from German-speaking countries.

Individual-level factors of stress

Although the importance of effective leadership for the quality and performance of school systems is well established (Leithwood et al., 2017), the understanding of individual factors affecting school principals' experience of stress remains limited.

In the face of continually evolving demands and shifting expectations, it is unsurprising that workload, particularly in the administrative domain, emerges as a primary source of work-related stress for principals (OECD, 2018). A recent comprehensive analysis of data collected over a decade (2011–2020) further corroborates this finding, indicating that workload ("sheer quantity of work") is among the predominant factors contributing to principals' stress at work (Arnold et al., 2023).

Findings pertaining to other factors, such as the relationship between gender and school principals' stress experiences, are inconclusive. Whereas previous studies have shown being female is the main risk factor associated with poorer mental health (Phillips et al., 2007, 2008) and female principals reported more signs of possible exhaustion disorder than their male counterparts (Persson et al., 2021), other studies (Dadaczynski & Paulus, 2016; Darmody & Smyth, 2016) could not detect gender-specific differences. However, differences regarding age were noted. The youngest age group was found to have the lowest levels of well-being, positively correlated with age, possibly due to increased experience and established routines at work as well as possibly improved strategies for coping with work-related demands (Dadaczynski & Paulus, 2016). Whereas stress levels tend to be higher in the early stages of a career, suggesting that previous experience as a principal may affect how job demands are perceived and coped with as a result of being better equipped for their current role, stress levels appear to rebound with age and tenure in a position (Darmody & Smyth, 2016).

In this context, the role of professional development and qualification programs in mitigating work-related stress remains a relatively understudied area. Although prior research in the domain of the teaching profession has indicated that qualification and professional development could have an impact on work-related stress and strain Fernet et al. (2012); O'Connor and Clarke, (1990), evidence regarding principals is missing. Continuous professional development is often not mandatory for school principals in German-speaking countries. Therefore, little research has been conducted to investigate possible interactions between professional development activities and school principals' stress levels (Dadaczynski et al., 2020) although it is argued that school principals "should be placed more firmly at the focus of school health education and school health promotion" (Dadaczynski et al., 2020, p. 234) to support their health and that of the school community (Beausaert et al., 2016; Mahfouz, 2020).

A growing body of international research suggests that school principals' self-efficacy beliefs may influence their commitment and that of their teachers, particularly in the face of adversity (Hallinger et al., 2018; Mahfouz et al., 2021; Mavi et al., 2023). Therefore, principals with a strong sense of self-efficacy seem not only to contribute positively to their school but are also more likely to experience personal benefits. On this note, Federici and Skaalvik's (2011, 2012) research illustrates that school principals with higher levels of self-efficacy show greater work engagement and experience lower levels of burnout and work alienation, critical to their well-being and their professional efforts as school principals. Scholars also stress that school principals' self-efficacy beliefs have implications for organizational learning and schools' capacities to innovate. As Hesbol (2019) shows, school principals' self-efficacy and perceptions of their school as a learning organization are positively correlated. This relationship implies that school principals with high self-efficacy beliefs are more likely to foster an environment that embraces learning and continuous improvement, which is believed to be relevant for the adaptability and capacity necessary for the development of schools (Maag Merki, 2017).

The Swiss context

Switzerland is a direct democracy with four official languages and 26 federal states, called cantons. Educational authority rests with the cantons, which delegate some of it to the local municipalities. A national law exerts pressure to continually harmonize key characteristics of each canton's educational system. The Swiss Conference of Cantonal Ministers of Education (EDK) serves as a coordinating body for educational policy, aiming to develop policies that can be adopted in all cantons, thereby establishing national frameworks.

In most of Switzerland, schools operated without school principals until about the turn of the millennium. In a move toward improved school governance, formal school principals were then introduced, creating a new level of governance. The responsibilities of the position were expanded, and a mandatory in-service qualification curriculum was ratified by the EDK in 2009 and implemented at higher-education institutions across Switzerland. In most cases, school principals in Swiss public schools are former teachers who have participated in this in-service qualification, totaling at least approximately 450 h.

According to a Program for International Student Assessment (PISA) study, Swiss school principals bear a significant number of responsibilities and rights related to school governance (corresponding almost exactly to the OECD average; OECD, 2016, p. 115). This includes recruiting and managing teachers, deciding on (some) budget allocations, and navigating local school policies. Additionally, schools in Switzerland enjoy a significant degree of autonomy, again corresponding to the OECD average (OECD, 2016, p.119). Swiss schools and principals are estimated to operate in a low-stakes accountability context (Hangartner, 2019).

Present study

As shown, the job of school principals can be demanding depending on contextual factors of the school, such as school level and size, but also in dependence of school principals' individual characteristics, such as their self-efficacy beliefs, their official workload, and their professional development activities. However, drawing on the transactional model, we can assume that individuals perceive and cope with high work-related demands in different ways (Folkman, 2013). Only some principals might perceive high levels of work overload and might try to cope with self-endangering behaviors such as extending and intensifying their working hours. Such individuals at risk of experiencing high levels of stress require targeted support. For the development of tailored support measures, a person-centered approach seems appropriate (Woo et al., 2018). This approach allows us to examine stress profiles and related factors at the school level (i.e., size, level) and individual level (i.e., self-efficacy beliefs, workload, qualification, professional development activities). We contribute to the research by investigating the following questions:

1. What profiles of stress can be found by looking at school principals' perception of work overload, and coping behavior (i.e., extending and intensifying working hours)?
2. Which factors of the school (i.e., school size, school level) and of the principals (i.e., self-efficacy beliefs, official workload, qualification, professional development activities) are associated with profile memberships?

Method

Participants and procedure

Data was collected from October to November 2022 using a standardized online questionnaire. For this purpose, $N = 2369$ school principals of pre-primary, primary, and lower-secondary levels in the German-speaking part of Switzerland were invited via personalized emails to participate in the study. $N = 1095$ school principals participated in the survey. Because all questions were optional, the response rate varied slightly across the items. Participants (49.3 % female) were on average 45 years old.

Measures

Indicators of stress profiles

School principal's perceived work overload was assessed with a subscale consisting of three items from the short form of the Trier Inventory for Chronic Stress (TICS, Schultz et al., 2004; for English version, see Petrowski et al., 2012). This was done to reduce the participants' time expenditure; other scholars have successfully used the adapted subscale in the educational context (e.g., Groß Ophoff & Pfurtscheller, 2024). School principals were asked to rate the extent to which they perceived work overload (e.g., "There are times when I have too many commitments to fulfill") on a five-point scale (1 = "never" to 5 = "very often"). The scale's internal consistency was very good ($\alpha = 0.83$). For each participant, an average score of perceived work overload was calculated ($n = 1083$, $M = 3.26$, $SD = 0.81$, Min = 1, Max = 5).

The extension and intensification of working hours were measured using two scales (Krause et al., 2015; for English version, see Knecht et al., 2017). School principals rated the extension of working hours in the three months prior to taking the survey using five items (e.g., "How often did it happen that you gave up breaks – short breaks or lunch breaks – during working hours?") on a six-point scale (1 = "never" to 6 = "very often"). The scale's internal consistency was acceptable ($\alpha = 0.77$). For each participant, an average score of the extension of working hours was calculated ($n = 1086$, $M = 4.09$, $SD = 0.88$, Min = 1.4, Max = 6).

The intensification of working hours in the three months prior to taking the survey was assessed with three items (e.g., "How often did it happen that you were working at a pace that you could not sustain over the long term?"). Principals rated the intensification of

their work on a six-point scale (1 = "never" to 6 = "very often"). The scale's internal consistency was very good ($\alpha = 0.9$). For each participant, an average score of the intensification of working hours was calculated ($n = 1086$, $M = 3.94$, $SD = 1.06$, Min = 1, Max = 6).

Factors at the school level

School principals were asked to indicate the school level they were responsible for. Options included the pre-primary level (first and second year of preschool, 4- to 6-year-olds), the primary level (first to sixth grade in primary school, 6- to 12-year-olds), and the lower-secondary level (first to third grade in secondary school, 12- to 15-year-olds). Multiple choices were allowed. Most participants ($n = 853$) indicated being responsible for pre-primary through primary level students (Table 1). Approximately a fifth of participants ($n = 242$) were also or exclusively responsible for lower-secondary level students. For the analysis, a dichotomous variable was built with principals who were responsible for students from pre-primary through primary levels versus principals who were responsible for lower-secondary level students. Most principals responsible for lower-secondary level students were male (65.7 %) whereas more than half of the principals exclusively responsible for pre-primary and/or primary level students were female (55.7 %).

To assess the school size, principals indicated the number of students enrolled in their schools. There was a high variance between the schools, ranging from 12 to 3330 students (Table 1). The broad range can be explained by the fact that Switzerland does indeed have a few very small schools and that some school principals lead so-called "school sites," which are clustered as one school. Although legally speaking, each school site doesn't constitute its own independent school, functionally speaking, there are many similarities. The average school size was 440 students in pre-primary and primary schools ($SD = 402.21$, Min = 18, Max = 3330) and 403 students in lower-secondary schools ($SD = 428.55$, Min = 12, Max = 3300).

Factors at the school principal level

School principals indicated their official workload ranging from 0 to 100 %, 100 % corresponding to a full-time equivalent, which in Switzerland corresponds (in most cases) to a standard 42-hour work week. Quotas ranged from 8 to 200 %. Values that exceeded 100 % (e.g., 200 %) were set to 100 %. This was done in 17 cases. Most school principals worked between 80 and 100 % (Table 1).

To assess their qualification, principals were asked to indicate whether they had acquired a certificate of advanced studies in school leadership (a standardized certificate received after having completed the principal qualification in Switzerland) or were currently attending such a course. Most school principals had such a qualification (Table 1).

School principals' self-efficacy was assessed with six items based on Schmitz and Schwarzer (2002). School principals rated on a four-point scale (1 = "I do not agree at all" to 4 = "I totally agree") how much they agreed with various statements related to their self-efficacy beliefs (e.g., "I have the confidence to inspire the teachers in my school for new projects") or the collective self-efficacy beliefs at the school (e.g., "I believe in the strong innovation potential in my school, which enables us to implement innovations even under adverse circumstances"). The scale's internal consistency was acceptable ($\alpha = 0.67$). For each participant, an average self-efficacy score was calculated ($n = 1093$, $M = 3.22$, $SD = 0.41$, Min = 1.5, Max = 4.5).

The extent to which school principals used various forms of professional development activities was assessed with five items based on the TALIS 2018 (OECD, 2019). The principals rated on a five-point scale (1 = "to no extent" to 5 = "to a high extent") the extent to which they had used coaching, peer mentoring, and networks of principals, had conducted informal exchanges with other school principals, and attended conferences in the last twelve months (Table 1).

Statistical analysis

In a first step, a confirmatory factor analysis (CFA) with the R package lavaan version 0.6–19 (Rosseel, 2012; Rosseel et al., 2019) was used to test the relationships between the three indicators of stress (i.e., perceived work overload, extension and intensification of working hours). Goodness of fit was evaluated with chi-square test, comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root-mean-square residual (SRMR). The CFA results indicated a good fit between the model and the observed data for the three factors, $\chi^2(41) = 240.69$, $p = .000$, CFI = 0.97, RMSEA = 0.07, SRMR = 0.04. The results showed a standardized covariance of 0.89 between perceived work overload and intensification of working hours, suggesting a possible

Table 1
Participant and school characteristics.

	n (%)	*M* (*SD*)	Missing
Female participants	540 (49.3 %)		55
Pre-primary and primary school level	853 (77.9 %)		0
Qualification	1052 (96.1 %)		3
Age	1075	45.16 (8.35)	20
School size (number of students)	1087	431.93 (408.21)	8
Workload	1091	78.16 (21.24)	4
Participating in coaching	1058	2.11 (1.25)	37
Participating in peer mentoring	1066	1.84 (1.1)	29
Engaging in network of/for principals	1067	2.88 (1.19)	28
Informal exchanges with other principals	1053	3.83 (0.89)	42
Attending conferences	1066	2.61 (1.13)	29

Note. [a] Values are not standardized.

multicollinearity. However, the three-factor model was significantly better than a one-factor model ($\Delta\chi^2(3) = 485.27$, $p = .000$, $\Delta CFI = 0.075$) and a two-factor model with the items of perceived work overload and intensification of working hours specified in one factor ($\Delta\chi^2(2) = 155.82$, $p < .000$, $\Delta CFI = 0.024$). Thus, the three indicators were used in further analyses.

We used latent profile analysis (LPA) to examine profiles of principals with similarities in their levels of stress). The three variables perceived work overload, extension, and intensification of working hours were incorporated as indicators of latent profiles, which we refer to as stress profiles. LPA is a person-centered approach that allows for identification of unobservable profiles in a population based on observed variables. The aim is to uncover distinct profiles of individuals who share similar characteristics. Single imputation to data and scaling of the variables was applied in the models using the R package tidyLPA 1.1.0 (Rosenberg et al., 2018). Variances in the models were estimated to be equal across profiles, and the covariances were constrained to be zero. To determine the number of profiles, one- to five-profile solutions were tested in an iterative process. The best-fitting model was chosen based on the Akaike information criterion (AIC), the Bayesian information criterion (BIC), the Bootstrap Likelihood Ration Test (BLRT), and the entropy value (Tein et al., 2013). Smaller AIC and BIC values indicate a better fit. The BLRT tests' significant *p*-values indicate that the fit of a model with *k* classes improves significantly compared to the previous model with *k*-1 classes. Entropy indicates how well the LPA model distinguishes between profiles based on observed variables. A higher entropy value (closer to 1) suggests a more distinct and accurate classification (Nylund-Gibson et al., 2014). Values higher than 0.8 indicate that the latent classes are highly discriminating. The classification probabilities were also analyzed to select the model. The classification probabilities represent an individual's most likely latent profile membership. Similarly, values higher than 0.8 are recommended (Spurk et al., 2020). Finally, the class size served as a selection criterion because for analysis and interpretations of the results, a reasonable number of individuals in a profile is needed for analysis and interpretation of the results. In a final step, Bonferroni-corrected post hoc tests were conducted to confirm significant differences in the three stress indicators between the stress profiles, and multinomial logistic regression analysis with SPSS 27.0.1.0 was conducted to examine explanatory variables of profile membership. School variables (i.e., school size, school level) and school principal characteristics (i.e., gender, age, workload, qualification, self-efficacy beliefs) and professional activities (i.e., participating in coaching, peer mentoring, conferences, engaging in networks and professional exchanges) were included as explanatory variables.

Results

Correlations between study variables

Table 2 shows the correlations between the study variables. The three indicators of stress profiles (i.e., perceived work overload as well as extension and intensification of working hours) are significantly and positively correlated with each other. All three indicators are also significantly and positively correlated with the pre-primary and primary school levels and the school principals' gender. This indicates that female principals and principals responsible for students in pre-primary and primary schools reported higher levels of perceived work overload as well as extension and intensification of working hours. Gender is also positively correlated with the pre-primary and primary school levels and negatively correlated with school size and the official workload.

Neither school size, qualification, nor workload are significantly correlated with the three stress profile indicators. Age is negatively correlated with perceived work overload and the extension of working hours but not significantly correlated with the intensification of working hours. Age is positively correlated with workload, indicating that older principals had a higher number of working hours in their contracts. Workload, in turn, is positively correlated with school size. Furthermore, there are negative correlations between school principals' self-efficacy beliefs and the three stress profile indicators. School principals who reported higher levels of perceived work overload as well as intensification and extension of working hours were more likely to experience lower levels of self-efficacy. Also, a significant negative correlation indicates that school principals in pre-primary and primary schools were more likely to have lower levels of self-efficacy.

All variables regarding principals' professional development activities are significantly correlated with each other. The highest correlations were found among engaging in networks, attending conferences, and participating in informal exchanges with other principals. Looking at the relationship between stress on the one hand and professional development activities on the other, participating in coaching is positively correlated with all stress profile indicators, participating in peer mentoring is positively correlated with the extension of working hours, and attending conferences is negatively correlated with the extension and the intensification of working hours. This means that school principals who reported higher levels of stress were more likely to take part in coaching whereas taking part in peer mentoring was associated with an extension of working hours. In contrast, school principals reporting less extension and less intensification of working hours were more likely to attend conferences.

Coaching is significantly correlated with the pre-primary and primary schools and gender, indicating more frequent use of coaching by female principals and by principals responsible for students in pre-primary and primary schools. On the other hand, coaching is not correlated with school principals' self-efficacy beliefs, whereas all other behavior variables are. Therefore, principals using peer mentoring, networking with other principals, participating in informal exchanges, and attending conferences, reported higher self-efficacy beliefs. Further, age is only positively correlated with attending conferences and engaging in networks with other school principals. School size and workload are positively correlated with the use of peer mentoring, engaging in networks with other school principals, and attending conferences but not correlated with participating in coaching and informal exchanges with other school principals. Having a formal principal training qualification is not correlated with any of the variables related to principals' professional development.

Table 2
Bivariate correlations for the study variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1. Perceived work overload	1													
2. Extension of working hours	0.64***	1												
3. Intensification of working hours	0.77***	0.61***	1											
4. Pre-primary and primary school level (=1)	0.12***	0.1**	0.09**	1										
5. Gender (1 = female)	0.09**	0.14***	0.07*	0.24***	1									
6. Age	-0.1**	-0.1***	-0.05	-0.04	-0.05	1								
7. School size	0.05	0.01	0.04	0.04	-0.1***	.03	1							
8. Qualification (=1)	0.002	-0.01	0.01	-0.03	-0.03	-0.06	-0.03	1						
9. Workload	0.003	-0.02	0.04	-0.03	-0.26***	0.18***	0.31***	0.06	1					
10. Self-efficacy	-0.23***	-0.15***	-0.23***	-0.06*	-0.03	0.04	-0.04	0.01	-0.01	1				
11. Coaching	0.14***	0.1***	0.12***	0.08**	0.15***	0.02	0.02	0.004	0.05	-0.02	1			
12. Peer mentoring	0.05	0.1**	0.04	0.04	0.03	0.01	0.1**	0.01	0.09**	0.12***	0.15***	1		
13. Conferences	-0.06	-0.06*	-0.08*	0.01	-0.02	0.07*	0.09**	0.03	0.1***	0.06*	0.14***	0.13***	1	
14. Network	-0.01	0.03	-0.01	-0.02	-0.04	0.07*	0.07*	0.03	0.12***	0.09**	0.09**	0.21***	0.33***	1
15. Informal exchange	-0.01	0.01	-0.02	0.02	-0.05	0.01	0.04	0.01	0.04	0.09**	0.07*	0.21***	0.17***	0.3***

Note. *p < .05, **p < .01, ***p < .001, two-tailed. Pre-primary and primary school level vs. lower secondary school level, gender, and qualification (having an official principal qualification certification vs. not having one) are dichotomous variables.

Stress profiles based on indicators

To identify stress profiles based on the observed data, the model fit indices for one- to five-profile solutions were analyzed (Table 3). All profile solutions have a significant BLRT *p*-value; however, the three-profile solution is the most appropriate one. Its entropy is higher than in the two- and four-profile solutions. The five-profile solution has the lowest AIC and BIC values. However, the smallest profile in the five-profile solution only contains 6 % of the population whereas the smallest profile in the three-profile solution includes 14 % of the population. For these reasons, the three-profile solution was chosen for further analysis.

Three stress profiles were identified (Fig. 1). One profile is characterized by the lowest levels (LOW) in all three indicators and is the smallest profile, with 148 school principals (14 %). In this profile, the indicator "extension of working hours" is slightly higher than the other two indicators. The biggest profile of principals ($n = 624$, 57 %) is the one indicating average levels of stress (AVG). The third profile is characterized by the highest levels in all three stress indicators (HIGH). This profile includes 323 school leaders (29 %).

Bonferroni-corrected post hoc analyses revealed significant differences in the three indicators among the three stress profiles. School principals in the HIGH profile experienced significantly higher levels of stress than those in the AVG profile (perceived work overload: $p < .001$, $M_{Diff} = 1.04$, 95 %-CI[0.97, 1.11]; extension: $p < .001$, $M_{Diff} = 0.94$, 95 %-CI[0.83, 1.04]; intensification: $p < .001$, $M_{Diff} = 1.16$, 95 %-CI[1.06, 1.26]) and the LOW profile (perceived work overload: $p < .001$, $M_{Diff} = 2.15$, 95 %-CI[2.05, 2.26]; extension: $p < .001$, $M_{Diff} = 1.93$, 95 %-CI[1.77, 2.08]; intensification: $p < .001$, $M_{Diff} = 2.85$, 95 %-CI[2.71, 2.99]). The LOW profile experienced significantly lower levels than the AVG profile (perceived work overload: $p < .001$, $M_{Diff} = 1.12$, 95 %-CI[1.02, 1.21]; extension: $p < .001$, $M_{Diff} = 0.99$, 95 %-CI[0.85, 1.13]; intensification: $p < .001$, $M_{Diff} = 1.70$, 95 %-CI[1.57, 1.83]).

Explanatory variables of profile membership

A multinomial logistic regression was run to explore explanatory variables of profile membership. School principal characteristics (i.e., gender, age, workload, qualification, self-efficacy beliefs), school variables (i.e., school size, school level), and professional development activities (i.e., coaching, peer mentoring, participating in conferences, engaging in networks, participating in informal exchanges with other school leaders) were gradually included as explanatory variables. The HIGH profile was chosen as reference group.

Table 4 shows the three models. In model 1, school principal characteristics (i.e., gender, age, workload, qualification, self-efficacy beliefs) were examined as explanatory variables of profile membership. Whereas age, qualification, and official workload were not significant predictors, gender and self-efficacy significantly predicted profile membership. The results show that school principals in the AVG and LOW profiles reported significantly higher levels of self-efficacy beliefs than school principals in the HIGH profile. School principals in the HIGH profile were predominantly female. There were slightly older school principals in the LOW profile than in the HIGH profile.

In model 2, school factors (i.e., school size, school level) were included. Whereas school size was not a significant predictor of profile membership, school level was a significant predictor for the HIGH profile membership. This means that school principals who worked in pre-primary and/or primary schools were more likely to be in the HIGH profile and therefore reported higher levels of stress. Self-efficacy beliefs remained a significant predictor of profile membership: school principals in the HIGH profile had significantly lower levels of self-efficacy beliefs than school principals in the other profiles. Gender remained a significant predictor only between the AVG and HIGH profiles, indicating that female school principals were more likely to be in the HIGH profile than in the AVG profile. The difference in workload became significant between the AVG and HIGH profiles, suggesting that school principals with a higher workload were more likely to be in the HIGH profile than in the AVG profile.

In model 3, school principals' professional development activities (i.e., coaching, mentoring, conferences, engaging in networks, exchange) were included. Neither engaging in a network of school principals nor participating in informal exchanges with other school principals was a significant predictor of profile membership. The use of coaching and peer mentoring and attending conferences significantly predicted profile membership. School principals in the HIGH profile were more likely to use coaching than those in the AVG and LOW profiles. They were also more likely to use peer mentoring than school principals in the LOW profile. However, they were less likely to attend conferences than school principals in the AVG and LOW profiles. Gender, self-efficacy beliefs, school level, and workload remained significant predictors.

Table 3
Model fit indices for latent profile analysis, one- to five-profile solutions.

Nr. of Profiles	AIC	BIC	Entropy	CProb Min	CProb Max	Smallest Profile %	BLRT *p*
1	9331.42	9361.42					
2	8423.49	8473.47	0.74	0.88	0.95	36 %	0.01
3	7922.39	7992.37	0.81	0.88	0.93	14 %	0.01
4	7748.94	7838.91	0.78	0.82	0.92	9 %	0.01
5	7671.68	7781.65	0.78	0.82	0.91	6 %	0.01

Note. AIC = Akaike information criterion, BIC = Bayesian information criterion, BLRT = bootstrap likelihood ratio test, CProb = Classification probabilities for the most likely latent profile membership.

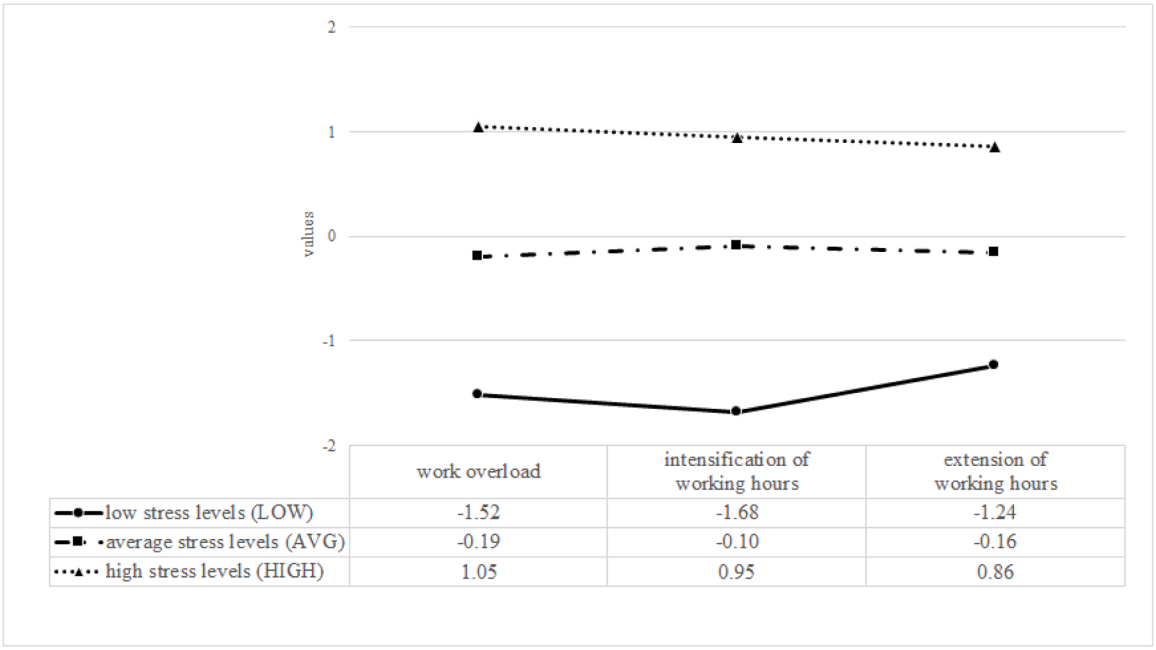

Fig. 1. Three-profile solution based on three stress indicators
Note: Mean values of profile estimates for each indicator of stress.

Discussion and limitations

A person-centered approach was used to identify principals of pre-primary to lower secondary schools with similar levels of stress. School principals' perceptions (i.e., work overload) and responses (i.e., extension and intensification of working hours) were examined as corresponding indicators. Three distinct stress profiles were identified: school principals with high, average, and low levels. Most school principals were found to experience average levels of stress, but almost a third of the sample were identified as experiencing high levels. The results also show that it is rather common to experience stress in this job: school principals who reported the lowest levels constituted the smallest group of the sample. This means that only 14 % of principals were less likely to perceive work overload in their job and to intensify and extend their working hours. This result is a cause for concern as it has the potential to result in health complications and burnout (Wright et al., 2023).

Further, we found that school principals experiencing the highest levels of stress were more likely to report lower levels of self-efficacy beliefs than their peers with average to low levels. Although causality is yet to be fully understood, studies focusing on teachers and some on school principals have indicated direct and mediated relationships between self-efficacy and several key factors related to the profession, including job satisfaction, engagement, and well-being (Federici & Skaalvik, 2012; Malinen & Savolainen, 2016; Skaalvik & Skaalvik, 2019). This result seems particularly important given that self-efficacy is related to how school principals foster the school's learning environment (Hesbol, 2019) and influence the school's ability to innovate in times of crisis (Röhl et al., 2022). Further research is needed to understand the underlying mechanisms of these associations to develop effective prevention strategies.

On a critical note, the present study was not designed to assess the extent to which school principals perceive demands as burdensome. Therefore, the heightened levels of stress of principals found in this study could (partly) reflect the expectations of the job, meaning that it is expected of principals to work overtime (to some extent) and consequently have fewer breaks and leisure time. However, our analyses also show that the workload was higher for principals in the HIGH profile compared to the AVG profile but not compared to the LOW profile. This suggests that a high number of working hours in the contract is not automatically associated with perceived work overload, extension, or intensification of working hours. Relatedly, Laux (2011) found a generally positive experience of stress in terms of school principals' desire to reenter the profession. In her study, 80 % of respondents indicated that they would choose their profession again.

Another aim of the present study was to identify factors that predict belonging to a certain stress profile. Looking at school factors, school size was not a significant predictor, but the school level significantly predicted the profile membership. Principals in pre-primary and primary schools were more likely to be in the HIGH profile than in the AVG or LOW profiles. In addition, school level was not correlated with school size. This suggests that the job demands of pre-primary and primary school principals are perceived as more demanding than those of school principals in lower-secondary schools, independent of the school size. These results align with those of previous studies (Brauckmann & Herrmann, 2013; Nido et al., 2008). The education system in Switzerland is highly tracked. After primary school, students in most cantons are assigned to a track in lower-secondary school based on their academic achievement

Table 4
Multinomial logistic regression models predicting stress profiles.

	Model 1						Model 2						Model 3					
	AVG vs. HIGH			LOW vs. HIGH			AVG vs. HIGH			LOW vs. HIGH			AVG vs. HIGH			LOW vs. HIGH		
	B (SE)	χ^2	*p*	*B (SE)*	χ^2	*p*	*B (SE)*	χ^2	*p*	*B (SE)*	χ^2	*p*	*B (SE)*	χ^2	*p*	*B (SE)*	χ^2	*p*
Male	0.6 (0.15)	15.68	**<0.001**	0.59 (0.22)	7.28	**.01**	.5(0.16)	10.12	**.001**	.4 (0.23)	3.1	.08	.39 (0.17)	5.56	**.02**	.32 (0.24)	1.73	.19
Age	.02 (0.01)	2.99	.08	0.03 (0.01)	3.96	.05	.02 (0.01)	2.96	.09	.02 (0.01)	3.44	.06	.01 (0.01)	2.27	.13	.02 (0.01)	1.32	.25
Workload	-0.01 (0.00)	3.62	.06	-0.01 (0.01)	3.53	.06	-0.01 (0.00)	4.13	**.04**	-0.01 (0.01)	2.42	.12	-0.01 (0.00)	5.26	**.02**	-0.01 (0.01)	2.2	.14
Qualification	-0.5 (0.42)	1.39	.24	-0.08 (0.63)	0.02	.9	-0.5 (0.42)	1.4	.24	-0.14 (0.64)	.05	.82	-0.42 (0.43)	.96	.33	-0.12 (0.64)	.04	.85
Self-efficacy	.83 (0.18)	22.12	**<0.001**	1.5 (0.27)	30.41	**<0.001**	.82 (0.18)	21.38	**<0.001**	1.47 (0.27)	28.65	**<0.001**	.8 (0.19)	18.25	**<0.001**	1.5 (0.29)	26.87	**<0.001**
School level							-0.54 (0.2)	6.87	**.01**	-0.94 (0.26)	12.53	**<0.001**	-0.51 (0.21)	5.85	**.02**	-0.84 (0.28)	9.15	**.002**
School size							.00 (0.00)	1.19	.28	.00 (0.00)	.05	.82	.00 (0.00)	.6	.44	.00 (0.00)	.23	.63
Coaching													-0.16 (0.06)	6.39	**.01**	-0.27 (0.1)	7.56	**.01**
Peer ment.													-0.03 (0.07)	.18	.67	-0.35 (0.12)	8.43	**.004**
Conferences													.17 (0.07)	5.58	**.02**	.28 (0.11)	7.23	**.01**
Network													-0.04 (0.07)	.31	.58	-0.08 (0.1)	.63	.43
Exchange													.08 (0.09)	.81	.37	.07 (0.13)	.29	.59

Note. Wald's χ^2 (df = 1). School level: pre-primary and primary school, peer ment.: peer mentoring. Significant effects are bold.

level. This means that after the transition from primary to lower-secondary school, the heterogeneity in terms of the student body's achievement level is significantly reduced. The lack of correlation between school size and stress levels underscores the central assumption of the transactional model (Folkman, 2013; Lazarus & Folkman, 1984): the subjective evaluation of specific demands in relation to available resources appears to be a more critical factor than the assessment of objective demands, such as school size. The results further indicate that a reduction in complexity (e.g., through tracking systems in secondary schools) may have an impact on the appraisal of job demands, which in turn may influence the experience of stress.

We also examined the predictive value of age and gender. Older and male school principals were more likely to have higher numbers of work hours in their contracts. We also found that female principals were more likely to be in the HIGH profile than in the AVG profile. This effect was not found when we compared the HIGH with the LOW profile. In addition, female school principals were more likely to lead a pre-primary and primary school than a lower-secondary school. Therefore, the relationship between gender and levels of stress is explained by the context factor of school level and by the lower number of hours in their contract rather than by the individual characteristics of the principals. In this line, age was not an explanatory variable for stress profile membership anymore after the school level was introduced. This result further supports the effect of school level (i.e., pre-primary and primary school vs. lower-secondary school) on principals' perceptions.

Although the (lack of) qualification of school principals was not correlated with a specific profile membership, some of their professional development activities were. Principals in the HIGH profile reporting were more likely to participate in coaching and less likely to attend conferences than their peers with average to low levels of stress. They also were more likely to use peer mentoring than principals with low levels of stress. Neither engaging in networks of school principals nor informal exchanges with other school principals predicted principals' stress profile membership. Due to the nature of the data, the causality of the relationship between these factors is not clear. However, we could assume that activities such as coaching and peer mentoring were used by principals experiencing high levels of stress as a coping strategy to deal with said stress. These principals probably also refrained from attending conferences to reduce the perceived work overload and the extension of working hours.

Although our study provides new insight into factors related to school principals' stress, there are important limitations. First, the data used is cross-sectional. In the absence of longitudinal observation, it is difficult to determine whether stress influenced school leaders' engagement in professional developmental activities, such as coaching, or whether the reverse is true. Second, all variables were assessed using self-reports of school principals, who were members of a national association of school leaders (which most principals in Switzerland are). The correlations might have been artificially inflated due to the shared method variance. Third, stress was operationalized as perceived work overload as well as intensification and extension of working hours. How burdensome the stress was for the school principals was not assessed. In addition, although the CFA confirmed a three-factor solution for the corresponding indicators, the results indicated a possible multicollinearity between the factors perceived work overload and intensification of working hours. Future studies should investigate school principals' levels of stress as well as professional activities with established multi-factorial scales and using multi-informant data and observations.

Fourth, the items used to assess school principals' professional development activities were based on the TALIS 2018 (OECD, 2019). They had to be included separately in the analysis because no factor was found although the items were correlated. More studies are needed to understand better which aspects constitute a measurable concept of principals' professional development or continuing education behavior. Finally, despite the advantages of using LPA to identify distinct profiles, the decision on the number of profiles and the indicators is complex. Further studies are necessary to validate the three profiles identified, ensuring their reliability and generalizability across multiple populations and contexts.

Conclusion

The present study contributes to the growing body of research indicating that the increasing complexity and multiple demands school principals face in their daily work life (Tamadoni et al., 2024) can be accompanied by high levels of stress (Marsh et al., 2023). Even though health management in the field of education is gaining attention, our findings highlight the need to take a closer look at school principals' work situation and associated demands as well as coping mechanisms to contribute to the development and implementation of preventive and interventional measures.

The study revealed a notable result: Higher levels of stress were linked to working in pre-primary and primary schools. In other words, there seems to be a divergence in their perception of and coping with work-related demands compared to their secondary-school colleagues although they hold the same job title. This may indicate that school principals at lower levels face a set of complexities and demands specific to their school level and therefore likely require adapted resources and support systems.

This finding reinforces the value of taking a nuanced view and exploring differences between schools to come to a better understanding of how particular factors and constellations may contribute to the perception of and coping with work-related demands in further research. Therefore, the in-depth exploration of group-specific differences seems to be a promising approach to identifying and addressing possible predictive factors, even at an early career stage, which could offer meaningful implications for qualification and continuous professional development programs. This requires a multidimensional perspective, including task-related aspects (e.g., instructional obligations, human resource management, administration), person-related characteristics (e.g., stress resilience, self-efficacy, coping), and contextual frameworks (e.g., governance, school-specific factors, support systems).

In the face of often challenging staffing situations in schools, a fundamental responsibility and challenge for practitioners, educational policymakers, and researchers alike (DeMatthews et al., 2021) is to address stress and strain factors as well as interactions between individual and contextual factors and to identify risk groups to derive targeted strategies for the support of school principals in their vital role for the educational system.

CRediT authorship contribution statement

Ariana Garrote: Writing – original draft, Formal analysis, Conceptualization, Methodology, Data curation. **Ella Grigoleit:** Writing – original draft, Conceptualization. **Pierre Tulowitzki:** Supervision, Funding acquisition, Writing – original draft, Project administration, Conceptualization.

References

Altrichter, H., & Maag Merki, K. (2016). Steuerung der entwicklung des Schulwesens [Governance of school system development]H. Altrichter, & K. Maag Merki (Eds.), Steuerung der entwicklung des Schulwesens [Governance of school system development]. *Handbuch neue steuerung im schulsystem [Handbook of new governance in the school system]*, 1–27. https://doi.org/10.1007/978-3-531-18942-0_1

Ärlestig, H., Day, C., & Johansson, O. (2016). *A decade of research on school principals*. Springer International Publishing. https://doi.org/10.1007/978-3-319-23027-6

Arnold, B., Rahimi, M., & Riley, P. (2023). The mental health of leaders in Australian government schools: Stress and burnout over a decade (2011–2020). *Educational Management Administration & Leadership*, 17411432231209713. doi:10.1177/17411432231209713.

Beausaert, S., Froehlich, D. E., Devos, C., & Riley, P. (2016). Effects of support on stress and burnout in school principals. *Educational Research, 58*(4), 347–365. https://doi.org/10.1080/00131881.2016.1220810

Boyce, J., & Bowers, A. J. (2016). Principal turnover: Are there different types of principals who move from or leave their schools? A latent class analysis of the 2007–2008 schools and staffing survey and the 2008–2009 Principal follow-up survey. *Leadership and Policy in Schools, 15*(3), 237–272. https://doi.org/10.1080/15700763.2015.1047033

Brauckmann, S., & Herrmann, C. (2013). Belastungserleben von Schulleiterinnen und schulleitern im rahmen erweiterter schulischer eigenständigkeit – Erste empirische befunde aus der SHaRP-Studie [Perceived stress of school principals in the context of increased school autonomy - Initial empirical findings from the SHaRP study]. In I. van Ackeren, M. Heinrich, & F. Thiel (Eds.), *Evidenzbasierte steuerung im bildungssystem? - Befunde aus dem BMBF-SteBis-Verbund [Evidence-based governance in the education system? - Findings from the bmbf stebis network]: 12. Evidenzbasierte steuerung im bildungssystem? - Befunde aus dem BMBF-SteBis-Verbund [Evidence-based governance in the education system? - Findings from the bmbf stebis network]* (pp. 172–196). Waxmann.

Collie, R. J., Granziera, H., & Martin, A. J. (2020). School principals' workplace well-being: A multination examination of the role of their job resources and job demands. *Journal of Educational Administration, 58*(4), 417–433. https://doi.org/10.1108/JEA-04-2019-0075

Dadaczynski, K., & Paulus, P. (2016). Wohlbefinden von schulleitungen in Deutschland: Ausprägungen und zusammenhänge mit arbeit und gesundheit [well-being of school principals in Germany: Characteristics and relationships with work and health. *Prävention und Gesundheitsförderung, 11*(3), 171–176. https://doi.org/10.1007/s11553-016-0544-3

Dadaczynski, K., Paulus, P., & Horstmann, D. (2020). The predictive value of individual and work-related resources for the health and work satisfaction of German school principals. *Health Education Journal, 79*(2), 225–236. https://doi.org/10.1177/0017896919867118

Darmody, M., & Smyth, E. (2016). Primary school principals ' job satisfaction and occupational stress. *International Journal of Educational Management, 30*(1), 115–128. https://doi.org/10.1108/IJEM-12-2014-0162

Day, C., Gu, Q., & Sammons, P. (2016). The impact of leadership on student outcomes how successful school leaders use transformational and instructional strategies to make a difference. *Educational Administration Quarterly, 52*(2), 221–258. https://doi.org/10.1177/0013161X15616863

DeMatthews, D., Carrola, P., Reyes, P., & Knight, D. (2021). School leadership burnout and job-related stress: Recommendations for district administrators and principals. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 94*(4), 159–167. https://doi.org/10.1080/00098655.2021.1894083

Denecker, C. (2019). School principals' Work stress in an era of new education governance. *Swiss Journal of Sociology, 45*(3), 447–466. https://doi.org/10.2478/sjs-2019-0021

Dettmers, J., Deci, N., Baeriswyl, S., Berset, M., & Krause, A. (2016). Self-endangering work behavior. In M. Wiencke, M. Cacace, & S. Fischer (Eds.), *Healthy at work: Interdisciplinary perspectives* (pp. 37–51). Springer International Publishing. https://doi.org/10.1007/978-3-319-32331-2_4.

Federici, R. A., & Skaalvik, E. M. (2011). Principal self-efficacy and work engagement: Assessing a Norwegian Principal self-efficacy scale. *Social Psychology of Education, 14*(4), 575–600. https://doi.org/10.1007/s11218-011-9160-4

Federici, R. A., & Skaalvik, E. M. (2012). Principal self-efficacy: Relations with burnout, job satisfaction and motivation to quit. *Social Psychology of Education, 15*(3), 295–320. https://doi.org/10.1007/s11218-012-9183-5

Fernet, C., Guay, F., Senécal, C., & Austin, S. (2012). Predicting intraindividual changes in teacher burnout: The role of perceived school environment and motivational factors. *Teaching and Teacher Education, 28*(4), 514–525. https://doi.org/10.1016/j.tate.2011.11.013

Folkman, S. (2013). Stress: Appraisal and coping. In M. D. Gellman, & J. R. Turner (Eds.), *Encyclopedia of behavioral medicine* (pp. 1913–1915). Springer. https://doi.org/10.1007/978-1-4419-1005-9_215.

Grissom, J. A., Egalite, A. J., & Lindsay, C. A. (2021). *How principals affect students and schools: A systematic synthesis of two decades of research. research report*. http://www.wallacefoundation.org/principalsynthesis.

Groß, N., Dadaczynski, K., & Pietsch, M. (2024). Effort–reward imbalance and burnout among German school leaders. Representative study findings and implications for an underserved occupational group. *European Journal of Public Health, 35*(1), 79–84. https://doi.org/10.1093/eurpub/ckae182

Groß Ophoff, J., & Pfurtscheller, J. (2024). Schulleitung werden ist nicht schwer, Schulleitung bleiben umso mehr? Belastungen und ressourcen von schulleitungen in Deutschland und Österreich [Becoming a school principal is easy, but staying one is much harder? Stressors and resources of school principals in Germany and Austria]. *Die Deutsche Schule, 116*(4), 366–378. https://doi.org/10.31244/dds.2024.04.04

Hallinger, P., & Heck, R. H. (2011). Conceptual and methodological issues in studying school leadership effects as a reciprocal process. *School Effectiveness and School Improvement, 22*(2), 149–173. https://doi.org/10.1080/09243453.2011.565777

Hallinger, P., Hosseingholizadeh, R., Hashemi, N., & Kouhsari, M. (2018). Do beliefs make a difference? Exploring how principal self-efficacy and instructional leadership impact teacher efficacy and commitment in Iran. *Educational Management Administration & Leadership, 46*(5), 800–819. https://doi.org/10.1177/1741143217700283

Harazd, B., Gieske, M., Gerick, J., & Rolff, H.-G. (2009). Lehrergesundheit und Schulleitung: Ergebnisse des Forschungsprojektes. In B. Harazd, M. Gieske, & H.-G. Rolff (Eds.), *Gesundheitsmanagement in der Schule. Lehrergesundheit als neue Aufgabe der Schulleitung. Eine Veröffentlichung der Dortmunder Akademie für Pädagogische Führungskräfte (DAPF) der Technischen Universität Dortmund.* (pp. 44–103). LinkLuchterhand.

Hangartner, J. (2019). Control of teachers under conditions of low-stakes accountability. *On education. Journal for Research and Debate, 2*(5). https://doi.org/10.17899/ON_ED.2019.5.4

Hansen, C. (2018). Why rural principals leave. *The rural educator (Fort collins, colo.)*, 39(1), 41–53. doi:10.35608/ruraled.v39i1.214.

Hesbol, K. (2019). Principal self-efficacy and Learning organizations: Impacting school improvement. *International Journal of Educational Leadership Preparation, 14*(1), 33–51.

Jong, D. D., Grundmeyer, T., & Yankey, J. (2017). Identifying and addressing themes of job dissatisfaction for secondary principals. *School Leadership & Management, 37*(4), 354–371. https://doi.org/10.1080/13632434.2017.1338253

Knecht, M., Meier, G., & Krause, A. (2017). Endangering one's health to improve performance? *Gruppe. Interaktion. Organisation. Zeitschrift Für Angewandte Organisationspsychologie (GIO), 48*(3), 193–201. https://doi.org/10.1007/s11612-017-0377-3

Krause, A., Baeriswyl-Zurbriggen, S., Berset, M., Deci, N., Dettmers, J., Dorsemagen, C., Meier, W., Schraner, S., Stetter, B., & Straub, L. (2015). *Selbstgefährdung als indikator für mängel bei der gestaltung mobil-flexibler arbeit: Zur entwicklung eines erhebungsinstruments [Self-endangerment as an indicator of deficiencies in the design of mobile-flexible work: Development of a measurement instrument], 17* pp. 49–59). Wirtschaftspsychologie.

Laux, A. (2011). *Schulleitung im mittelpunkt schulischer Gesundheit: Eine studie zu der Gesundheit schulischer Führungskräfte und ihrer rolle für die lehrergesundheit* [School leadership at the center of school health: A study on the health of school leaders and their role in teacher health] [Unpublished doctoral dissertation]. https://nbn-resolving.org/urn:Nbn:De:Kobv:517-opus-59771.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer Publishing Company.

Leithwood, K., Harris, A., & Hopkins, D. (2020). Seven strong claims about successful school leadership revisited. *School Leadership & Management, 40*(1), 5–22. https://doi.org/10.1080/13632434.2019.1596077

Leithwood, K., Sun, J., & Pollock, K. (2017). *How school leaders contribute to student success*. https://doi.org/10.1007/978-3-319-50980-8

Maag Merki, K. (2017). School Improvement capacity als ein forschungsfeld der schulentwicklungs- und schuleffektivitätsforschung – Theoretische und methodische herausforderungen [School improvement capacity as a research field of school development and school effectiveness research – Theoretical and methodological challenges]. In U. Steffens, K. Maag Merki, & H. Fend (Eds.), *Schulgestaltung – aktuelle befunde und perspektiven der Schulqualitäts- und Schulentwicklungsforschung [School organisation – current findings and perspectives in school quality and school development research]* (pp. 269–286). Waxmann.

Mahfouz, J. (2020). Principals and stress: Few coping strategies for abundant stressors. *Educational Management Administration & Leadership, 48*(3), 440–458. https://doi.org/10.1177/1741143218817562

Mahfouz, J., King, K., & James, L. D. (2021). Lessons from the storm: Emotions, meaning-making & leadership during transition. *The Asia-Pacific Education Researcher, 30*(4), 339–347. https://doi.org/10.1007/s40299-021-00574-w

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. https://doi.org/10.1016/j.tate.2016.08.012

Marsh, H. W., Dicke, T., Riley, P., Parker, P. D., Guo, J., Basarkod, G., & Martin, A. J. (2023). School principals' mental health and well-being under threat: A longitudinal analysis of workplace demands, resources, burnout, and well-being. *Applied Psychology: Health and Well-Being, 15*(3), 999–1027. https://doi.org/10.1111/aphw.12423

Mavi, D., Tuti, G., & Özdemir, M. (2023). The effect of principal self-efficacy on innovative work behavior: The mediating role of principal entrepreneurship. *Current Psychology*. https://doi.org/10.1007/s12144-023-04663-5

Nido, M., Ackermann, K., Ulich, E., Trachsler, E., & Brüggen, S. (2008). *Arbeitsbedingungen, belastungen und ressourcen von lehrpersonen und schulleitungen im kanton aargau 2008: Ergebnisse der untersuchung im auftrag des departements bildung, kultur und sport [Working conditions, stressors, and resources of teachers and school principals in the canton of aargau 2008: Results of the study commissioned by the department of education, culture, and sport]*. Departement Bildung, Kultur und Sport. https://edudoc.ch/record/29732.

Nylund-Gibson, K., Grimm, R., Quirk, M., & Furlong, M. (2014). A latent transition mixture model using the three-step specification. *Structural Equation Modeling: A Multidisciplinary Journal, 21*(3), 439–454. https://doi.org/10.1080/10705511.2014.915375

O'Connor, P. R., & Clarke, V. A. (1990). Determinants of teacher stress. *Australian Journal of Education, 34*(1), 41–51. https://doi.org/10.1177/000494419003400103

OECD. (2016). *PISA 2015 results (Volume II) – policies and practices for successful schools*. OECD Publishing. https://doi.org/10.1787/19963777

OECD. (2018). *TALIS 2018 results (Volume II): Teachers and school leaders as valued professionals*. OECD Publishing. https://doi.org/10.1787/19cf08df-en

OECD. (2019, June 17). TALIS 2018 results—Volume 1. Annex C. Tables Chapter 5. doi:10.1787/888933933102.

Pekruhl, U., Dorsemagen, C., Kölliker, A., & Krause, A. (2011). *Arbeitszeit und Arbeitsorganisation der Schulleitungen an den Volksschulen des Kantons Basel-Landschaft. Projektbericht für die Bildungs-, Kultur- und Sportdirektion Basel-Landschaft* [Working hours and work organisation of school principals at public schools in the canton of basel-Landschaft. Project report for the department of education, culture, and sports Basel-Landschaft]. Fachhochschule Nordwestschweiz.

Persson, R., Leo, U., Arvidsson, I., Håkansson, C., Nilsson, K., & Österberg, K. (2021). Prevalence of exhaustion symptoms and associations with school level, length of work experience and gender: A nationwide cross-sectional study of Swedish principals. *BMC Public Health*, 21(1), 331. doi:10.1186/s12889-021-10317-7.

Petrowski, K., Paul, S., Albani, C., & Brähler, E. (2012). Factor structure and psychometric properties of the trier inventory for chronic stress (TICS) in a representative german sample. *BMC Medical Research Methodology, 12*(1), 42. https://doi.org/10.1186/1471-2288-12-42

Phillips, S. J., Sen, D., & McNamee, R. (2007). Prevalence and causes of self-reported work-related stress in head teachers. *Occupational Medicine, 57*(5), 367–376. https://doi.org/10.1093/occmed/kqm055

Phillips, S. J., Sen, D., & McNamee, R. (2008). Risk factors for work-related stress and health in head teachers. *Occupational Medicine (Oxford, England), 58*(8), 584–586. https://doi.org/10.1093/occmed/kqn112

Pietsch, M., Lücken, M., Thonke, F., Klitsche, S., & Musekamp, F. (2016). Der zusammenhang von Schulleitungshandeln, unterrichtsgestaltung und lernerfolg: Eine argumentbasierte validierung zur interpretier- und nutzbarkeit von schulinspektionsergebnissen im Bereich Führung von Schulen [The relationship between school leadership actions, educational planning, and learning outcomes: An argument-based validation of the interpretability and usability of school inspection results in the area of school leadership]. *Zeitschrift für Erziehungswissenschaft, 19*(3), 527–555. https://doi.org/10.1007/s11618-016-0692-4

Pietsch, M., & Tulowitzki, P. (2017). Disentangling school leadership and its ties to instructional practices – an empirical comparison of various leadership styles. *School Effectiveness and School Improvement, 28*(4), 629–649. doi:10.1080/09243453.2017.1363787.

Pietsch, M., Tulowitzki, P., & Koch, T. (2019). On the Differential and Shared Effects of Leadership for Learning on Teachers' Organizational Commitment and Job Satisfaction: A multilevel perspective. *Education Administration Quarterly, 55*(5), 705–741. doi:10.1177/0013161X18806346.

Röhl, S., Pietsch, M., & Cramer, C. (2022). School leaders' self-efficacy and its impact on innovation: Findings of a repeated measurement study. *Educational Management Administration & Leadership*. https://doi.org/10.1177/17411432221132482, 17411432221132482.

Rosenberg, J., Beymer, P., Anderson, D., Van Lissa, C.j., & Schmidt, J. (2018). tidyLPA: An R package to easily carry out latent profile analysis (LPA) using open-source or commercial software. *Journal of Open Source Software, 3*(30), 978. https://doi.org/10.21105/joss.00978

Rosseel, Y. (2012). lavaan: An *R* package for structural equation modeling. *Journal of Statistical Software, 48*(2). https://doi.org/10.18637/jss.v048.i02

Rosseel, Y., Jorgensen, T.D., Oberski, D., Bymes, J., Vanbrabant, L., Savalei, V., Merkle, E., Hallquist, M., Rhemtulla, M., Katsikatsou, M., Barendse, M., & Scharf, F. (2019). *Package „lavaan". Latent variable analysis* [Computer software].

Salomon, K. (2013). Stress. In M. D. Gellman, & J. R. Turner (Eds.), *Encyclopedia of behavioral medicine*. Springer. https://doi.org/10.1007/978-1-4419-1005-9_285, 1886–1886.

Schmitz, G.S., & Schwarzer, R. (2002). Individuelle und kollektive selbstwirksamkeitserwartung von Lehrern [individual and collective teacher self-efficacy expectations]. In M. Jerusalem & D. Hopf (Eds.), *Selbstwirksamkeit und motivationsprozesse in bildungsinstitutionen* [Self-efficacy and motivational processes in educational institutions] (pp. 192–214). Beltz. doi:10.25656/01:3936.

Schreier, A., & Ammann, M. (2023). Der beitrag der schulleitung in Schulentwicklungsprozessen für das Schaffen einer handlungsleitenden und wertebasierten Schulkultur [The contribution of school leadership in school development processes for creating an action-oriented and values-based school culture]. *heiEDUCATION Journal. Transdisziplinäre Studien zur Lehrerbildung, 12*, 105–123. https://doi.org/10.17885/heiup.heied.2023.12.24910

Schultz, P., Schlotz, W., & Becker, P. (2004). *Trierer inventar zum chronischen stress [Trier inventory on chronic stress]*. Hogrefe.

Skaalvik, E. M., & Skaalvik, S. (2019). Teacher self-efficacy and collective Teacher efficacy: Relations with perceived job resources and job demands, feeling of belonging, and Teacher engagement. *Creative Education, 10*(7), 1400–1424. https://doi.org/10.4236/ce.2019.107104

Snodgrass Rangel, V. (2018). A review of the literature on principal turnover. *Review of Educational Research, 88*(1), 87–124. https://doi.org/10.3102/0034654317743197

Spurk, D., Hirschi, A., Wang, M., Valero, D., & Kauffeld, S. (2020). Latent profile analysis: A review and "how to" guide of its application within vocational behavior research. *Journal of Vocational Behavior, 120*, Article 103445. https://doi.org/10.1016/j.jvb.2020.103445

Su-Keene, E., & DeMatthews, D. (2022). Savoring" the joy: Reducing principal burnout and improving well-being through positive psychology interventions. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas, 95*(5), 210–219. https://doi.org/10.1080/00098655.2022.2097623

Swen, C. P. (2020). Talk of calling: Novice school principals narrating destiny, duty, and fulfillment in work. *Educational Administration Quarterly, 56*(2), 177–219. https://doi.org/10.1177/0013161X19840387

Tamadoni, A., Hosseingholizadeh, R., & Bellibaş, M.Ş. (2024). A systematic review of key contextual challenges facing school principals: Research-informed coping solutions. *Educational Management Administration & Leadership, 52*(1), 116–150. https://doi.org/10.1177/17411432211061439

Tein, J.-Y., Coxe, S., & Cham, H. (2013). Statistical power to detect the correct number of classes in latent profile analysis. *Structural Equation Modeling: A Multidisciplinary Journal, 20*(4), 640–657. https://doi.org/10.1080/10705511.2013.824781

Tran, H. (2016). The impact of pay satisfaction and school achievement on high school principals' turnover intentions. *Educational Management Administration & Leadership*. https://doi.org/10.1177/1741143216636115, 174114321663611.

Tulowitzki, P., & Grigoleit, E. (2023). Leadership in education: Perspectives in German-speaking cultures. In P. A. Woods, A. Roberts, M. Tian, & H. Youngs (Eds.), *Handbook on Leadership in Education* (pp. 331–344). Edward Elgar Publishing. doi:10.4337/9781800880429.00031.

Warwas, J. (2009). Berufliches selbstverständnis und beanspruchung in der schulleitung [Professional identity and strain in school leadership]. *Zeitschrift für Erziehungswissenschaft, 12*(3), 475–498. https://doi.org/10.1007/s11618-009-0088-9

Woo, S. E., Jebb, A. T., Tay, L., & Parrigon, S. (2018). Putting the "person" in the center: Review and synthesis of person-centered Approaches and methods in Organizational science. *Organizational Research Methods, 21*(4), 814–845. https://doi.org/10.1177/1094428117752467

Wright, S. A., Walker, L. F., & Hall, E. E. (2023). Effects of workplace stress, perceived stress, and burnout on collegiate coach mental health outcomes. *Frontiers in Sports and Active Living, 5*, Article 974267. https://doi.org/10.3389/fspor.2023.974267

Wu, H., & Shen, J. (2022). The association between principal leadership and student achievement: A multivariate meta-meta-analysis. *Educational Research Review, 35*, 1–17. https://doi.org/10.1016/j.edurev.2021.100423