ELECTRONIC JOURNAL FOR RESEARCH
IN SCIENCE & MATHEMATICS EDUCATION
VOL. 30, NO. 2, 25-45

Examining Middle School Mathematics Teachers' Burnout and Self-Efficacy During the Pandemic

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ABSTRACT

The purpose of this study was to investigate the differences among middle school mathematics teachers' burnout and perceived self-efficacy levels in terms of gender, weekly lesson hours, school type, years of experience, marital status, and parental status during online education due to the COVID-19 pandemic. To examine the differences, a survey research design was used, and the data was collected from 316 middle school mathematics teachers in Turkey through Maslach's Burnout Inventory and Self-Efficacy Belief in Distance Education Scale. Findings revealed that the characteristics of gender, weekly lesson hours, school type, and marital status had no effect on the teachers' burnout. However, experienced teachers felt higher burnout than novice teachers. Also, compared to the teachers who had one or more children, the teachers with no children had less burnout. Considering the self-efficacy of the teachers, similar to the burnout, experienced teachers had a lower level of self-efficacy. Additionally, the variable of school type had a significant effect on teachers' self-efficacy for the benefit of the private school teachers. Yet, the other characteristics such as gender, weekly lesson hours, marital status, and having children did not affect the teachers' self-efficacy.

Keywords: Burnout, Teacher Self-Efficacy, Online Education, Covid-19

Introduction

The pandemic presented challenges in every aspect of life, particularly in education (OECD, 2021). In March 2020, Turkey's Ministry of National Education (MoNE) informed that face-to-face education at all levels was initially suspended for three weeks. However, due to the course of the pandemic, face-to-face education, similar to that in many countries around the world, could not continue for the entire semester. Consequently, online education was adopted for the rest of the semester through online platforms created by MoNE to conduct the lessons. However, many teachers working at K-12 levels were unfamiliar with and unprepared for conducting their classes online, and many of them had challenges such as access to the internet (Marshall et al., 2020; Simmons et al., 2020), adjusting their materials and lessons to online education (Honigsfeld & Nordmeyer, 2020) and having emotional and psychological problems (Presley, 2021). Additionally, depending on the teachers' familiarity with the online platforms or their experience, teachers had difficulties with online

classroom management (Monroy-Gómez-Franco et al., 2022). Already, "teaching is widely considered physically and psychologically challenging and stressful work" (Yerdelen et al., 2016, p. 148); therefore, the new challenges brought by the pandemic required examining teachers' self-efficacy and burnout levels in online education during the pandemic. Although there were many studies investigating self-efficacy and burnout levels of teachers in terms of several characteristics, there is still room and a need to investigate teachers' self-efficacy and burnout while teaching online during the COVID-19 pandemic. Since online teaching offers an alternative for education and educators when there is an unexpected and unfortunate situation, such as a pandemic or an earthquake, it is important to investigate the teachers' self-efficacy and burnout levels in regard to different characteristics. In other words, by identifying the critical factors related to teachers' self-efficacy and burnout, we could propose alternative solutions to the challenges brought by online education. Therefore, in light of this information, the current study aimed to investigate middle school mathematics teachers' burnout and perceived self-efficacy levels in terms of gender, marital status, parental status, years of experience, weekly lesson hours, and school type during the online education due to the COVID-19 pandemic.

Theoretical Framework

This section will provide theoretical backgrounds and related studies on burnout and self-efficacy.

Burnout

"Burnout has most commonly been defined by a symptom pattern" (Savicki & Cooley, 1983, p. 229). Karakaş and Bilen (2014) described burnout as the state of an employee experiencing loss of power and energy due to failure, depreciation, and overloading or depletion of one's inner sources and energy due to unmet desires. Burnout is a serious issue that can significantly affect individuals' physical and psychological health, ranging from minor symptoms like headaches to severe outcomes such as depression and even suicide (Hendrickson, 1979). According to Elflein (2020), before COVID-19, global perfect mental health was 45.6%, and the percentage of people who had nonfunctional or extremely challenged mental health was 6.8%. However, after COVID-19, the percentage of global perfect mental health decreased by 13.8%, and the percentage of global extremely challenged mental health increased by 7.6%. Burnout is typically categorized and measured under three dimensions according to the Maslach Burnout Model: emotional exhaustion, depersonalization, and lack of personal accomplishment (Maslach & Schaufeli, 1993). This study employs the Maslach Burnout Inventory (MBI) to measure burnout levels across the dimensions of emotional exhaustion, depersonalization, and lack of personal accomplishment, as detailed in the methodology section.

Emotional Exhaustion

Maslach and Jackson described emotional exhaustion as "feelings of being emotionally overextended and drained by one's contact with other people" (1984, p. 134). The main reasons for this emotional fatigue could be excessive workload, mobbing at work, occupational stress, problems in social relations, imbalance in the workload and leisure time, economic concerns, and so on (Weber & Jaekel-Reinhard, 2000). The COVID-19 pandemic has exacerbated these issues for teachers, introducing additional stressors such as fear of the virus, role ambiguity, and challenges with remote learning (Pressley, 2021). Studies have shown a significant increase in emotional exhaustion among teachers during this period, with factors like inadequate technical equipment and high levels of extraversion contributing to increased risk (Sokal et al., 2020). Moreover, individuals experiencing emotional exhaustion often report persistent frustration, stress, and anxiety about their daily work

tasks (Sağlam Arı & Çına Bal, 1983). These symptoms affect job performance and spill over into personal life, leading to a pervasive sense of depletion. For teachers during the pandemic, this has manifested as decreased teaching enthusiasm, increased likelihood of considering leaving the profession, and negative impacts on psychological well-being, including higher levels of depression and anxiety (Collie, 2021; Kim & Asbury, 2020).

Depersonalization

Depersonalization is characterized by an intense feeling of indifference to other people's needs and negative attitudes toward them (Maslach & Jackson, 1981). Furthermore, these negative attitudes and behaviors were more permanent and resistant to change even when workplace settings and resources were altered compared to other dimensions of burnout (Savicki & Cooley, 1983). In general, having persistent feelings of emotional exhaustion in the long term leads to depersonalization and inhuman behaviors (Maslach & Goldberg, 1998). The COVID-19 pandemic has exacerbated these issues for teachers. Factors such as fear of COVID-19, role ambiguity, and challenges with remote learning have contributed to increase depersonalization among teachers (Sokal et al., 2020). As a result of depersonalization, individuals may behave in rude, injurious, and arrogant ways towards not only their clients (or students) but also their co-workers, which can further deteriorate workplace relationships and overall morale. This is particularly concerning in the educational context, as higher levels of depersonalization have been associated with negative impacts on psychological well-being and an increased likelihood of teachers considering leaving the profession (Collie, 2021).

Lack of Personal Accomplishment

The last dimension of burnout is reduced personal accomplishment. Individuals set personal and professional goals, and their sense of accomplishment is influenced by their perceived success in achieving them. According to Maslach and Jackson (1981), if a person's perception of personal accomplishment decreases or their expectations remain unmet, they would experience a diminished sense of personal achievement. The COVID-19 pandemic has further complicated this issue for teachers, with some studies indicating a decrease in feelings of personal accomplishment during this period (Weißenfels et al., 2021). Factors such as perceived infectability and role ambiguity have been significant predictors of reduced personal accomplishment (Ptacek et al., 2022). Conversely, a heightened feeling of reduced personal accomplishment and work inadequacy can reinforce a sense of incapability, often referred to as a self-fulfilling prophecy (Özler, 2015). This lack of accomplishment can lead to demotivation and a loss of enthusiasm for the job, further impacting teaching quality and student engagement (Pressley, 2021).

The impact of COVID-19 on teachers' mental well-being and burnout has been examined in various studies. For instance, Pressley (2021) investigated the factors contributing to teacher burnout during COVID-19 to inform stakeholders. At the end of the study, three variables, current teaching anxiety, anxiety communicating with parents, and administrative support, significantly predicted teachers' burnout. Similarly, Sokal et al. (2020) aimed to detect the factors related to teacher burnout and endurance during the first wave of COVID-19 and made empirically backed recommendations to better support teachers during the next wave. Decreasing demands, providing appropriate sources of support, giving importance to administration and parental backing, and promoting physical and emotional self-care practices were suggested as essential strategies to prevent teacher burnout. Like Sokal et al. (2020), who emphasized the importance of reducing demands, providing adequate support, and promoting self-care practices to prevent teacher burnout during the first wave of COVID-19, Amri et al. (2020) investigated these dynamics among 125 primary Moroccan teachers. Their findings revealed that high levels of burnout were closely linked to increased workload, work-

family role conflicts, limited ICT skills, and insufficient social support, ultimately highlighting the urgent need for targeted interventions to protect teachers' mental well-being during and after lockdown. Building upon these findings, it is evident that teacher burnout represents a pervasive and multifaceted issue within the educational sector, exacerbated by unforeseen circumstances such as the COVID-19 pandemic. The rapid shift to online teaching modalities has introduced additional stressors that have significantly impacted teachers' mental health around the world. Numerous studies have investigated the impact of these transitions on teacher well-being, highlighting the multifaceted nature of stressors and their implications for educators' mental health. For instance, in a study conducted in India, Kumawat (2020) examined the prevalence of perceived stress and burnout among teachers engaged in online teaching during the pandemic. Findings revealed that a significant proportion of teachers experienced moderate to high levels of stress and emotional exhaustion, underscoring the need for interventions to mitigate these adverse effects. Despite these challenges, many teachers demonstrated resilience, maintaining high levels of personal accomplishment. Similarly, Shlenskaya et al. (2020) explored burnout among university teachers in Russia transitioning to online learning modalities during the pandemic. Through a survey using the Maslach Burnout Inventory, the study identified factors contributing to teachers' emotional exhaustion, depersonalization, and diminished personal accomplishment. Variations in burnout levels across these dimensions emphasized the diverse experiences of educators during this period. Extending this line of inquiry beyond the primary and secondary education context, the abrupt shift to online teaching prompted by the COVID-19 pandemic has also been examined in broader contexts, including higher education institutions worldwide. Mosleh et al. (2022) examined the impact of this transition on the stress and burnout levels of faculty and course instructors working remotely. Through a cross-sectional design involving 278 participants, results showed moderate stress levels, with those having 7–10 years of online teaching experience reporting higher stress. Elevated stress and lower satisfaction were linked to increased burnout, particularly among married participants with school-age children. These findings emphasize the need for supportive professional development to address faculty burnout in remote teaching. Similarly, Daumiller et al. (2021) explored faculty members' attitudes toward online teaching and their associations with underlying motivations, burnout levels, and student learning outcomes. Results highlighted the importance of faculty goals and attitudes, with learning approach goals positively linked to perceiving the transition as a positive challenge that enhanced teaching quality.

In addition to contextual and psychological factors, recent research has highlighted the importance of different demographic characteristics in shaping teachers' experiences of burnout. Further supporting the literature, Yavuz (2009) claimed that gender significantly affects burnout, with male teachers showing higher levels of burnout than females. On the other hand, Ozamiz-Etxebarria et al. (2021), Sokal et al. (2020), and Pressley (2021) studied burnout and found that female teachers reported higher levels of burnout. Similarly, Sánchez-Pujalte et al. (2021) explored burnout levels among Spanish teachers during COVID-19, and found significant differences associated with gender and years of experience, with higher burnout levels reported by women and less experienced teachers. Similarly, considering the year of experience, Yerdelen et al. (2016) found that teachers with more experience tend to have higher personal accomplishment but lower emotional exhaustion and depersonalization.

Furthermore, marital and parental status has been identified as a critical demographic characteristic shaping teachers' experiences of burnout. For instance, several studies highlighted that single teachers were more susceptible to burnout, pointing to marital status as key predictors of burnout risk (Başol &Altay, 2009; Karanfil, 2019; Zadok Gurman et al, 2021). On the contrary of these findings, Mosleh et al. (2022) suggested that married teachers experienced higher burnout than single ones. Regarding parental status, some studies suggest that teachers with children have lower levels of emotional exhaustion and depersonalization and higher levels of personal accomplishment

(Karabıyık Özipek, 2006; Yerdelen et al., 2016), others claim that teachers without children report low levels of emotional exhaustion (Mosleh et al., 2022).

Moreover, various research showed that the type of school and weekly lesson hours also play a role in burnout, with Karanfil (2019) finding that teachers in public schools experience more emotional exhaustion and fewer personal accomplishments than their private school counterparts. On the other hand, Ozamiz-Etxebarria et al. (2021) found that private school teachers had a higher burnout during COVID-19. Additionally, the number of weekly lesson hours has been shown to correlate with increased burnout, particularly in terms of emotional exhaustion and depersonalization (Yerdelen et al., 2016).

Collectively, these studies underscore the importance of understanding the diverse factors contributing to teacher burnout, including demographic variables, work conditions, and the unprecedented challenges posed by the COVID-19 pandemic. This understanding can inform targeted interventions to support teacher well-being and enhance the overall quality of education in both traditional and online settings.

Teacher Self -Efficacy

Bandura (1977a) defines self-efficacy in his social learning theory as "the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations." (p.3). In this view, self-efficacy is influenced by four major sources, which are mastery experiences, vicarious experiences, verbal persuasion, and physiological and affective responses (Bandura, 1997). If people have successful experiences, it helps them believe in the strength of their efficacies in similar tasks. By contrast, an unsuccessful experience leads them to doubt their competencies (Bandura, 1994). It is suggested that self-efficacy develops through investigating other people's experiences. When people cannot determine their failure or success because of their insufficient experiences, they generally tend to compare themselves with others and make an inference about their possible outcome (Bandura, 1997). People can boost or diminish their self-efficacy by being persuaded by others' verbal responses. When people are encouraged to think they can achieve, they tend to put in more effort. In terms of physiological and affective responses, an individual's body responses to the conditions at hand affect self-efficacy beliefs. People use physiological and affective responses such as stress and think these reactions will lead to failure. Further, when people need to perform physically, their states, such as tiredness and aches, lead them to consider their deficiency in their physical skills. Finally, this affects their interpretation of the capabilities they possess (Bandura, 1994, 1997).

According to Bandura (1977b), people with a sense of self-efficacy recover easily when they encounter unsuccessful situations and think about managing them without worrying needlessly. Moreover, they tend to think that failures are related to inadequate abilities and knowledge, which can be enhanced. This kind of belief about failures helps them decrease their anxiety levels (Bandura, 1994). Besides, people with low self-efficacy refrain from taking responsibility and trying due to thinking of failure since they are convinced that this failure stemmed from their insufficiencies, not because of insufficient effort or knowledge about people with high self-efficacy. These people cannot evaluate their competence of knowledge and abilities; hence, they have trouble through their learning process. Also, they give up easily or have a high level of anxiety when they have difficulties (Bandura, 1994, 1997).

Since having a high self–efficacy level is critical, investigating the teachers' self–efficacy beliefs gain importance. Following Bandura's definition of self-efficacy, teacher self-efficacy can be perceived as what the teachers think about their capabilities "to plan, organize, and carry out activities required to attain given educational goals" (Skaalvik & Skaalvik, 2010, p. 1059). Tschannen-Moran and Hoy (2001) claimed that teacher self-efficacy is a criterion that has the potential to have either a

positive or negative effect on education. Research reveals that teachers who believe in their abilities work more and are more adept at organizing and planning (Pajares, 1992). Furthermore, teacher self-efficacy plays an essential role in students' success and motivation, and there is a positive relationship between these two concepts (Caprara et al., 2006; Lazarides et al., 2018).

Similar to burnout, some demographics have a relationship with teacher self-efficacy. Considering the gender variable, whereas many researchers expressed that gender did not affect teachers' self–efficacy beliefs (Robinia & Anderson, 2010), some researchers suggested that it had a significant effect. While some studies showed that female teachers had higher levels of self–efficacy beliefs (Atta et al., 2012), some advocated that male teachers' self–efficacy levels were higher than females' (Klassen & Chiu, 2010).

Years of experience have consistently been identified as a significant factor influencing teachers' self-efficacy, with more experienced teachers generally demonstrating higher self-efficacy levels (Atta et al., 2012; Ávalos & Valenzuela, 2016; Hoy & Wollfok, 1993; Reyhing & Perren, 2021). Similarly, research examining the relationship between self-efficacy and weekly lesson hours has revealed a positive relationship and suggested that teachers with a greater number of weekly lesson hours tend to have higher self-efficacy levels (Reyhin & Perren, 2021). Furthermore, school type has also been shown to have a critical role, as a study conducted by Semerci and Uyanık Balat (2018) revealed. According to the study, private school teachers often report higher self-efficacy levels compared to public school teachers.

Although limited, some research has explored the relationship between marital status and teachers' self-efficacy (Batool et al., 2020). However, studies specifically investigating this demographic characteristic within the context of COVID-19 warrant further attention. Transforming to online education and teaching during the pandemic brought new challenges for teachers. The studies indicated that in online teaching, teachers faced difficulties in communicating with the students due to the separation between the parties (Putri et al., 2020) and spending more time to be familiar with online teaching and motivating students (Scull et al., 2020). Based on these findings, it is evident that the abrupt transition to remote teaching has the potential to increase teachers' burnout levels while at the same time undermining their self-efficacy, which may ultimately compromise the overall quality of education.

Furthermore, the literature highlights the necessity of examining how demographic characteristics influence teachers' experiences of burnout and self-efficacy. Investigating these relationships becomes critical as it can inform the development of support strategies and interventions for teachers, and enable stakeholders to address specific needs more effectively.

In particular, marital status has been identified as a demographic characteristic which affects both burnout and self-efficacy, and this relationship may be further moderated by parental status. Exploring the independent and interactive effects of these variables is therefore essential to gain an understanding of teachers' psychological resilience and professional functioning during crisis situations such as the COVID-19 pandemic. By addressing these gaps, this research aims to contribute valuable insights for policymakers and educational leaders seeking to promote teacher well-being and sustain educational quality under challenging circumstances.

Thus, in this research, we aimed to investigate the following questions:

1. Do gender, weekly lesson hours, years of experience, and the school type significantly affect burnout and perceived self-efficacy of middle school mathematics teachers during online education due to the COVID-19 pandemic?
2. Do marital status and parental status, considered independently and interactively, significantly affect burnout and perceived self-efficacy of middle school mathematics teachers during online education due to the COVID-19 pandemic?

Methodology

In the study, the quantitative research was implemented using a survey research design since survey research is useful "to collect large amounts of survey data from a representative sample of individuals sampled from the targeted population" (Kalaian, 2008, p. 728). To represent the targeted population, 316 middle school mathematics teachers from all regions of Türkiye participated in the study. In Türkiye, middle school mathematics teachers are responsible for teaching middle school students from 5th grade to 8th grade. In selecting the sample through convenience sampling, online forums and groups regarding mathematics education were identified. Within forums and groups, middle school mathematics teachers were invited to participate voluntarily in the online survey. The decision to employ convenience sampling was pragmatic, aiming to streamline participant recruitment and facilitate data collection within a limited timeframe and resource constraints during the COVID-19 pandemic. Convenience sampling allowed for practical access to middle school mathematics teachers who were readily available and willing to participate. Ethical considerations were rigorously upheld throughout the study, with informed consent obtained from all participating teachers and measures implemented to protect their privacy and confidentiality (Franken et al., 2012). Some demographic information regarding the sample is given below.

Sample

Looking at the demographic information, the participants of the study were 316 (223 females and 93 males) middle school mathematics teachers. The years of experience in teaching ranged from 7 months to 33 years (M = 11.41 & SD = 7.60), and this variable was separated into three groups. The group of 0 to 10 years for years of experience had the highest percentage (52.8%), the percentage of the group of 10 to 20 years was 32.3%, and the lowest percentage belonged to the group of 20+ years (14.6%). The variable of weekly lesson hours ranged from 11 to 40, including after school lesson hours (M = 25.30 & SD = 6.41), into four groups. For this variable, the information was that 54.1% of the sample belonged to the group of 16-25 hours, 40.8% of them were 26-40, and the lowest percent (1.9%) was the group of 41 hours and above. The average number of students in a class ranged from 5 to 75 in four groups. For the variable of the number of students in a class, while the highest percentage belonged to 16 to 30 (58.5%), the lowest percentage belonged to 46 and above (1.6%). The percentages of 31 to 45 and 15 and below groups were 20.9% and 17.4%. Moreover, 64.9% of the teachers were married, while 35.1% were single. 78.8% of the teachers had bachelor's degrees, 20.6% had master's degrees, 0.3% had doctoral degrees, and 0.3% were high school graduates. 81.3% of the teachers worked in public schools, and 18.7% worked in private schools. Also, 26.6% of the teachers had one child, 27.8% had two or more children, whereas 45.6% had no child. Lastly, while 70.6% of the teachers teach 8th graders, 57.3% teach 5th graders. Additionally, the percentage of the teachers in terms of grade level exceeded 100 because the teachers taught more than one grade level at the same time.

In addition to the sample's demographic characteristics, the information on the teachers' educational infrastructure is indicated below. 34.5% of the teachers conducted their lessons at home, while 63.3% taught at school and home. Additionally, 53.5% of the teachers did not receive any in-service training, course, or seminar related to online teaching, and 93% had a personal device belonging to themselves. As for the sufficiency of the internet connectivity, 44% of the teachers stated that their connectivity was poor, and what followed this statement was acceptable connectivity with 22.8%; however, poor connectivity and very poor connectivity were 44% and 25%, respectively. It was understood that the good and very good connectivity was very low, at 5.7% and 2.5%, respectively. For the type of electronic devices used during classes, 88.6% of the teachers said they used a computer, 40.8% said a smartphone and 29.7% said a tablet. 90.5% of the teachers used

written documents, 67.4% used EBA (an educational network developed by the Ministry of National Education), and 31% used dynamic geometry applications.

When the education infrastructure information of the sample was checked, most of the teachers used Zoom as a virtual classroom application, with 94.6% and 60.8% using EBA for this goal. 53.8% of the teachers preferred mixed type of lesson conduction, and 44.6% preferred synchronous classes. 17.4% of the teachers stated that 20% and below of their students could access online education. However, only 30.4% of the teachers indicated that 81% and above of their students could access online education. As the teachers stated, the other students' dispersion was 17.4% of them, 20% and below, 15.8% of them, 21% to 40%, 16.8% of them, 41% to 60% connectivity for their students' access to online courses. 21.5% of the teachers did not conduct any assessment during online education, and only 17.7% assessed their students more than once a week. Among the teachers who did assessments during online education, 84.7% chose to give homework to assess students, 54% used online quizzes for assessment, and 23.4% assigned students a project.

Data Collection Process and Procedure

Data was collected through an online survey using the link on the form sent out to teachers. The online survey consisted of four sections. The first section included nine demographic questions regarding gender, marital status, number of children, experience in years, weekly lesson hours, type of school they worked in, last degree they received, the average number of students in their classes, and the class levels they worked with.

The second section is dedicated to the education infrastructure and includes eleven questions. Related to how teachers conduct online education and what they used to do. The questions sought information about the technological tools, materials, applications, medium used for teaching, classroom management, access rate to lessons of the students, and teachers' assessment methods. There were eleven questions, ten of which were multiple choice and one of which was a 5-point Likert-type question. The third section consisted of the Self-Efficacy Belief in Distance Education Scale developed by Yıldız (2015). The scale consisted of 5–5-point Likert type ten items ranging from "1 = I am not sufficient at all" to "5 = I am very sufficient". The scale was divided into three subscales: learning management, technology management, and virtual classroom management. The learning management dimension refers to the ability to prepare the environment, course materials, teaching activities, measurement, and assessment activities for effective learning. An example sample item for this dimension was "I can prepare effective learning environments.". The second dimension, which was technology management, included the effective use of school technologies and the ability to solve problems related to the use of technology. An example sample item for this dimension was "I can integrate the necessary technologies for effective learning into my lessons.". The last dimension was virtual classroom management, which refers to the ability to use virtual classroom applications and manage the classroom successfully while using them. An example sample item for this dimension was "I can perform classroom management in the online classes.". The reliability values of the scale were calculated for this study, and the values for the study ranged from 0.843 to 0.922. The first dimension, learning management, had four items in the test, and the Cronbach Alpha reliability coefficient was 0.852. The second dimension, technology management, had four items in the test, and the Cronbach Alpha reliability coefficient was 0.900. Then, the last dimension, virtual classroom management, had two items in the test, and the Cronbach Alpha reliability coefficient was 0.843.

The last section is dedicated to Maslach's Burnout Inventory. This scale was developed by Maslach and Jackson (1986) and included twenty-two 5-point Likert-type questions. The items ranged from "1 = Never" to "5 = Always". The MBI scale was divided into three subscales: emotional exhaustion, depersonalization, and personal accomplishment. The emotional exhaustion

subscale consisted of nine questions related to an individual's emotional exhaustion because of the job, and the Cronbach Alpha reliability coefficient was 0.899. An example sample item for this dimension was "I feel emotionally drained from my work.". The second subscale was depersonalization and included five questions with a Cronbach Alpha reliability coefficient of 0.783. An example sample item for this dimension was "I worry that this job is hardening me emotionally". Depersonalization refers to a teacher's emotionless behaviors towards students. The last subscale was a personal accomplishment with eight questions and referred to a teacher's feelings of professional inadequacy. An example sample item for this dimension was "In my work, I deal with emotional problems very calmly.". The Cronbach Alpha reliability coefficient of the personal accomplishment was 0.723. The reliability value of the whole scale was calculated for this study as 0.903.

Data Analysis

After data were collected from 316 middle school mathematics teachers, quantitative analysis using IBM SPSS Statistics 26.0, was conducted to examine the differences among the dependent variables, teachers' perceived self-efficacy and burnout, regarding independent variables: gender, marital status, parental status, years of experience, weekly working hours, and school type. Multivariate analysis of variance (MANOVA) allows for the examination of significant differences in the means of multiple dependent variables across several groups, while taking into account the relationships among the dependent variables (Tabachnick & Fidell, 2019). Prior to hypothesis testing, preliminary analyses were conducted to ensure that the dataset met the required assumptions for MANOVA.

For all analyses, assumption checks included the evaluation of sample size adequacy, normality, linearity, homogeneity of variance and covariance matrices, multicollinearity, and the presence of univariate or multivariate outliers (Pallant, 2016). Skewness and kurtosis values for key variables were within acceptable ranges (between -2 and +2). Visual inspections of histograms, Q-Q plots, and boxplots also supported the normality assumption. The presence of multivariate outliers was assessed using Mahalanobis distance, and no extreme values requiring exclusion were detected. Linearity was confirmed through scatterplot matrices, and multicollinearity was ruled out based on correlation coefficients below the critical threshold ($r < .80$). The assumptions of homogeneity of variance and covariance were assessed using Levene's test and Box's M test, respectively, and were found to be satisfied across the groups.

To address the first and second research questions, descriptive analysis and inferential statistics were conducted. As inferential analysis, both one-way and two-way MANOVAs were conducted. One-way MANOVA was used to examine whether perceived self-efficacy and burnout levels differed significantly by gender, years of teaching experience, weekly working hours, and school type. A two-way MANOVA was conducted to explore the effects of marital status and parental status on the same dependent variables and on each other. Post-hoc tests were performed when significant multivariate effects were found to identify specific group differences.

All statistical tests were evaluated at a significance level of α=.05, and effect sizes (partial eta squared for MANOVA) were reported to assess the practical significance of the findings.

Results

This research investigated the differences among the middle school teachers' perceived self-efficacy and burnout regarding gender, marital status, parental status, years of experience, weekly working hours, and school type. One-way MANOVAs were conducted for gender, years of experience, weekly working hours, and school type, while a two-way MANOVA was conducted for marital and parental status. The descriptive statistics and results are presented according to the

research questions.

The effect of gender, weekly lesson hours, years of experience, and school type

The first research question deals with the effect of gender, weekly lesson hours, school type, and years of experience on burnout and perceived self-efficacy. Participants' descriptive statistics of self–efficacy and burnout related to gender, years of experience, weekly working hours, and school type were shown in the table below. As mentioned before, the range of both the MBI Scale and the Self-Efficacy Belief in Distance Education Scale is 1 to 5. Thus, for each variable, scores could range from 1 as the lowest self-efficacy and the lowest burnout to 5 as the highest self-efficacy and the highest burnout. In other words, when one of the scores increases, the respective score of a dependent variable also increases.

Table 1

Descriptive Statistics of Burnout and Self–Efficacy Related to Gender, Weekly Working Hours, School Type, and Years of Experience

Variables	Groups	*n*	Burnout		Self-Efficacy	
			M	*SD*	*M*	*SD*
Gender	Male	93	3.80	.68	4.14	.65
	Female	223	3.69	.60	4.07	.60
Weekly Lesson Hours	0-15	10	4.07	.45	3.88	.54
	16-25	171	3.76	.60	4.07	.62
	26-40	129	3.64	.66	4.10	.61
	41+	6	3.92	.44	4.65	.37
School Type	Public	257	3.72	.62	4.03	.62
	Private	59	3.75	.64	4.36	.54
Years of Experience	0-10	167	3.61	.60	4.15	.58
	11-20	102	3.77	.41	4.11	.66
	21+	46	4.04	.55	3.84	.58

Table 1 shows there were 223 female teachers and 93 male teachers. These teachers were categorized into four groups based on weekly lesson hours, into two groups based on the school type where they worked, and into three groups based on their years of experience. For burnout scores, the table shows male teachers (M = 3.80, SD = .68) felt more burnout than female teachers (M = 3.69, SD = .60). For the variable weekly lesson hours of teachers, teachers who have less than 16 hours (M = 4.07, SD = .45) felt more burnout than teachers who have 16 – 25 hours (M = 3.76, SD = .60), those who have 26 – 40 hours (M = 3.64, SD = .66) and those who have more than 40 hours (M = 3.92, SD = .44). This revealed teachers who have less than 16 hours and more than 40 hours feel more burnout than the other teachers in between. Also, the table shows the teachers who worked in private schools (M = 3.75, SD = .64) felt more burnout than public school teachers (M = 3.72, SD = .62). Lastly, teachers with more than 20 years of experience (M = 4.04, SD = .55) felt more burnout than teachers who have 11 – 20 years of experience (M = 3.77, SD = .41) and those who have less than 10 years of experience (M = 3.61, SD = .60). This indicated experienced teachers felt more burnout than novice teachers in online education.

Additionally, as it could be understood from the table, male teachers (M = 4.14, SD = .65) showed higher self–efficacy levels than female teachers (M = 4.07, SD = .60). For the weekly lesson

hours, teach more than 40 lesson hours (M = 4.65, SD = .37) had higher levels of self-efficacy than the teachers with less than 15 hours (M = 3.88, SD = .54), those with 16 – 25 hours (M = 4.07, SD = .62) and those with 26- 40 hours (M = 4.10, SD = .61). It could be concluded that as the number of weekly lesson hours increased, teachers' self – efficacy increased. Concerning the school type, the table implied that teachers who worked in private schools (M = 4.36, SD = .54) had more self-efficacy levels than the teachers in public schools (M = 4.03, SD = .62). Furthermore, concerning years of experience, self – efficacy mean scores of teachers with less than 10 years of experience (M = 4.15, SD = .58) showed higher self – efficacy levels than teachers with 11 – 20 years of experience (M = 4.11, SD = .66) and those with more than 20 years of experience (M = 3.84, SD = .58). This indicated experienced teachers had lower self – efficacy levels than the novice teachers in online education.

To test whether the given mean differences in burnout and self-efficacy scores were statistically significant in terms of gender, weekly lesson hours, and years of experience, one–way MANOVAs were conducted. Before MANOVAs, the assumptions such as independence observation, sample size, normality, linearity, univariate and multivariate outliers, multicollinearity and singularity, homogeneity of variance-covariance matrices, and homogeneity of variance were checked (Pallant, 2016). Firstly, for independent observation, since the instruments were applied online, there was no interaction between observations. Secondly, Tabachnick and Fidell (2007) gave a formula (N > 50+8m) to check the sample size assumption by considering the number of independent variables (IVs) that would be used. "m" was the number of IVs and N was the number of participants. For this study, m was 5; therefore, 50+8*5 = 90. The observation number was 316 (N), and due to the 316 > 90, the sample size assumption was met. Thirdly, regarding the normality assumption, both univariate and multivariate normality should be checked. Furthermore, according to Pallant (2016), in descriptive statistics, when the sample size for each cell of every variable included at least 30 participants, the violations of normality and equality of variance assumptions did not create so much problem. Thus, except for two subgroups of the variable, which was weekly lesson hours, there were no potential violations, but the assumptions were still checked in detail. For univariate normality, all skewness and kurtosis values of self–efficacy, and burnout regarding three independent variables, gender, weekly lesson hours, and years of experience were between -1.17 and 1.32, and they fitted the desired range of -2 and +2 (Pallant, 2007). In addition to checking skewness and kurtosis values, the histograms, normal q – q plots, detrended normal q – q plots, and boxplots were checked, and they met the desired normality. Considering the sample size is less than 50, normality for subgroups of 0-15 hours and 41+ hours would be checked using Shapiro-Wilk (Shapiro & Wilk, 1965). The significance values for the test of normality for burnout of subgroups of 0-15 hours (p = .61 > .05) and 41+ hours (p = .28 > .05) and self-efficacy of subgroups of 0-15 hours (p = .36 > .05) and 41+ hours (p = .95 > .05) were met. Thus, no violation was found for univariate normality. Furthermore, to check multivariate normality, the Mahalanobis distance was used and calculated as 14.21 for just one case. In contrast, others were smaller than the critical value for two dependent variables, which was 13.82. (Pallant, 2007). According to Pallant (2007), there was no need to take action when there was a small number of outliers and a reasonable Mahalonobis value. Thus, the multivariate normality assumption was also met because the data set had one outlier, and the Mahalonobis distance value was not extreme. While the normality assumption was checked, the fourth assumption, outliers, were also checked with boxplots and Mahalonobis values, and there was no violation, either.

The fourth assumption, linearity, seemed to be met by considering the linear relationship of each pair of dependent variables regarding independent variables on the scatterplot matrices. The other assumption was multicollinearity and singularity. Since the Pearson correlation was significant and the correlation coefficient (r = .23) did not exceed .8 or .9 (Pallant, 2007), multicollinearity was not violated. The last assumptions to be checked were homogeneity of variance-covariance matrices

and homogeneity of variance. As the Box's M Test of Equality of Covariance Matrices showed, gender ($p = .18 > .05$), weekly lesson hours ($p = .68 > .05$), and years of experience ($p = .45 > .05$) satisfied the homogeneity of variance-covariance matrices assumption. Moreover, according to the results in Levene's tests of equality of variance table, the homogeneity of variance assumption of burnout and self-efficacy in terms of gender (*pburnout* = .52 > .05) (*pself-efficacy* = .64 > .05), weekly lesson hours (*pburnout* = .30 > .05) (*pself-efficacy* = .28 > .05), and years of experience (*pburnout* = .15 > .05) (*pself-efficacy* = .41 > .05) was also met. Thus, all assumptions were met for one-way MANOVAs.

According to the multivariate test for gender, regarding the first research question, gender ($p = .28 > .05$) did not significantly affect burnout of middle school mathematics teachers and self–efficacy in online education. In other words, there was no difference between male and female combined burnout and self-efficacy scores. Moreover, there was an insignificant difference between subsamples of the variable weekly lesson hours ($p = .06 > .05$). On the other hand, school type ($p = .00 < .05$) and years of experience ($p = .00 < .05$) affected combined burnout and self-efficacy scores significantly.

Furthermore, while one of the dependent variables, burnout, was not affected by school type [F (1, 315) = .11, p > .025; Wilks' Lambda = .95; multivariate effect size = .00], self-efficacy was affected [F (1, 315) = 14.98, $p < .025$; Wilks' Lambda = .95; multivariate effect size = .05]. Due to the significant effect of school type on self-efficacy, the post-hoc test was conducted. The result of the post-hoc analysis showed that the teachers who worked in private schools had a higher self-efficacy rating than those who worked in public schools.

Besides, the dependent variable burnout [F (2, 313) = 9.75, $p < .025$; Wilks' Lambda = .89; partial eta squared = .06; multivariate effect size = .06] and self-efficacy [F (2, 313) = 4.75, $p < .025$; Wilks' Lambda = .89; partial eta squared = .03; multivariate effect size = 0.06] were significantly affected by years of experience. Further post hoc analysis revealed that teachers who had less than 10 years of experience and teachers who had between 10 and 20 years of experience felt less burnout than those who had more than 20 years. Considering the self-efficacy levels, teachers who had less than 10 years of experience and teachers who had between 10 and 20 years of experience had more self–efficacy levels in online education than those who had more than 20 years. Since the partial eta squared values of the test of years of experience for burnout .06 ($\eta^2 = .06$), and for self-efficacy .03 ($\eta^2 < .06$), the effect sizes of the study were small and medium, respectively (Pierce et al., 2004).

The effect of marital status and parental status

The second research question deals with the effect of marital status and parental status on burnout and perceived self-efficacy.

Regarding the second research question, a two–way MANOVA was conducted, and the participants' descriptive statistics of burnout and self–efficacy related to marital status and parental status are shown in the table below.

Table 2

Descriptive Statistics of Burnout and Self–Efficacy Related to Marital Status and Parental Status

Variables	Groups	*n*	Burnout		Self-Efficacy	
			M	*SD*	*M*	*SD*
Marital Status	Married	205	3.80	.63	4.09	.64
	Single	111	3.59	.59	4.09	.57
Parental Status	No Child	144	3.80	.68	4.14	.65
	One or More Children	172	3.70	.60	4.06	.60

For the variable of marital status, there were 205 married and 111 single teachers. Also, for the variable of parental status, there were 144 teachers without a child and 172 teachers with one or more children. With respect to burnout, single teachers (M = 3.59, SD = .59) felt less burnout than married teachers (M = 3.80, SD = .63). Additionally, teachers who had one or more children (M = 3.70, SD = .60) felt less burnout than ones who did not have any (M = 3.80, SD = .68).
In terms of the teachers' self–efficacy, there was no difference in self–efficacy between teachers who were married (M = 4.09, SD = .64) and who were single (M = 4.09, SD = .57). For parental status, teachers who did not have children (M = 4.14, SD = .65) had higher self-efficacy than ones who had (M = 4.06, SD = .60).

Table 3

Descriptive Statistics of Burnout and Self–Efficacy Related to Interaction of Marital Status and Parental Status

Variables	Groups	*n*	Burnout		Self-Efficacy	
			M	*SD*	*M*	*SD*
Marital Status – Parental Status	Married with No Child	42	3.42	.64	4.29	.49
	Married with One or More Children	163	3.89	.59	4.04	.67
	Single with No Child	102	3.57	.60	4.11	.55
	Single with One or More Children	9	3.77	.52	3.93	.76

Table 3 shows that there were 42 married teachers who had no child, 163 married teachers who had one or more children, 102 single teachers who had no child, and 9 single teachers who had one or more children. Regarding burnout, teachers with the highest burnout scores were the ones who were married and had one or more children (M = 3.89, SD = .59), whereas teachers with the lowest burnout scores were the ones who were married and with no child (M = 3.42, SD = .64). In terms of the teachers' self–efficacy, the highest self–efficacy level for teachers was the ones who were married and had no child (M = 4.29, SD = .49), while the lowest self–efficacy level for teachers was the ones who were single and had one or more children (M = 3.93, SD = .76). Before conducting one – way MANOVA, the assumptions were checked.

According to the multivariate test, there was no statistical difference between subsamples of the interaction of marital status (p = .44 > .05) and parental status (p = .39 > .05) on the combined dependent variables. Although there was an insignificant difference between subsamples of marital

status (p = .08 < .05) concerning dependent variables, there was a significant difference between subsamples of parental status (p = .01 < .05) concerning dependent variables. Since the significance is high, between–subject effects are analyzed to identify the difference among the dependent variables.

Table 4

Tests of Between-Subject Effects for Parental Status

Variables	Burnout				Self-Efficacy			
	df	*F*	*p*	Partial Eta Squared	*df*	*F*	*p*	Partial Eta Squared
Parental Status	1	8.16	.005	.03	1	3.16	.08	.01

Table 4 shows that parental status did not significantly affect the self-efficacy variable; however, the burnout variable was significantly affected by parental status [F (1, 314) = 8.16, p < .025; Wilks' Lambda = .95; partial eta squared = .03; multivariate effect size = 0.05]. Post-hoc analysis showed that teachers with no children felt more burnout than those with one or more children. Besides, the self-efficacy variable [F (1, 314) = 3.16, p > .025; Wilks' Lambda = .95; partial eta squared = .01; multivariate effect size = 0.05]. Since the partial eta squared of the study was .03 (η^2 < .06), the effect size of the study was small (Pierce et al., 2004).

Discussion

The purpose of the study was to investigate the effects of gender, weekly lesson hours, years of experience, school type in which the participants worked, marital status, and parental status on burnout and self-efficacy in terms of online education during the pandemic. Considering the first research question, even though the study results pointed out a mean difference between female and male teachers in which female teachers experienced burnout less than male teachers, this difference was not significant This result was inconsistent with some of the studies in the literature (Ozamiz-Etxebarria et al., 2021; Pressley, 2021; Sokal et al., 2020). The lack of a significant gender difference in the present study might be explained by the extraordinary stressors of COVID-19 pandemic, which might overshadow the gender-based differences regarding burnout. Similarly, according to the current findings, considering the gender, self-efficacy scores of female and male teachers were not found to be significantly different from each other. This result was also consistent with the literature, which stated no difference between male and female teachers regarding their self-efficacy beliefs (Corry & Stella, 2018; Robinia & Anderson, 2010). Although Freeman and He (2010) stated that men had a higher self-efficacy score in the technological context than women, this situation was not valid in this research. In this study, the demographic about taking any seminar or course about online education, was answered positively mostly by women. Thus, this knowledge about the participants may have equalized or decreased the difference between genders and caused insignificant results.

Additionally, when teachers' burnout related to weekly lesson hours was investigated, there was no significant difference between teachers; however, the analysis suggested a mean difference, which indicated that teachers who had less than 16 hours and more than 40 hours felt more burnout than the teachers in between. However, the results have some inconsistencies with the study conducted by Yerdelen and colleagues (2016), which states that burnout levels increase when the weekly lesson hours increase. This result could be attributed to the pandemic when teachers conducted

their lessons mostly at home, and it may not make any difference for them to have fewer or more lesson hours since they were already at home. Regarding self-efficacy, in descriptive statistics, similar to the literature, it could be easily seen that the self-efficacy of teachers increased as weekly lesson hours increased. In contrast to the findings reported in the literature, where the variable of weekly working hours had a significant positive effect on self-efficacy (Reyhing & Perren, 2021), the results were found to be insignificant in this study. Future studies could include a larger sample size to examine the potential effect more deeply.

The findings of the study also demonstrated that there is a significant difference between more experienced and less experienced teachers and demonstrated that teachers with higher experience had higher burnout levels. This finding was inconsistent with the literature, stating that high experience led to low burnout (Yerdelen et al., 2016). Maslach and Jackson (1981) stated that burnout occurred more at the beginning of the profession. Although Maslach and Jackson's idea (1981) and the study demonstrated that novice teachers experienced burnout as psychological self-defense as a consequence of unmet expectations in the workplace (Edelwich & Brodsky, 1980), the reason why experienced teachers felt more burnout in this study could be related to online education and incompetence in technology. In addition to those factors, the pandemic might also have triggered burnout because of the limited connection of students through online education. In terms of self-efficacy, the current study also showed that there is a significant difference in terms of years of experience. According to the post-hoc analysis, teachers who have less than 10 years of experience and teachers who have between 10 and 20 years of experience had higher levels of self-efficacy in online education than the teachers who have more than 20 years of experience, unlike the studies which found that the more years of experience led to the higher self-efficacy in teachers (Atta et al., 2012; Ávalos & Valenzuela, 2016; Reyhing & Perren, 2021). The reason for the difference between the results of the literature and this study could be that the studies in the literature worked on self-efficacy in a general term; however, in this study, the aim was to investigate the effect of the independent variables on self-efficacy during online education in the COVID-19 pandemic. Thus, the necessary competence of online education, which is the ability to use technological tools such as computers and programs such as Zoom, EBA, and Web 2.0, might have affected why the study showed different results from the literature.

According to the Turkish Council of Higher Education (YÖK, 1998), the Instructional Technology and Material Development course was added to the teacher education programs to enhance teachers' competence in technology. This decision meant that teachers who graduated before 2002 did not have the privilege to take this course because it was not in the curriculum. Thus, it could cause novice teachers to have more self-efficacy than experienced ones in online education. Furthermore, the descriptive analysis supported the idea that the teachers who had taken seminars about online education before the survey had higher self-efficacy beliefs than the others.

The variable of school types in which the teachers worked was found to be insignificant for burnout. Unlike the findings of the study in terms of school type, Karanfil (2019) stated that the teachers in private schools had a higher level of burnout. The fact that school type doesn't seem to affect teacher burnout might be due to how the usual differences between schools disappeared during COVID-19. While earlier studies, such as Karanfil (2019), reported higher burnout among private school teachers due to factors like increased workload and parental pressure, these unique stressors were likely overshadowed by the universal challenges due to the pandemic. Online teaching, emotional strain, and systemic uncertainty could have affected teachers across all school types and it may neutralize previously observed differences. Therefore, it may not lead to any significant change for teachers. In terms of self-efficacy, the variable of school types in which the teachers worked was found to be significant regarding self-efficacy for the benefit of private school teachers (Semerci & Uyanık Balat, 2018). The reason why these teachers had higher levels of self-efficacy than others might depend on the provided opportunities, such as purchased programs and obligatory in-service

education by private schools. Moreover, as Karanfil (2019) stated, this might have occurred because of long working hours, a competitive environment, high expectations from teachers, motivated students, and cooperation with parents during a pandemic.

Considering the second question, the finding of the study displayed that the teachers who did not have any children significantly experienced more burnout than the teachers who had one or more children. This result was consistent with the literature, which said that having children made teachers feel less burnout (Karabıyık Özipek, 2006; Yerdelen et al., 2016). As opposed to the current study, the existing literature revealed that having children provided parents with emotional support, reducing the teachers' burnout level. As regards the pandemic, having children brought emotional support for the parents in a difficult time like the pandemic. The effect of parental status also showed that they were insignificant regarding the effect on self-efficacy. These findings were also supported by the studies in the literature (Bonett, 1994).

As for the marital status of the teachers, the results did not indicate any significant difference between married and single teachers. This result was inconsistent with the literature (Başol & Altay, 2009 Karanfil, 2019; Zadok Gurman et al, 2021) which stated that single teachers have higher levels of burnout than married one. This result may be attributed to issues related to working remotely. Also, when the pandemic suddenly hit the world and people started to work at home, partners sharing resources, such as the Internet, workspace, or computers, may have caused unexpected friction. This friction between married couples of teachers could have decreased the difference between single and married teachers. The effect of marital status also showed that they were insignificant regarding the effect on self-efficacy. These findings were also supported by the study of Batool and colleagues (2020). One possible reason for this finding is that, during the pandemic, all teachers, regardless of marital status, had to abruptly adapt to new teaching methods, such as online platforms and digital tools. This might have created a common learning curve that placed everyone in similar professional circumstances, and it may have minimized the potential effect of personal factors like marital status. Additionally, while marriage may typically provide emotional support, the unique stressors of the pandemic, such as financial uncertainty, health concerns, and increased household responsibilities, may have diminished these benefits. As a result, marital status may have had little influence on teachers' perceived self-efficacy during COVID-19.

Further, when looking at the interaction of marital status and parental status, it could be seen that this difference was insignificant, considering burnout levels. A possible explanation for the insignificant interaction between marital and parental status on burnout may lie in the shared crisis environment created by the COVID-19 pandemic. The widespread uncertainty, health concerns, and disruption to daily life may have affected people across all family structures and created a collective sense of stress and emotional exhaustion. In such a context, personal circumstances like being married or having children may have had less impact on burnout levels, as all teachers, regardless of their marital or parental status, were having similar psychological and professional challenges. In terms of self-efficacy, the findings of the interaction of marital status and parental status were insignificant. Similar to the insignificant difference between single or married teachers in terms of self-efficacy levels, one possible reason for the insignificance of the interaction between marital and parental status on self-efficacy is that all teachers, regardless of their family circumstances, were exposed to similar professional challenges during the COVID-19 pandemic. The sudden transition to online education required every teacher to adapt quickly to unfamiliar technologies, manage the classroom, and maintain instructional quality under uncertain conditions. These shared professional stressors may have had a stronger influence on teachers' sense of self-efficacy than differences in personal life and it may have led to a leveling effect across marital and parental categories.

Implications for Research and Practice

In the current study, significant differences were found in years of experience and parental status for burnout levels of teachers. Also, there were significant differences in years of experience and school type with respect to the self-efficacy levels of teachers. Based on these findings, more targeted and practical strategies can be recommended. These include:

- Providing more seminars, courses, and in-service training on stress management, coping skills, and innovative teaching methods to help decrease burnout and improve self-efficacy.
- Organizing collaboration sessions where teachers interact with each other, exchange ideas about teaching strategies and online education materials, and receive social and professional support to reduce anxiety.
- Improving the quality, characteristics, and opportunities of public schools so that no differences exist among them regarding factors that influence teachers' self-efficacy levels.
- Supporting teachers who have children by reducing their workload when possible and ensuring access to reliable institutions or programs where their children can safely attend, thereby minimizing the impact of parental status on burnout.

These targeted and practical strategies can help create a healthier, more supportive working environment and ultimately improve teachers' well-being and instructional quality.
The use of a convenience sample in this study represents an important limitation that should be acknowledged. Since participants were not randomly selected, there is a risk that the sample may not accurately represent the broader population of middle school mathematics teachers in Türkiye. Consequently, the findings may not be fully generalizable to all teachers and should be interpreted with caution. Regarding the choice of sampling, the sample can be generated from a targeted population that has similar characteristics to the sample. Future studies using random sampling or more diverse sampling strategies would strengthen the external validity of the results and improve the replicability of the study.

The authors received no financial support for the research, authorship, and/or publication of this manuscript

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