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Article abstract

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# Long-term Impacts of COVID-19 on Stress and Depression Among Teachers: Differences by Gender

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## Abstract

This article explores the impact of changes in teaching modalities resulting from the COVID-19 pandemic on the mental health of K-12 teachers, by gender, during the first year of the pandemic. Teachers from a random sample of K-12 schools in North Dakota and Minnesota were surveyed in April 2020, October 2020, and March/April 2021 about their current levels of stress and depression, as well as the frequency with which they experienced certain physical conditions. One-way analysis of variance and multiple regression were used to compare time points for each of the outcomes by gender. Female teachers were more likely to experience higher levels of stress than male teachers, while male teachers were more likely to experience higher levels of depression than female teachers, with spikes in stress and depression levels experienced by both males and females in Time 2. Additionally, physical symptoms were more likely to be experienced by female teachers, with Time 2 respondents overall reporting significantly higher proportions of physical symptoms than Time 1 or Time 3 respondents. Consistently experiencing heightened levels of stress and depression can lead to burnout for teachers. School districts need to monitor stress, especially among females, and depression, especially among males, to recognize the difference in experience for each gender in the teaching profession, as well as provide supports and resources to their teachers to help them in coping with these mental-health issues.



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## Introduction

At the onset of the COVID-19 pandemic in March 2020, K-12 public education underwent a drastic and abrupt change to online/distance learning to protect the public's health and prevent further spread of the disease (Decker et al., 2020; Donohue & Miller, 2020; Young & Donovan, 2020). Nearly two years into the pandemic, schools are continuing to feel the impact of COVID-19 with increased use of mitigation efforts to stifle disease spread, such as social distancing, quarantining of students, and mandated mask usage (Krishnamachari et al., 2021). Teachers have continued to be on the frontlines of the pandemic, adjusting to the ongoing recommendations from the Centers for Disease Control and Prevention (CDC) along with requirements passed down by school boards to address pandemic-related issues, including, but not limited to, modifying their lessons to being available online or from a distance (Sangeeta & Tandon, 2021), modifying their classrooms to be safer places to educate students (Lohmann et al., 2021), and modifying their daily schedules to accommodate increased demands on their limited time (Jones et al., 2021). Early cross-sectional research indicates the pandemic has had an adverse impact on the overall health and well-being of teachers, as evidenced by increases in stress and depression (Pressley et al., 2021; Santamaría et al., 2021). Additionally, female teachers have experienced increased levels of stress and depression due to the pandemic, as compared to their male counterparts (Ozamiz-Etxebarria et al., 2021; Santamaria et al., 2021). However, there is limited empirical research on the long-term impact of COVID-19 on these issues among teachers overall or by gender (Pressley et al., 2021). This study addresses the need for research into the long-term impacts on the mental health of teachers, overall and by gender, as the COVID-19 pandemic continues.

### *Stress*

Even prior to the pandemic, teaching had been viewed as a stressful job (Davidson, 2009; Johnson et al, 2005), with high burnout and teacher turnover (Califf & Brooks, 2020; Chang, 2009). Stress, defined as a range of physical and psychological reactions from threats to a person's stability or status quo (Hiebert & Farber, 1984), can influence teacher job satisfaction (Klassen & Chiu, 2010), teaching effectiveness (Trendall, 1989), and relationships with students leading to negative academic outcomes (Collie & Martin, 2017; Wentzel, 2010). Stress can also impact a teacher's overall physical and mental health (De Simone et al., 2016; Shernoff et al., 2011). A continued state of stress can lead to burnout (Herman et al., 2017). Teachers who are burnt-out, but remain in the profession, can see negative impacts on the quality of their instruction. Teachers who are experiencing burnout feel mentally drained, and thus are less likely to provide quality lessons, or to effectively deal with student classroom behaviour (Chang, 2009).

Prior to COVID, teacher stress was triggered by an increasing workload, grading, dealing with student discipline issues, and the constant feeling of never being done with their work (Davidson, 2009), many of which have been experienced to a greater extent during the pandemic (Ferren, 2021; Robinson et al., 2022; Westphal et al., 2022). Technology also triggered stress pre-pandemic (Califf & Brooks, 2020), and continued during the pandemic. Due to the transition to online learning and other technology requirements, because of the pandemic, teachers increased their use of technology, regardless of their experience or comfort level, which has had a direct impact on stress levels (Ferren, 2021; Goldberg, 2021). A study by Califf and Brooks (2020) found that technology-related stress for teachers is associated with a lack of technological knowledge, information overload, and issues with technology not working appropriately (or at all), which can lead to increased teacher turnover. Prior to COVID-19, almost 50% of teachers left the profession

in their first five years in the job, due to high levels of stress (Califf & Brooks, 2020), and this is expected to increase dramatically, as a result of the pandemic (Steiner & Woo, 2021). Teacher turnover is expensive, and costs upwards of $2.2 billion per year (Califf & Brooks, 2020). It can also have a negative effect on students. Constant turnover results in a decline in the quality of student instruction, due to a decline in the number of experienced teachers (Chang, 2009).

Recent research has identified pandemic-related issues, which increased teacher stress and levels of burnout. Ferren (2021) found that the rapid transition to online teaching, caused stress for many teachers, due to the sudden change, combined with the lack of time to prepare or receive training to teach in this manner. In addition to the stress from the rapid change, many teachers worried that they might lose their jobs due to the uncertainty and budget cuts from the pandemic (Ferren, 2021). Many teachers left the profession early during this time to take jobs with fewer hours (Dilberti et al., 2021). Nearly half of those teachers took lower paying jobs that had lower or no benefits (Dilberti, 2021). Overall, a majority of teachers who left the profession during the pandemic did so because of job dissatisfaction and not retirement (Dilberti, 2021; Ferren, 2021).

### *Depression*

Depression is defined as "a common and serious medical illness that negatively affects how you feel, the way you think, and how you act" (American Psychiatric Association [APA], n.d.). Symptoms of depression can include, but are not limited to, fatigue, social withdrawal, loss of energy, difficulty concentrating, feelings of failure, and various physical health-related symptoms, such as sleep issues (APA, n.d.). Teacher depression has been linked to reduced teaching effectiveness within the classroom (Hamre & Pianta, 2004; Ripski et al., 2011; Uzman & Telef, 2015). Depression and stress have been found to be the most common mental-health issues experienced by teachers (Uzman & Telef, 2015), and there is a correlation between teacher burnout and increased rates of depression (Shin et al., 2013). Additionally, depression and stress are inextricably connected, with depression being one of the most common mental health issues experienced by individuals experiencing high levels of stress (Hammen, 2005; Tsai et al., 2006). Research has shown that not only have many teachers experienced high levels of depression since the start of the pandemic (Silva et al., 2021), but they have also experienced increases in depression from pre-pandemic in the early months of the pandemic (Markowitz et al., 2021).

### *Theoretical framework*

The theoretical framework of work-life balance can assist in understanding potential gender differences in stress and depression among educators (Doble & Supriya, 2010). This framework describes the ability of an individual to dedicate equal amounts of time and energy to both work-related and non-work-related issues (Dave & Purohit, 2016). Women's workloads have increased steadily throughout the previous century, and although they are now working more hours, they have continued to maintain the same responsibilities within their households (Coverman, 1989; Power, 2020). The work-life balance framework provides a lens through which different expectations related to gender roles can be examined, especially as the demands of work and home life conflict (Leo et al., 2022). Recent studies have illuminated the increased burden placed on women because of the pandemic, such as taking a greater responsibility in childcare (Zamarro & Prados, 2021), because men were less likely to reduce their work hours than women (Reichelt et al., 2020). Additionally, cross-sectional studies conducted at the onset of the pandemic found differences in mental health outcomes in the general population by gender, in that women

have experienced increased rates of stress, depression, and anxiety during the pandemic as compared to their male counterparts (Elbay et al., 2020; Zamarro & Prados, 2021).

Few studies have examined the differences in levels of stress and depression experienced by K-12 teachers by gender during the pandemic, and of those that have, most are cross-sectional in nature, with either point-in-time interviews and focus groups, or surveys (Clark et al., 2021; Kara et al., 2021; Ozamiz-Etxebarria et al., 2021; Santamaria et al., 2021). The findings from these studies reveal higher rates of anxiety, stress, and depression among female teachers, as compared to males (Ozamiz-Etxebarria et al., 2021; Santamaria et al., 2021).

### *Current study*

This paper provides an analysis of the long-term impact of COVID-19 on the mental health of K-12 educators overall and by gender, regarding stress and depression over the course of one year, from the beginning of the pandemic to spring 2021. Studies on teacher mental health during COVID often draw on cross-sectional data (Pressley et al., 2021; Santamaría et al., 2021). This study includes data collected at three different points during the first year of the pandemic, and helps to fill the gap of limited empirical research on the long-term impact of the COVID-19 pandemic on stress and depression among teachers overall and by gender, providing information needed to develop interventions to assist in addressing teachers' mental health (Pressley et al., 2021).

## Materials and Methods

### *Design and participants*

This study was designed to measure stress, depression, and related physical symptoms experienced by K-12 teachers during the first year of the COVID-19 pandemic. Following institutional review board clearance, a survey was sent to teachers at randomly selected public schools in North Dakota (ND) and Minnesota (MN). To randomly select schools, ND and MN counties were first stratified by metropolitan status. Urban counties were defined as metropolitan counties with 50,000 or more people, and less than 50,000 as rural (Economic Resource Service, n.d.). Two urban and 20 rural counties were randomly selected in ND, and seven urban and 20 rural counties were selected in MN, with additional urban counties selected in MN, due to its larger urban population (Economic Resource Service, n.d.). Five elementary, one middle, and one high school were randomly selected within each county. All K-12 teachers with publicly available email addresses, at the randomly selected schools, were emailed a survey invitation to participate in the online Qualtrics survey.

Survey dissemination occurred at three distinct time points: April 2020 (Time 1), October 2020 (Time 2), and March/April 2021 (Time 3). The Time 1 survey dissemination occurred after schools were reopened to online learning, after the initial lockdown due to the COVID-19 pandemic (MN Exec. Order No. 20-19, 2020; ND Exec. Order No. 2020-10, 2020). As there was limited information about how long the pandemic would last, and no expectation there would be long-term impacts, it was only anticipated that a single, cross-sectional survey would be conducted. However, as the pandemic continued into the fall 2020, it was determined that data collection should continue, so a second round of invitations was sent in October 2020 (Time 2) to the same group of teachers, with the final round being sent in March/April 2021 (Time 3). Because

the research did not use a matched sample, the results cannot be compared for individual respondents over time, but, rather, constituted a series of three cross-sectional surveys.

### *Measures*

As part of a larger study, teachers responded to questions related to: a) perceived stress; b) depression; c) physical symptoms; and d) demographics.

The Perceived Stress Scale-10 (PSS-10) (Cohen et al., 1994) was utilized as a metric for stress. The PSS-10 is a self-report scale, which assesses stress levels, and is comprised of 10 items on a 5-point scale (0=never, 1=almost never, 2=once in a while, 3=often, 4=very often). For Time 1, participants responded to a series of statements, and selected how often they have felt, or thought, a certain way since schools were closed on account of the pandemic. This was modified slightly from the original scale time frame, which asked respondents to indicate how frequently they have felt, or thought, a certain way in the last month. Time 2 and Time 3 used the original scale time frame. In this study, the Cronbach alpha coefficient for the PSS-10 was 0.901. The scores were added together for a potential range from 0 to 40, with higher scores indicating a higher level of perceived stress. The scores were grouped into four distinct ranges: 0-9, 10-19, 20-29, 30-40, with scores of 20 or higher indicating increased levels of stress (Sharp Donahoo et al., 2018).

The Center for Epidemiologic Studies Short Depression Scale (CESD-R-10) was used to measure depression (Van Dam & Earleywine, 2011). The CESD-R-10 is also a self-report tool, which measures levels of depression. It is made up of 10 items on a 4-point scale (0=rarely or none of the time, 1=some or a little of the time, 2=occasionally or a moderate amount of time, 3=all of the time). For Time 1, participants responded to a series of statements and selected how frequently they have felt or behaved in a certain way since schools were closed because of the pandemic. This was modified slightly from the original scale time frame, which asked respondents to indicate how frequently they have felt or behaved in a certain way in the past week. Time 2 and Time 3 used the original scale time frame. In this study, the Cronbach alpha coefficient for the CESD-R-10 was 0.870. The scores were added together for a potential range from 0 to 30, with higher scores indicating higher levels of depression. The scores were grouped into three ranges: 0-9, 10-20, and 21-30, with scores of 10 or more indicating major depression (Björgvinsson et al., 2013).

Respondents also specified the frequency with which they experienced specified common stress-related physical and psychological symptoms (Marks, 2021) on a scale from 1 to 4 with 1 being “Rarely or none of the time” and 4 being “All of the time.” For Time 1, respondents were asked the frequency with which they felt these symptoms since schools were closed during the pandemic, and for Time 2 and Time 3, they were asked the frequency with which they felt these symptoms in the past week.

Respondents were also questioned regarding general demographic information, including age (open-ended), gender (male, female, other), marital status (single, never married; widowed; divorced, separated; married), number of children under age 18 in the home (open-ended), education (Bachelor’s, Master’s, Doctoral degree), race (American Indian/Alaska Native, Black, Asian, Hispanic Latino, White, Other - could select all that apply), and income ($19,999 or less; $20,000-$39,999; $40,000-$59,999; $60,000 to $79,999; $80,000 to $99,999; $100,000 to $149,999; $150,000 or more).

### *Data analysis*

Demographic information and outcomes of interest were summarized by time point using class frequencies and percentages for categorical variables, along with means and standard deviations for continuous variables. One-way analysis of variance (ANOVA) was used to compare the time point means for depression and stress scores followed by Tukey's multiple comparisons procedure. Symptom frequency, depression score range, and stress score range frequency distributions were compared across all three time points using the chi square test of association. Following statistical significance of the overall chi square test, each pair of time points was directly compared using additional chi square tests. Two multiple regression analyses were performed at each time point to determine factors significantly associated with depression score and stress score. Statistical significance was set at 5%. All analysis was performed in SPSS v. 25 (IBM Corp) and using the GLM procedure in SAS software v. 9.4 (SAS Institute, Cary NC).

## Results

The demographic distribution was similar across all three time points. More than 70% of respondents at all time points were female. Only two respondents indicated their gender as "other," and this was in Time 3. Because the number of respondents for this variable was extremely low, and did not have identified respondents for all three time points, this gender option was not included in the analysis. Mean age for both males and females ranged from 42 to 44 years, and more than two-thirds of both males and females at all time points were married (Table 1). Approximately 60% of both male and female respondents at all three time points had a master's degree, a significant majority were white, both males and females indicated, on average, that they had two children, and approximately half of respondents at all three time points had an annual household income of less than $100,000.

Table 1: Demographics.

| | | Time 1 (Apr '20) (n=765) | | | | Time 2 (Oct '20) (n=551) | | | | Time 3 (Mar/Apr '21) (n=334) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Male | | Female | | Male | | Female | | Male | | Female | |
| | | n | % | n | % | n | % | n | % | n | % | n | % |
| | | 174 | 22.7% | 591 | 77.3% | 122 | 22.0% | 433 | 78.0% | 87 | 25.7% | 250 | 73.7% |
| Years Teaching | Less than 1 year | 5 | 2.9% | 26 | 4.4% | 2 | 1.6% | 7 | 1.6% | 1 | 1.1% | 1 | 0.4% |
| | 1-5 years | 22 | 12.6% | 101 | 17.1% | 15 | 12.3% | 92 | 21.2% | 14 | 16.1% | 35 | 14.0% |
| | 6-10 years | 26 | 14.9% | 91 | 15.4% | 32 | 26.2% | 74 | 17.1% | 15 | 17.2% | 62 | 24.8% |
| | More than 10 years | 121 | 69.5% | 372 | 63.1% | 73 | 59.8% | 260 | 60.0% | 57 | 65.5% | 152 | 60.8% |
| Marital status | Single/ never married | 29 | 16.8% | 99 | 16.8% | 22 | 18.0% | 82 | 19.1% | 19 | 21.8% | 48 | 19.3% |
| | Widowed/ divorced/ separated | 12 | 6.9% | 52 | 8.8% | 9 | 7.4% | 48 | 11.2% | 5 | 5.7% | 32 | 12.9% |
| | Married | 132 | 76.3% | 439 | 74.4% | 91 | 74.6% | 299 | 69.7% | 63 | 72.4% | 169 | 67.9% |
| Children | Mean (Standard Deviation) | 2.2 (1.3) | | 2.0 (1.2) | | 2.0 (1.2) | | 1.9 (1.2) | | 2.0 (1.3) | | 2.0 (1.3) | |
| Age (years) | Mean (Standard Deviation) | 44.2 (11.2) | | 42.9 (11.8) | | 42.3 (11.1) | | 42.0 (11.7) | | 43.5 (11.5) | | 42.9 (10.7) | |
| Education | Bachelors | 70 | 40.2% | 245 | 41.5% | 59 | 48.4% | 179 | 41.5% | 43 | 49.4% | 97 | 39.0% |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Master's or doctorate | 104 | 59.8% | 346 | 58.5% | 63 | 51.6% | 252 | 58.5% | 44 | 50.6% | 152 | 61.0% |
| Race | White | 167 | 96.0% | 564 | 95.4% | 115 | 94.3% | 410 | 95.6% | 81 | 94.2% | 236 | 95.5% |
| | American Indian/ Alaska Native | 1 | 0.6% | 6 | 1.0% | 0 | 0.0% | 6 | 1.4% | 1 | 1.2% | 5 | 2.0% |
| | Hispanic/Latino | 2 | 1.1% | 5 | 0.8% | 0 | 0.0% | 1 | 0.2% | - | 0.0% | 2 | 0.8% |
| | Asian | 2 | 1.1% | 2 | 0.3% | 0 | 0.0% | 2 | 0.5% | - | 0.0% | 2 | 0.8% |
| | Black | 1 | 0.6% | - | 0.0% | 0 | 0.0% | 1 | 0.2% | - | 0.0% | - | 0.0% |
| | Other | 1 | 0.6% | 14 | 2.4% | 7 | 5.8% | 9 | 2.1% | 4 | 4.7% | 2 | 0.8% |
| Income | $39,999 or less | 3 | 1.70% | 28 | 4.8% | 2 | 1.7% | 21 | 4.9% | 2 | 2.4% | 8 | 3.2% |
| | $40,000 to $59,999 | 28 | 16.20% | 103 | 17.7% | 19 | 15.7% | 82 | 19.2% | 14 | 16.5% | 56 | 22.7% |
| | $60,000 to $79,999 | 36 | 20.80% | 82 | 14.1% | 26 | 21.5% | 73 | 17.1% | 17 | 20.0% | 33 | 13.4% |
| | $80,000 to $99,999 | 38 | 22.00% | 97 | 16.7% | 25 | 20.7% | 66 | 15.5% | 11 | 12.9% | 49 | 19.8% |
| | $100,000 to $149,999 | 50 | 28.90% | 197 | 33.9% | 37 | 30.6% | 127 | 29.8% | 31 | 36.5% | 70 | 28.3% |
| | $150,000 or greater | 18 | 10.40% | 74 | 12.7% | 12 | 9.9% | 57 | 13.4% | 10 | 11.8% | 31 | 12.6% |

## *Stress*

Overall, the lowest amount of stress was experienced by respondents at Time 1 with a significantly lower mean stress score of 19.25 (SE = 0.25), compared to both Time 2 (mean=22.69; SE=0.29; $p<0.001$) and Time 3 (mean=20.02; SE=0.41; $p=0.016$) (Table 2). Additionally, respondents experienced a significantly higher level of stress at Time 2, compared to Time 3 ($p<0.001$). Nearly half (49.8%) of respondents had scores of 20 or higher in Time 1, indicating increased levels of stress, while more than 72% had scores of 20 higher in Time 2, with 55.8% of respondents in Time 3 having scores of 20 or higher.

Table 2: Stress and depression among K-12 teachers.

| | | Time 1 (April '20) | | Time 2 (Oct '20) | | Time 3 (Mar/Apr '21) | | p-values (SE) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | n | % | n | % | n | % | T1 to T2 | T2 to T3 | T1 to T3 |
| Stress | 0-9 | 59 | 7.9% | 23 | 4.3% | 34 | 10.0% | | | |
| | 10-19 | 314 | 42.3% | 128 | 23.7% | 119 | 35.1% | | | |
| | 20-29 | 326 | 43.9% | 301 | 55.6% | 152 | 44.8% | | | |
| | 30-40 | 44 | 5.9% | 89 | 16.5% | 34 | 10.0% | | | |
| Mean (SE) | | 19.25 (0.25) | | 22.69 (0.29) | | 20.02 (0.41) | | <0.001 | <0.001 | 0.016 |
| Depression | 0-9 | 255 | 33.7% | 130 | 23.6% | 119 | 35.1% | | | |
| | 10-20 | 414 | 54.8% | 322 | 58.3% | 181 | 53.4% | | | |
| | 21-30 | 87 | 11.5% | 100 | 18.1% | 39 | 11.5% | | | |
| Mean (SE) | | 12.58 (0.23) | | 14.64 (0.27) | | 12.41 (0.35) | | <0.001 | <0.001 | 0.615 |

*SE=standard error*

Females had significantly higher stress scores than males in Time 1 (Female: 20.4 vs. Male: 19.4; p=0.013) and Time 2 (Female: 22.8 vs. Male: 20.8; p<0.001) (Figure 1, Table 3), controlling for stress, gender, years teaching, age, marital status, education, race, income and number of children. While stress scores were not significantly different in Time 3 by gender, females maintained a higher level of stress than their male counterparts (Female: 20.3 vs Male: 19.4; p=0.08). Stress scores for both males and females peaked during Time 2.

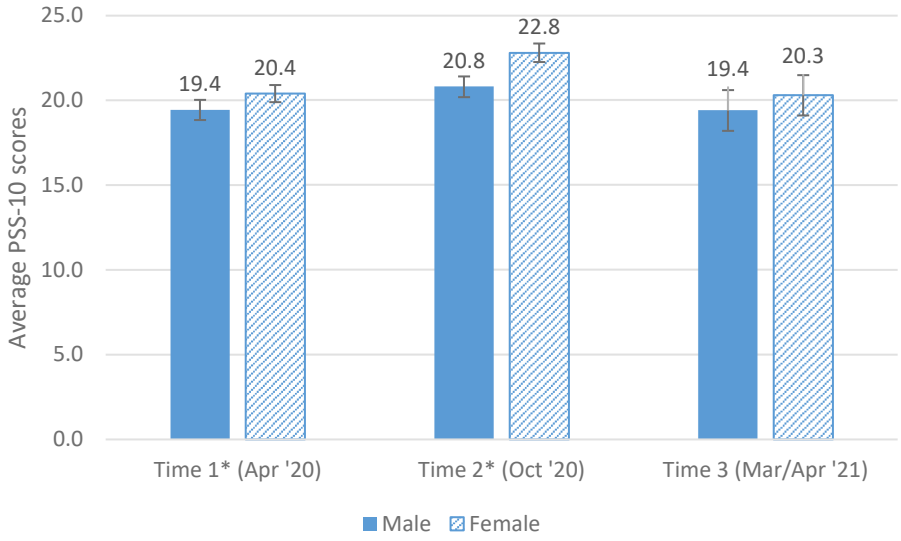


Figure 1: Mean stress scores by gender.

Table 3: Multiple regression for stress.

| | | Time 1 (Apr '20) | | | Time 2 (Oct '20) | | | Time 3 (Mar/Apr '21) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Est. | SE | p-value | Est. | SE | p-value | Est. | SE | p-value |
| Gender | Male | -0.08 | 0.36 | 0.830 | 1.14 | 0.38 | 0.003 | 0.45 | 0.47 | 0.334 |
| | Female | 0.00 | . | | 0.00 | . | | 0.00 | . | |
| Stress | Continuous | 0.71 | 0.02 | <0.001 | 0.80 | 0.02 | <0.001 | 0.76 | 0.03 | <0.001 |
| Years Teaching | Less than 1 year | -0.18 | 1.00 | 0.046 | -1.80 | 1.40 | 0.512 | 2.20 | 3.84 | 0.330 |
| | 1-5 years | -0.95 | 0.57 | | -0.50 | 0.61 | | 1.21 | 0.81 | |
| | 6-10 years | 0.58 | 0.49 | | -0.53 | 0.48 | | -0.07 | 0.62 | |
| | More than 10 years | 0.00 | . | | 0.00 | . | | 0.00 | . | |
| Age | Continuous | 0.00 | 0.02 | 0.883 | 0.05 | 0.02 | 0.028 | 0.10 | 0.03 | <0.001 |
| Marital Status | Single/never married | -0.13 | 0.56 | <0.001 | 0.68 | 0.57 | 0.331 | 0.32 | 0.75 | 0.897 |
| | WDS* | 2.33 | 0.61 | | -0.27 | 0.58 | | 0.28 | 0.79 | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Married | 0.00 | . | | 0.00 | . | | 0.00 | . | |
| Education | Bachelor's | 0.21 | 0.33 | 0.523 | 0.01 | 0.34 | 0.970 | 0.10 | 0.44 | 0.811 |
| | Master's/Doctorate | 0.00 | . | | 0.00 | . | | 0.00 | . | |
| Race | Non-white | -2.00 | 0.71 | 0.005 | 0.88 | 0.79 | 0.268 | 1.76 | 0.94 | 0.064 |
| | White | 0.00 | . | | 0.00 | . | | 0.00 | . | |
| Income | $39,999 or less | -1.63 | 1.04 | 0.202 | 2.78 | 1.09 | 0.057 | 2.37 | 1.54 | 0.186 |
| | $40,000 to $59,999 | -1.27 | 0.68 | | 0.61 | 0.73 | | 2.42 | 0.96 | |

### *Depression*

The overall mean depression scores were similar in Time 1 and Time 3, with average scores of 12.41 (SE = 0.23) and 12.58 (SE = 0.35), respectively (p=0.615), and significantly higher in Time 2, with an average score of 14.62 (SE = 0.27; p<0.001) (Table 2). Approximately two-thirds of respondents had scores of 10 or higher, indicating an increased risk for a clinical level of depression in Times 1 (66.3%) and 3 (64.9%), with more than three-fourths of respondents having scores of 10 or higher in Time 2.

Males had significantly higher depression scores than females in Time 2 (Male: 15.8 vs. Female: 14.7; p=0.003), controlling for stress, gender, years teaching, age, marital status, education, race, income, and number of children (Figure 2, Table 4). While depression scores were not significantly different in Time 3 by gender, males maintained a higher level of depression than their female counterparts (Male: 13.0 vs. Female: 12.5, p=0.334). Depression scores were similar by gender for Time 1 (Male: 12.1 vs. Female: 12.2, p=0.830). Depression scores for both males and females peaked during Time 2.

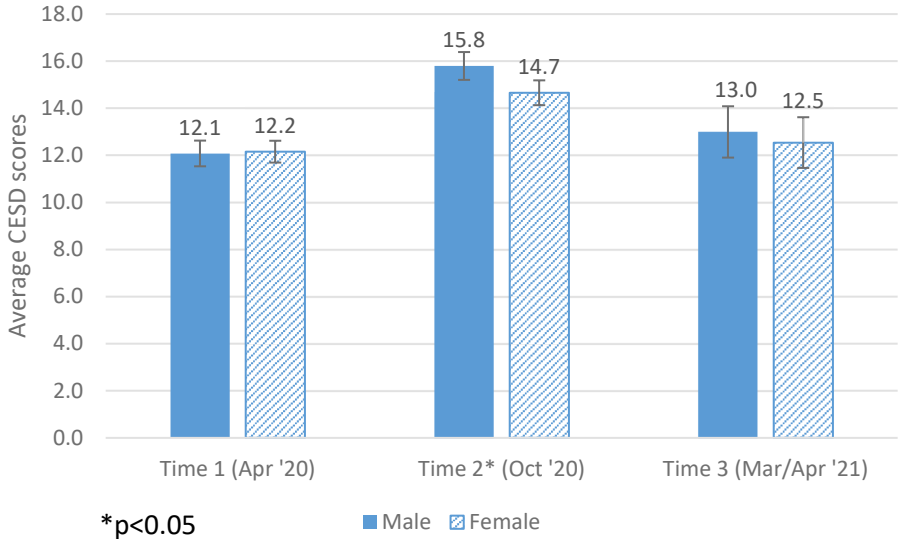


Figure 2: Mean depression scores by gender.

Table 4: Multiple regression for depression.

| | Time 1 (Apr '20) | Time 2 (Oct '20) | Time 3 (Mar/Apr '21) |
|---|---|---|---|

| | | Est. | SE | p-value | Est. | SE | p-value | Est. | SE | p-value |
|---|---|---|---|---|---|---|---|---|---|---|
| Gender | Male | -0.08 | 0.36 | 0.830 | 1.14 | 0.38 | **0.003** | 0.45 | 0.47 | 0.334 |
| | Female | 0.00 | . | | 0.00 | . | | 0.00 | . | |
| Stress | Continuous | 0.71 | 0.02 | **<0.001** | 0.80 | 0.02 | **<0.001** | 0.76 | 0.03 | **<0.001** |
| Years Teaching | Less than 1 year | -0.18 | 1.00 | 0.046 | -1.80 | 1.40 | 0.512 | 2.20 | 3.84 | 0.330 |
| | 1-5 years | -0.95 | 0.57 | | -0.50 | 0.61 | | 1.21 | 0.81 | |
| | 6-10 years | 0.58 | 0.49 | | -0.53 | 0.48 | | -0.07 | 0.62 | |
| | More than 10 years | 0.00 | . | | 0.00 | . | | 0.00 | . | |
| Age | Continuous | 0.00 | 0.02 | 0.883 | 0.05 | 0.02 | **0.028** | 0.10 | 0.03 | **<0.001** |
| Marital Status | Single/never married | -0.13 | 0.56 | <0.001 | 0.68 | 0.57 | 0.331 | 0.32 | 0.75 | 0.897 |
| | WDS* | 2.33 | 0.61 | | -0.27 | 0.58 | | 0.28 | 0.79 | |
| | Married | 0.00 | . | | 0.00 | . | | 0.00 | . | |
| Education | Bachelor's | 0.21 | 0.33 | 0.523 | 0.01 | 0.34 | 0.970 | 0.10 | 0.44 | 0.811 |
| | Master's/Doctorate | 0.00 | . | | 0.00 | . | | 0.00 | . | |
| Race | Non-white | -2.00 | 0.71 | **0.005** | 0.88 | 0.79 | 0.268 | 1.76 | 0.94 | 0.064 |
| | White | 0.00 | . | | 0.00 | . | | 0.00 | . | |
| Income | $39,999 or less | -1.63 | 1.04 | 0.202 | 2.78 | 1.09 | 0.057 | 2.37 | 1.54 | 0.186 |
| | $40,000 to $59,999 | -1.27 | 0.68 | | 0.61 | 0.73 | | 2.42 | 0.96 | |
| | $60,000 to $79,999 | -0.35 | 0.60 | | 0.12 | 0.61 | | 1.70 | 0.85 | |
| | $80,000 to $99,999 | -0.93 | 0.56 | | 0.21 | 0.60 | | 1.25 | 0.78 | |
| | $100,000 to $149,999 | -0.15 | 0.50 | | -0.46 | 0.53 | | 0.58 | 0.70 | |
| | $150,000 or more | 0.00 | . | | 0.00 | . | | 0.00 | . | |
| Children | Continuous | -0.36 | 0.15 | **0.015** | -0.14 | 0.16 | 0.384 | 0.24 | 0.19 | 0.200 |

*Est.=Estimate; SE = Standard Error; *Widowed, divorced, separated*

## *Physical symptoms*

Respondents were asked about the specific stress-related symptoms that they were experiencing at all three time points. Overall, feeling more tired was the most frequently experienced symptom for all three time points, followed by difficulty falling and staying asleep, headaches, teeth grinding, stomach issues, and chest pain or rapid heartbeat (Table 5).

Females were more likely than males to experience all listed stress-related symptoms across all three time points. A minimum of 70% of females indicated that they experienced the following symptoms some of the time, occasionally or all of the time for all three time points: felt more tired, had difficulty falling asleep, and had difficulty staying asleep, while the only symptom experienced by at least 70% males some of the time, occasionally, or all of the time across all three time points was felt more tired. For Time 1, there were statistically significant differences by gender for experiencing the following symptoms at least some of the time: felt more tired ($p=0.020$), difficulty falling asleep($p<0.001$), difficulty staying asleep ($p<0.001$), headaches ($p<0.001$), clenched jaw/grinding ($p<0.001$), and chest pain or rapid heart rate ($p<0.001$). For Time 2, statistically significant differences existed by gender for experiencing the following symptoms

at least some of the time: felt more tired (p=0.003), difficulty falling asleep (p=0.010), headaches (p<0.001), clenched jaw/grinding (p<0.001), and stomach issues (p=0.049). For Time 3, statistically significant differences existed by gender for experiencing the following symptoms at least some of the time: headaches (p<0.001), clenched jaw/grinding (p<0.003), and stomach issues (p=0.007).

Table 5: Physical symptoms.

| | | Time 1 (April '20) | | | Time 2 (Oct '20) | | | Time 3 (Mar/Apr '21) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Male | Female | p-value | Male | Female | p-value | Male | Female | p-value |
| Felt more tired | Rarely/none | 19.5% | 13.9% | 0.020 | 6.6% | 3.2% | 0.003 | 10.3% | 6.8% | 0.430 |
| | SOA | 80.5% | 86.1% | | 93.4% | 96.8% | | 89.7% | 93.2% | |
| Difficulty falling asleep | Rarely/none | 31.0% | 16.0% | <0.001 | 23.0% | 17.4% | 0.010 | 27.6% | 20.8% | 0.325 |
| | SOA | 69.0% | 84.0% | | 77.0% | 82.6% | | 72.4% | 79.2% | |
| Difficulty staying asleep | Rarely/none | 31.0% | 20.2% | <0.001 | 21.3% | 16.0% | 0.240 | 29.9% | 18.8% | 0.140 |
| | SOA | 69.0% | 79.8% | | 78.7% | 84.0% | | 70.1% | 81.2% | |
| Headaches | Rarely/none | 48.3% | 28.6% | <0.001 | 36.1% | 20.1% | <0.001 | 50.6% | 29.2% | <0.001 |
| | SOA | 51.7% | 71.4% | | 63.9% | 79.9% | | 49.4% | 70.8% | |
| Clenched jaw or grinding teeth | Rarely/none | 62.4% | 44.2% | <0.001 | 52.5% | 35.0% | <0.001 | 58.1% | 36.4% | 0.003 |
| | SOA | 37.6% | 55.8% | | 47.5% | 65.0% | | 41.9% | 63.6% | |
| Stomach issues | Rarely/none | 64.9% | 54.2% | 0.084 | 50.0% | 39.5% | 0.049 | 60.9% | 43.8% | 0.007 |
| | SOA | 35.1% | 45.8% | | 50.0% | 60.5% | | 39.1% | 56.2% | |
| Chest pain or rapid heartbeat | Rarely/none | 75.9% | 58.5% | <0.001 | 61.5% | 51.2% | 0.055 | 70.1% | 54.2% | 0.067 |
| | SOA | 24.1% | 41.5% | | 38.5% | 48.8% | | 29.9% | 45.8% | |
| Cold or sweaty hands or feet | Rarely/none | 81.0% | 74.3% | 0.183 | 76.2% | 67.9% | 0.370 | 76.7% | 65.1% | 0.258 |
| | SOA | 19.0% | 25.7% | | 23.8% | 32.1% | | 23.3% | 34.9% | |
| Dry mouth or difficulty swallowing | Rarely/none | 85.1% | 76.6% | 0.122 | 73.0% | 63.2% | 0.068 | 76.7% | 66.1% | 0.318 |
| | SOA | 14.9% | 23.4% | | 27.0% | 36.8% | | 23.3% | 33.9% | |
| Trembling or shaking hands | Rarely/none | 85.6% | 83.1% | 0.526 | 82.0% | 75.5% | 0.274 | 77.9% | 79.1% | 0.735 |
| | SOA | 14.4% | 16.9% | | 18.0% | 24.5% | | 22.1% | 20.9% | |

## Discussion

The current study examined the gender differences from the long-term impacts of rapid and continuous changes in teaching and classroom management requirements due to COVID-19 on the mental health of K-12 teachers during the first year of the pandemic. Prior to COVID-19,

depression and stress were the most common mental health issues for teachers for both men and women (Uzman & Telef, 2015), often resulting from general workload issues such as increased grading requirements and addressing student behaviour (Davidson, 2009). While COVID-19 brought forth new stressors, such as requiring teachers to rapidly shift curriculum online using technology with which they might not have had previous experience, prior stressors were still present, resulting in dramatic increases in teacher stress and depression, but with differences seen by gender.

In regard to stress, this study shows that in general, teachers experienced stress at levels higher than those seen in the general population throughout the first year of the pandemic, with teacher stress levels spiking in October 2020. Less than one month after schools closed due to the pandemic in March 2020, the mean PSS-10 score for teachers was 19.25. This stress level was higher than levels found in the general North-American population using the same scale (Teachers: 19.25 vs. North America:16.8) (Gamonal-Limcaoco et al., 2021). The participant stress scores peaked at 22.69 during October 2020, with many schools in ND and MN continuing to teach online at this time (Lonetree, 2020). Although the average stress level for the study participants decreased to 20.02 at the end of the 2020-2021 school year (March/April 2021), it should be noted that a score of 20 or higher is an indicator of increased levels of stress (Sharp Donahoo et al., 2018), and at all three time points, at least half of the participants in the study were experiencing these heightened levels of stress.

When examined by gender, both male and female teachers were experiencing stress at levels higher than those seen in the general population for all three time points (Gamonal-Limcaoco et al., 2021). Women were experiencing stress to a greater extent than their male counterparts. There are many reasons as to why women, specifically teachers, may be experiencing higher rates of stress. This increase may be the result of work-life balance challenges, as discussed previously (Doble & Supria, 2010; Power, 2020). Research related to gender roles and caregiving, as well as workforce issues, have found that women shoulder the brunt of the responsibility for health-related decisions within families (Matoff-Stepp et al., 2014), and that they are often the ones to stay at home with sick children (Ranji & Salganicoff, 2014). Additionally, when it comes to taking care of aging parents, women are more likely than men to take on the role of caregiver (Swinkels et al., 2017). These gender-based issues, coupled with the added stress of having to teach from home, or teach online, as well as transitioning lesson plans, and ensuring that students were keeping up with schoolwork (Lagat, 2021) made the COVID-19 pandemic a perfect storm, bringing each of these gender-based and teaching issues to the forefront simultaneously. This resulted in female teachers experiencing increased levels of stress, as compared to their male counterparts. Stress, especially heightened levels, can impact teacher job satisfaction (Klassen & Chiu, 2010), teaching effectiveness (Trendall, 1989), and overall mental and physical health (De Simone et al., 2016; Shernoff et al., 2011). Future research should continue to track stress among female teachers. However, studies should also be conducted regarding the ongoing long-term impact of experiencing heightened levels of stress on the overall well-being of this population.

In addition, there was a focus on depression levels among teachers. Participant depression levels mirrored those of stress. At the beginning of the pandemic (March 2020), the average CESD-R-10 depression score for teachers was 12.58. This level of depression was higher than levels found in the general U.S. population during the same time period (Teachers: 12.58 vs. U.S.:10.49) (Dayton et al., 2021). The depression scores for study participants peaked at 14.64 in October 2020. Although depression scores dropped to 12.41 in March/April 2021, approaching the end of the 2020-2021 school year, it should be noted that scores of 10 or higher indicate an increased risk

of heightened levels of depression (Dayton et al., 2021). In essence, teachers in this study experienced heightened levels of depression for at least the first year of the pandemic.

When examined by gender, it was found that both male and female teachers were experiencing depression at levels higher than those seen in the general population (Dayton et al., 2021). However, while women were experiencing higher levels of stress than men, men were experiencing higher levels of depression than women. These results differ from other research focused on depression among teachers, which tended to find that female teachers were often experiencing higher levels of depression than men (Ozamaiz-Etxebarria et al., 2021; Santamaria et al., 2021). Men have fewer close relationships than women, including fewer friendships, and are less likely than women to reach out to friends via phone or text to connect and maintain friendships (Shaw et al., 2014). Additionally, many male friendships are often focused on some type of activity (Shaw et al., 2014). Due to the required social distancing recommended during the first year of the pandemic, men may have had a difficult time sustaining their friendships and other social connections, since they were not able to participate in activities with others, ultimately impacting their overall mental health, and resulting in increases in depression. As stated earlier, teacher depression can lead to reduced teaching effectiveness in the classroom (Ripski et al., 2011), and the increased levels of depression experienced by both men and women can have an impact on classroom interactions with students.

The heightened levels of stress and depression among both male and female teachers manifested through many symptoms for both populations. Sleep issues were most common for both men and women, as were headaches. The physical manifestations of mental health can be seen in all aspects of an individual's life (Worley, 2018). Sleep is imperative to maintain healthy functioning, including overall attention, cognition, and mood (Worley, 2018). Sleep deprivation, or lack of quality sleep, can impact psychological well-being, often resulting in increased levels of stress, depression, and anxiety (Worley, 2018). Therefore, in this respect, sleep issues resulting from increased stress and depression, can result in the increased likelihood of experiencing mental health issues, which may lead to additional sleep issues – a never-ending cycle.

***Recommendations***

Teachers, both men and women, have been experiencing heightened levels of stress and depression since the start of the pandemic, due in part to changes in teaching requirements that were put in place to prevent the community spread of COVID-19 (Pressley et al., 2021; Santamaría et al., 2021). The burnout potential for the participants, who have experienced these increased levels of stress and depression for an extended period of time, is concerning, especially for women (Pressley, 2021). School districts need to recognize the different experiences of both men and women, and take action to guide their teachers through this unprecedented mental-health crisis. It is important that school districts continually monitor teachers for stress and depression (Pressley et al., 2021). Additionally, providing training to identify appropriate coping mechanisms can be beneficial, as it has been found that the use of coping mechanisms can provide a way to reduce stress, or use it in a positive manner, which can buffer the negative consequences associated with stress (Mujtaba & Rice, 2013). Mindfulness training has also been shown to reduce levels of stress and depression among teachers, and could be a beneficial addition to required professional development for teachers (Roeser et al., 2013).

Moreover, as the pandemic caused many schools to transition their class content, assignments, and delivery methods online, increased levels of teacher stress and anxiety were the consequences (Pressley, 2021). As schools continue to integrate technology within the classroom, schools need to provide technology training to help alleviate the residual stress and anxiety

teachers have from teaching online during COVID. Many teachers did not have the technological background and knowledge for teaching online (Klapproth et al., 2020). Providing technological training for teachers can assist in reducing stress levels from this issue (Califf & Brooks, 2020). Additionally, training in coping strategies to manage increased requirements to use digital technology can also be effective at reducing levels of anxiety and stress (Toto & Limone 2021).

### *Limitations*

While the study is of great importance and adds to the literature related to the impact of COVID-19 on educators, there are limitations. First, the findings are not generalizable to educators nationally, since the study was focused on a small geographic region of the U.S. in the upper mid-west. Additionally, the initial survey was not intended to be a longitudinal study, and did not use a matched sample, so the results cannot be compared for individual respondents over time, but rather, constituted a series of three cross-sectional surveys. Non-response bias was also a potential issue for this study, as participation was voluntary, and those who completed the surveys may have had different experiences with teaching and COVID-19, than those who decided not to participate. A final limitation is the attrition of study participants. There was a reduction in surveys completed between each of the data collection time points.

## Conclusion

Prior to COVID-19, teachers experienced high levels of stress and depression, both of which have only increased during the pandemic. As constant stress and depression can lead to burnout, school districts need to be aware of the causes of mental-health issues among their teachers. Although this study found that women experienced higher levels of stress, and males experienced higher levels of depression, it is important to note that both genders experienced levels higher than the general population, as well as at a level of a possible clinical diagnosis. Therefore, schools need to provide supports and resources to their teachers to help them cope with these mental-health issues. This may include providing professional development on coping strategies, social-emotional learning for teachers, or a reduction of school initiatives to allow teachers more time to focus on their lessons. School districts also need to ensure they are continuing to monitor stress and depression among their teachers.

***Declaration of Interest Statement***
No potential competing interest was reported by the authors.

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