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RESEARCH ARTICLE

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# Impact of work schedule characteristics on teacher mental health and burnout symptoms while remote working

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## Abstract

**Background:** During the COVID-19 pandemic, teachers quickly shifted to remote teaching with many teachers experiencing increased work demands with limited resources, affecting both mental health and work.

**Methods:** Within a cross-sectional study, we evaluated the relationship between one type of work demand, non-standard work schedule characteristics, and depressive and burnout symptoms in kindergarten through 8th grade U.S. teachers working remotely in May 2020. We further assessed the impact of COVID-19 and work resources. Work schedule characteristics were self-assessed across six domains on a 5-point frequency scale from *always* (1) to *never* (5). We used multilevel Poisson models to calculate prevalence ratios (PRs) and 95% confidence intervals (CIs).

**Results:** In fully adjusted models, frequently working unexpectedly was associated with a higher prevalence of depressive symptoms (PR = 1.18, 95% CI = 1.07–1.31, $p < 0.01$), high emotional exhaustion (PR = 1.17, 95% CI = 1.05–1.30, $p < 0.01$), and high depersonalization (PR = 1.40, 95% CI = 1.02–1.92, $p = 0.03$). Remote work resources were significantly associated with a lower prevalence of depressive symptoms (PR = 0.88, 95% CI = 0.79–0.98, $p = 0.02$). There was a linear association between low coworker support and a low sense of personal accomplishment (PR = 0.68, 95% CI = 0.53–0.87, $p < 0.01$).

**Conclusions:** Frequently having to work unexpectedly while remote teaching was associated with symptoms of depression and burnout during the COVID-19 pandemic. Workplaces should support predictable working times to lessen the disruption caused by unexpected work to promote worker well-being.

KEYWORDS
educators, mental health, remote work, work demands, work schedule

## 1 | INTRODUCTION

Long before the COVID-19 pandemic, teachers were experiencing a high and increasing burden of stress. In a 2005 survey in the United Kingdom, among the 26 occupations surveyed teachers were identified as having worse than average scores on all three of the stress-related variables (physical health, psychological well-being, and job satisfaction).[1] Furthermore, high levels of professional burnout had been observed among teachers long before the start of the pandemic. Numerous studies of teachers dating back to as early as

1933 report high levels of stress and burnout within the profession.[2] In the 1990s, it was estimated that U.S. teachers, at any given time, were considered overworked and burned out between 5% and 20% of the time.[3] In 2000, 40 percent of teachers visited doctors for concerns over work-related stress.[2] Prior research links teachers' high levels of burnout as well as symptoms of anxiety and depression with high workload, student behavior, and employment conditions.[4] Poor teacher mental well-being is associated with high rates of turnover, thus contributing to the growing teacher shortage.[5] In a previous study tracking teacher retention, 45% of teachers who entered the profession in the 2000–2001 school year left within 5 years.[5] Estimates for teachers entering the field in 2007 or 2008 are that 17% leave the profession annually.[6]

As with many occupations deemed essential during the COVID-19 pandemic, teachers were exposed to increased stressors. Beginning in March 2020, the majority of United States (U.S.) teachers transitioned to remote work. With a switch to remote teaching, teachers faced a challenging and new remote work environment, along with new routines and instructional approaches.[6] Teachers were required to handle multiple challenges related to their work, including learning unfamiliar technology platforms while simultaneously facilitating remote instruction to students and their families.[7] They had to face the challenges associated with technology problems for students who may have lacked internet access or access to adequate technology in the home.[7] The sudden shift to delivering instruction to students online limited the degree to which teachers could engage students in learning,[7] resulting in high levels of student disengagement. Remote work required that teachers enter an often isolated working environment that may have lacked the support of other teachers, colleagues, and administration.

The effects of stressors can be viewed within the job-demands-resources (JDR) model which posits that when workers have insufficient resources to meet the demands of their jobs, they experience strain which can lead to burnout.[8] Job demands are aspects of a person's job that require the expenditure of physical and psychological effort, and job resources are the factors that a person draws from to meet the job demands. Burnout is another concept central to the JDR model and includes three dimensions: emotional exhaustion, depersonalization, and personal accomplishment.[9] Excess job demands and lack of resources can ignite a health impairment process that leads to strains such as burnout and other negative organizational outcomes including work-life conflict, absenteeism, and turnover, as well as negative personal outcomes including depression and anxiety symptoms as well as increased perceived stress.[9]

Specifically, the JDR model has been used to explain the relationship between telework and worker well-being.[10] Beckel and Fisher[10] define telework as "working outside of the office or another physical organizational setting, such as within one's home or from another location, often using a form of information technology to perform work tasks and communicate with others both in and outside the organization." They posit that in general, telework can be viewed as a job resource that is used to alleviate job demands. However, Beckel and Fisher[10] acknowledge that there are numerous job and task characteristics that moderate the relationship between telework and positive well-being outcomes. Voluntary telework is linked with more positive outcomes as compared to mandatory telework.[10] Furthermore, remote work requiring tasks that are highly interdependent or rely upon others to complete is linked with poor work and well-being outcomes, likely because the remote environment creates an additional work demand.[10] During the COVID-19 pandemic, educators were forced to adapt their job to a remote work format. Furthermore, with the primary goal of educating students, educators' work is necessarily highly interdependent on students as they must adapt work tasks based on student performance and needs. These important moderators suggest that for educators during the pandemic, remote work can be considered a further job demand, leading to health impairment.

We sought to further examine one aspect of educators' job demands, non-standard work schedule characteristics, on well-being while working remotely during the COVID-19 pandemic. Briefly, work schedule characteristics have important effects on physical and mental health and well-being. Working time can be characterized based on the physiological mechanisms by which work schedule characteristics impact worker health and well-being including disruptions of the circadian systems and sleep, increase in fatigue, and impacts on social connections.[11] Characteristics of a worker's time at work include the length or total hours over days, weeks, and longer periods; the time of day including early morning, evening, or night; the intensity or the accumulation of work hours over short periods; and the social aspects of working hours including work on weekends, as well as the variability and predictability of the schedule.[11]

Work schedule characteristics have been linked to myriad physical and mental health outcomes. The most consistent evidence comes from the evaluation of the health effects of "shift work" which can be broadly defined as work schedules outside of the "standard" working hours of Monday–Friday between 8:00 a.m. and 6:00 p.m.[12] In 2019, the Working Time Society, a working group of the International Commission on Occupational Health, developed consensus statements supporting the accumulation of strong evidence linking shift work, or work outside of the standard working hours, to cardiovascular disease as well as gastrointestinal and metabolic disorders.[12] Meta-analysis results have found an association between shift work and poor mental health (specifically depressive symptoms), with an indication that women may be more susceptible.[13] Yet, the link between specific working time characteristics within shift work, such as work at night or long work hours, and mental health effects are still not well understood. Furthermore, there is a need to examine the relationships between working time characteristics and mental health and work outcomes while teleworking.

We sought to examine the work and personal impact of work schedule characteristics on educators who were remotely working during the COVID-19 pandemic. We hypothesized that poor work schedule characteristics (including low schedule control, evening work, long work hours, unexpected work, and weekend work) would

be associated with a higher prevalence of symptoms of depression and burnout. Furthermore, within the context of the JDR model, we further hypothesized that the perceived demands of the COVID-19 pandemic (finances and resources) would be associated with a higher prevalence of depression and burnout symptoms and work resources would be associated with a lower prevalence of depression and burnout symptoms independent of work schedule.

## 2 | MATERIALS AND METHODS

### 2.1 | Study design and data collection

This cross-sectional survey is part of the larger U.S.-based WorkTime study. Survey item selection and measure development for the WorkTime survey is discussed in more detail elsewhere.[14,15] Data for this analysis came from responses to an online survey. Participants were recruited through Qualtrics' traditional, actively managed, double opt-in market research panels. We commissioned Qualtrics, a research service provider, to screen and recruit participants based on our eligibility criteria. Payment for services were rendered to Qualtrics and they, in turn, paid participants a small incentive directly. Qualtrics provided data cleaning and quality assurance services, and our research team was able to inspect the data before completing the terms of service. The survey was launched on 5/21/2020 and remained open until the budget-based quota of 270 respondents was reached on 6/2/2020. Eligibility criteria for survey participation included: working in the United States, aged 18 or older, certified teacher in grades kindergarten through 8th grade (no aides, part-time, or substitute teachers), being employed by a public school but working from home because the school was currently closed due to the COVID-19 pandemic. All data were collected anonymously. The study was approved by the UConn Health Institutional Review Board.

### 2.2 | Variables and measures

#### 2.2.1 | Mental health outcomes

The outcomes considered in this analysis were symptoms of depression and the components of burnout (emotional exhaustion, depersonalization, and reduced personal accomplishment). Depressive symptoms were assessed using eight items from the center for epidemiologic studies depression (CES-D) scale.[16] Participants answered how often (0 = *rarely*; 1 = *some of the time*; 2 = *occasionally*; 3 = *all of the time*) they felt sad, enjoyed life, felt depressed, felt that everything they did was an effort, had restless sleep, felt happy, felt lonely, and could not "get going." The "enjoyed life" and "felt happy" items were reverse coded and then individual scores for all eight items were added to obtain a final score ranging from 0 to 24. Depressive symptom scores were then dichotomized with a score of 0–7 indicating low depressive symptoms and a score of 8–24 indicating moderate or higher depressive symptoms.[16] Symptoms of emotional exhaustion, depersonalization, and feelings of reduced personal accomplishment were assessed using the Maslach Burnout Inventory—Educator Version.[17] Participants were presented 9 items pertaining to emotional exhaustion, 5 items pertaining to depersonalization, and 8 items pertaining to personal accomplishment and were asked to answer how often they experienced each feeling (1 = *never*; 2 = *a few times a year or less*; 3 = *once a month or less*; 4 = *a few times a month*; 5 = *once a week*; 6 = *a few times a week*; 7 = *every day*). All items were summed to create a final score, and scores were dichotomized, with a score of 0–26 indicating low to moderate emotional exhaustion and 27–54 indicating high emotional exhaustion; a score of 0–12 indicating low to moderate depersonalization and 13–30 indicating high depersonalization; and a score of 0–30 indicating low sense of personal accomplishment and 31–48 indicating a moderate to high sense of personal accomplishment.[17]

#### 2.2.2 | Working time characteristics

We assessed six working time characteristics proposed by Harma et al.[11] through a series of survey items described in detail elsewhere.[15] Briefly, participants were asked to respond on a scale of (1) to (5) (1 = *always*; 2 = *usually*; 3 = *sometimes*; 4 = *rarely*; 5 = *never*) how often the work schedule conditions occurred in the last year at all jobs worked and including all overtime. To assess "length of working hours," participants responded to the question "I worked more than 12 hours per day." To assess "time of day," participants responded to the item "I worked at least 3 evening hours after 6 p.m." To assess "shift intensity," participants responded to the item "I worked 6 or more days in a row." To assess "free time," participants responded to the following item "I worked on a weekend." To assess "schedule control," participants responded to the item "I had control over my work schedule." To assess "predictability," participants responded to the item "I had to go to work unexpectedly at times when I was not scheduled to work." The length of working hours, time of day, shift intensity, free time, and predictability variables were then reverse coded so that increased values indicated increased risk (1 = *never* to 5 = *always*).

#### 2.2.3 | COVID-19 effects

We used survey questions to assess effects of COVID-19 on finances and resources.[18] Participants were presented with items and asked to respond on a scale of "*not true of me at all*" (1) to "*very true of me*" (7) of how accurately each statement described them. To assess COVID-19 financial effects, participants responded to the items "The Coronavirus (COVID-19) has impacted me negatively from a financial point of view" and "I have lost job-related income due to the Coronavirus (COVID-19)." To assess effects on COVID-19 resources, participants responded to the items "I have had a hard time getting needed resources (food, toilet paper) due to the Coronavirus (COVID-19)" and "It has been difficult for me to get the things I

need due to the Coronavirus (COVID-19)." Mean scores were calculated by averaging the two item responses.

### 2.2.4 | Work resources

We used survey questions to assess two work resources: remote-work resources and coworker support. Participants were presented with items and asked to consider the past 4 weeks and to respond on a scale of *strongly disagree* (1) to *strongly agree* (5) how much they agreed. To assess "remote work resources," participants responded to the item "The information that I have gotten from my work or education makes me feel well prepared for working at home." To assess "coworker support," participants responded to the item "I can keep a good relationship with my colleagues when I'm working from home."

### 2.2.5 | Covariates

We included three variables as covariates in our analyses. Sex was assessed with the survey question "What is your sex?" with the response options of male/female. Tenure was assessed with the open-ended survey question "How many years (total) have you been teaching or supporting students?" Teacher type was assessed using several survey questions including the open-ended survey question "What is your job title", and the survey questions "What certification (s) do you currently hold? (General education/Special education/Administrator), "Which grades do you currently teach?," and "Which subjects do you currently teach?" Using this information, the research team categorized teachers into five types: classroom teacher, subject-specific teacher, unified arts teacher, special education teacher, interventionist, which we then collapsed into three categories (classroom teacher, subject-specific teacher, other educator) to increase power for analysis.

## 2.3 | Data analysis

We calculated descriptive statistics including means and standard deviations (*SD*) or percentages for all variables. We calculated Pearson correlation coefficients to determine correlations between our continuous predictor variables. Because the "weekend" and "greater than 6 days" variables were highly (defined as Pearson's $R > 0.7$) correlated (Pearson's $R = 0.75$), we selected the weekend variable for further analysis. We used multilevel Poisson models with robust standard errors to calculate prevalence ratios (PRs) and 95% confidence intervals (CIs) including covariates (job tenure, teacher type, gender) for each outcome separately (Model 1). First, we considered the association between each mental health and work outcome and the five working time characteristics (low schedule control, evening hours, long hours per day, work unexpectedly, weekend) (Model 2). Each of the working time characteristic variables was modeled linearly from never to always, with PRs reflecting the increase in prevalence of each symptom with a one-point increase in frequency along the 5-point Likert scale. Next, we evaluated the association between outcomes and COVID-19 effects (Financial and Resources) (Model 4). Then, we examined the association between work resources (remote work resources, coworker relationships) (Model 3) and outcomes. As with the working time characteristics, these were modeled linearly. Finally, we used multilevel Poisson models including all covariates, working time characteristics, work resources, and COVID-19 impacts (Model 5). All data analyses were performed in SAS (version 9.4, Cary NC) using Proc Genmod.[19]

# 3 | RESULTS

Overall, our dataset included survey responses from 254 teachers from 35 U.S. states. Teachers across all grades from kindergarten to eighth were included in the survey. Surveyed teachers taught a range of subjects such as English, mathematics, social studies, science, unified arts, special education, and others. Table 1 shows some additional characteristics of the study population. The majority of participants were female (85%) and had 6 or more years of teaching experience (78%). The participants were distributed across teacher type with 34% of participants classified as classroom teachers, 25% as subject-specific teachers and the remaining 41% in other teaching categories (e.g., unified arts, special education, or interventionist). The majority (92%) of participants identified as White and 11% identified as Hispanic.

Within this population, the mean (*SD*) CES-D score from the 8-item scale was 8.71 (4.95) which corresponds to a CES-D 21 scale value of 21.8 (12.4). To get this score, the items on the shortened 8-item scale are weighted by the number of items on the original 21-item CES-D measure and then divided by the number of items on the shortened measure.[16] Depressive symptoms and emotional exhaustion were common in the cohort, with 53% of participants categorized as having moderate or higher depressive symptoms, 54% categorized as having "high" emotional exhaustion. Within the other components of burnout, 15% were categorized as having "high" depersonalization, and 14% were categorized as having "low" sense of personal accomplishment. The correlation among the summary scores for each of the mental health outcomes varied from −0.39 to 0.58. The depression score was positively correlated with the sum of the emotional exhaustion (0.48), depersonalization (0.25), and loss of personal accomplishment (0.24). Within the components of burnout, emotional exhaustion was positively correlated with depersonalization (0.58), and loss of personal accomplishment had similar positive correlations with emotional exhaustion (0.33) and depersonalization (0.39). A total of 14 individuals (6%) possessed all three components of burnout including high emotional exhaustion, high depersonalization, and low sense of personal accomplishment.

Table 2 shows the means, *SD*s, and correlations among work schedule characteristics, COVID-19 impacts, and work resources. Participants rated their agreement with items about work schedule

**TABLE 1** Population characteristics of the certified, K-8 educators, working remotely.

| Characteristic | *N* | (%) |
|---|---|---|
| Sex | | |
| Female | 215 | (85) |
| Male | 39 | (15) |
| Teacher type | | |
| Subject-specific teacher | 62 | (25) |
| Classroom teacher | 85 | (34) |
| Other | 106 | (41) |
| Job tenure | | |
| 0–5 years | 57 | (22) |
| 6+ years | 197 | (78) |
| Race | | |
| White | 234 | (92) |
| Persons of color or mixed races | 20 | (8) |
| Hispanic ethnicity | | |
| Yes | 27 | (11) |
| No | 227 | (89) |
| Depressive symptoms | | |
| Low | 120 | (47) |
| Moderate or higher | 134 | (53) |
| Emotional exhaustion | | |
| Low to moderate | 116 | (46) |
| High | 138 | (54) |
| Depersonalization | | |
| Low to moderate | 217 | (85) |
| High | 37 | (15) |
| Personal accomplishment | | |
| Moderate or higher | 160 | (63) |
| Low | 36 | (14) |

characteristics on a scale from 1 = *never* to 5 = *always*. On average, participants reported rarely to sometimes having control over their work schedules (mean = 2.70, *SD* = 1.20), working evening hours (mean = 2.80, *SD* = 1.25), working long hours (mean = 2.11, *SD* = 1.12), working unexpectedly (mean = 2.21, *SD* = 1.23), and sometimes to usually working on a weekend (mean = 3.30, *SD* = 1.28). Correlations between work schedule characteristics ranged from low to moderate (0.03–0.62) with most items positively correlated. Schedule control had the lowest correlation with other working time variables (0.03–0.11). The remaining work schedule characteristics were moderately correlated with each other (0.42–0.62). Participants rated their agreement with items about COVID-19 on a scale from 1 = *not true of me at all* to 7 = *very true of me*. Participants reported low agreement with COVID-19 financial (mean = 2.50, *SD* = 1.68) and resource impacts (mean = 3.11, *SD* = 1.64) and these variables were weakly correlated (0.38). Participants rated their agreement with items about work resources on a scale from 1 = *strongly disagree* to 5 = *strongly agree*. On average, participants were neutral that the information they had gotten from their work or education makes them feel well prepared for working at home (mean = 2.85, *SD* = 1.18), and that they can keep a good relationship with their colleagues when working from home (mean = 3.44, *SD* = 1.05). The work resources variables were weakly correlated (0.27). Likewise, COVID-19 impact and work resource variables had weak negative and positive correlations with working time variables (0.03–0.22).

First, we examined the effects of demands and resources on depressive symptoms (Table 3). In models including covariates only, we observed no statistically significant associations between teacher type, gender or tenure and the prevalence of moderate or higher depressive symptoms (Table 3, Model 1). In models including work schedule characteristics as well as covariates (Table 3, Model 2), we observed a significant association between increasing frequency of working unexpectedly and higher prevalence of moderate or higher depressive symptoms (PR = 1.23, 95% CI = 1.11–1.37, $p < 0.01$). In models including COVID-19 impacts as well as covariates, we observed no statistically significant associations (Table 3, Model 3). In models including work resources as well as covariates (Table 3, Model 4), we observed a statistically significant association between increasing agreement with remote work resources and lower depressive symptoms prevalence (PR = 0.86, 95% CI = 0.78–0.95, $p < 0.01$). In fully adjusted models (Table 3, Model 5), a higher frequency of working unexpectedly remained statistically significantly associated with higher prevalence of moderate to high depressive symptoms with similar effect sizes (PR = 1.18, 95% CI = 1.07–1.31, $p < 0.01$), and increasing agreement with remote work resources remained significantly associated with lower prevalence of moderate to high depressive symptoms, with similar effect sizes (PR = 0.88, 95% CI = 0.79–0.98, $p = 0.02$). Teacher type was also significant in the fully adjusted models, with a higher prevalence of depressive symptoms observed among teachers in the "other" category (PR = 1.38, 95% CI = 1.07–1.78, $p = 0.02$). No other variables were statistically significant in the fully adjusted models.

Next, we assessed the relationship between work schedule characteristics and the components of burnout, beginning with low personal accomplishment. In models including covariates only (Table 4, Model 1), we observed no statistically significant associations between teacher type, gender, or tenure and prevalence of low personal accomplishment. In models including work schedule characteristics as well as covariates (Table 4, Model 2), we observed a statistically significant association between increasing frequency of working unexpectedly and the prevalence of low personal accomplishment (PR = 1.42, 95% CI = 1.06–1.90, $p = 0.02$). In models including covariates and COVID-19 impacts (Table 4, Model 3) we observed no statistically significant associations with the prevalence of low personal accomplishment. In models including work resources as well as covariates (Table 4, Model 4), we observed a statistically

**TABLE 2** Summary statistics and correlations for predictor variables.

| Characteristic | Item | Description | Mean | *SD* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Working time[a] | 1 | Schedule control | 2.70 | (1.20) | 1.00 | | | | | | | | |
| | 2 | Evening hours (more than 3 h after 6 p.m.) | 2.80 | (1.25) | 0.11 | 1.00 | | | | | | | |
| | 3 | Long hours (more than 12 daily) | 2.11 | (1.12) | 0.09 | 0.62 | 1.00 | | | | | | |
| | 4 | Work unexpectedly | 2.21 | (1.23) | 0.03 | 0.46 | 0.42 | 1.00 | | | | | |
| | 5 | Weekend work | 3.30 | (1.28) | −0.06 | 0.59 | 0.46 | 0.49 | 1.00 | | | | |
| COVID-19 impacts[b] | 6 | Financial | 2.50 | (1.68) | 0.03 | 0.06 | 0.15 | 0.11 | 0.03 | 1.00 | | | |
| | 7 | Resources | 3.11 | (1.64) | 0.11 | 0.17 | 0.10 | 0.23 | 0.07 | 0.38 | 1.00 | | |
| Work resources[c] | 8 | Remote work resources | 2.85 | (1.18) | −0.12 | −0.07 | −0.06 | −0.22 | −0.16 | −0.08 | −0.20 | 1.00 | |
| | 9 | Coworker relationships | 3.44 | (1.05) | −0.09 | 0.01 | -0.03 | −0.16 | −0.07 | −0.20 | −0.17 | 0.27 | 1.00 |

[a]Scale from 1 to 5, never to always.

[b]Scale from 1 to 7, not true of me at all to very true of me.

[c]Scale from 1 to 5, strongly disagree to strongly agree.

significant association between increasing agreement with good coworker relationships and lower prevalence of low personal accomplishment (PR = 0.63, 95% CI = 0.49–0.82, $p < 0.01$). In the fully adjusted models (Table 4, Model 5), only coworker relationships remained statistically significant in predicting the prevalence of low personal accomplishment (PR = 0.68, 95% CI = 0.53–0.87, $p < 0.01$). No other variables were statistically significant in the fully adjusted models.

The models examining the predictors of emotional exhaustion and depersonalization are provided in Tables 5 and 6, respectively. Briefly, we observed a statistically significant association between increasing frequency of working unexpectedly and the prevalence of high emotional exhaustion (PR = 1.21, 95% CI = 1.10–1.35, $p < 0.01$) (Table 5, Model 2). We also observed a statistically significant association between perceived COVID-19 resource impact and prevalence of high emotional exhaustion (PR = 1.09, 95% CI = 1.01–1.17, $p = 0.02$) (Table 5, Model 3), as well as remote work resources and lower prevalence of high emotional exhaustion (PR = 0.87, 95% CI = 0.79–0.96, $p < 0.01$) (Table 5, Model 4). However, in fully adjusted models, only working unexpectedly remained statistically significantly associated with high emotional exhaustion, with similar effect sizes (PR = 1.17, 95% CI = 1.05–1.30, $p < 0.01$) (Table 5, Model 5). For depersonalization, teacher type and working unexpectedly were statistically significant predictors in multivariate models (Table 6, Model 5).

## 4 | DISCUSSION

In a cross-sectional survey of U.S. Kindergarten through 8th grade educators working remotely during the COVID-19 pandemic, over half of the respondents reported moderate to high symptoms of depression and symptoms of emotional exhaustion. With respect to working time characteristics, we observed consistent associations between increased frequency of having to work unexpectedly and higher prevalence of symptoms of depression and each of the burnout components (low personal accomplishment, emotional exhaustion, and depersonalization). Yet, none of the remaining hypothesized components of working time were associated with symptoms of depression or burnout. We also observed varied relationships between depression and burnout symptoms and COVID-19 impacts as well as work resources. The relationship between higher reports of COVID-19 impacts and higher prevalence of emotional exhaustion (Table 5, Model 3) was independent of working unexpectedly (Table 5, Model 5). We observed a statistically significant decrease in the prevalence of symptoms of depression and emotional exhaustion, with higher levels of remote work resources (Table 3 Model 4 and Table 5 Model 4, respectively), which was also independent of the impact of working unexpectedly (Table 3 Model 5 and Table 5 Model 5). This was not the case for symptoms of low personal accomplishment which was inversely associated with co-worker relationships (Table 4, Model 4) and appeared to buffer the association between low personal accomplishment and working unexpectedly (Table 4, Model 5).

The prevalence of depression observed in this cohort is consistent with a survey of Wisconsin educators from June to August in 2020 where 61% and 50% had moderate or higher levels of clinically meaningful anxiety or depression symptoms, respectively.[20] Increases in poor mental health across the pandemic have been documented across numerous populations. For example, in the United Kingdom, from pre-pandemic to April 2020 (coinciding with the current study period of May 2020), a 13.5% increase in mental health problems was observed, with a greater effect on females.[21] Mean CES-D values among the current population (21.8) were higher than what was observed in an on-line survey of US adults in 2020, where mean CES-D levels for females were 17.[22]

Likewise, the prevalence of burnout symptoms among educators has long existed and has only been exacerbated by the COVID-19

**TABLE 3** The effects of covariates, working time characteristics, work resources, and COVID-19 demands on depressive symptoms prevalence.

| | Model 1 | | | Model 2 | | | Model 3 | | | Model 4 | | | Model 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PR | 95% CI | *p* value | PR | 95% CI | *p* value | PR | 95% CI | *p* value | PR | 95% CI | *p* value | PR | 95% CI | *p* value |
| **Covariates** | | | | | | | | | | | | | | | |
| **Teacher type** | | | | | | | | | | | | | | | |
| Block teacher | 0.91 | (0.63, 1.30) | 0.06 | **0.92** | **(0.65, 1.29)** | **0.01** | 0.92 | (0.64, 1.30) | 0.08 | 0.92 | (0.65, 1.31) | 0.06 | **0.97** | **(0.69, 1.35)** | **0.02** |
| Other | 1.26 | (0.97, 1.65) | | **1.36** | **(1.06, 1.76)** | | 1.25 | (0.96, 1.62) | | 1.27 | (0.98, 1.65) | | **1.38** | **(1.07, 1.78)** | |
| Classroom teacher | REF | | | REF | | | REF | | | REF | | | REF | | |
| **Gender** | | | | | | | | | | | | | | | |
| Male | 0.86 | (0.60, 1.25) | 0.42 | 0.89 | (0.63, 1.27) | 0.52 | 0.81 | (0.56, 1.18) | 0.24 | 0.86 | (0.60, 1.23) | 0.39 | 0.87 | (0.61, 1.25) | 0.44 |
| Female | REF | | | REF | | | REF | | | REF | | | REF | | |
| **Tenure** | | | | | | | | | | | | | | | |
| 0–5 years | 1.08 | (0.83, 1.41) | 0.56 | 1.12 | (0.87, 1.45) | 0.38 | 1.07 | (0.83, 1.39) | 0.60 | 1.04 | (0.81, 1.35) | 0.75 | 1.09 | (0.86, 1.39) | 0.49 |
| >5 years | REF | | | REF | | | REF | | | REF | | | REF | | |
| **Working time characteristics** | | | | | | | | | | | | | | | |
| Low schedule control | | | | 0.99 | (0.90, 1.09) | 0.79 | | | | | | | 0.96 | (0.87, 1.06) | 0.44 |
| Evening hours | | | | 1.11 | (0.96, 1.28) | 0.14 | | | | | | | 1.15 | (0.99, 1.33) | 0.07 |
| Long hours per day | | | | 0.93 | (0.82, 1.05) | 0.21 | | | | | | | 0.92 | (0.81, 1.03) | 0.16 |
| Work unexpectedly | | | | **1.23** | **(1.11, 1.37)** | **<0.01** | | | | | | | **1.18** | **(1.07, 1.31)** | **<0.01** |
| Weekend | | | | 0.93 | (0.81, 1.05) | 0.23 | | | | | | | 0.91 | (0.80, 1.04) | 0.16 |
| **COVID-19 impact** | | | | | | | | | | | | | | | |
| COVID-19 financial impact | | | | | | | 1.06 | (0.99, 1.13) | 0.08 | | | | 1.06 | (0.99, 1.13) | 0.08 |
| COVID-19 resources impact | | | | | | | 1.06 | (0.99, 1.14) | 0.10 | | | | 1.00 | (0.93, 1.08) | 0.94 |
| **Work resources** | | | | | | | | | | | | | | | |
| Remote work resources | | | | | | | | | | **0.86** | **(0.78, 0.95)** | **<0.01** | **0.88** | **(0.79, 0.98)** | **0.02** |
| Coworker relationships | | | | | | | | | | 0.92 | (0.83, 1.03) | 0.17 | 0.95 | (0.85, 1.06) | 0.35 |

*Note*: **Bold** indicates $p < 0.05$.

Abbreviations: CI, confidence interval; PR, prevalence ratio.

**TABLE 4** The effects of covariates, working time characteristics, work resources, and COVID-19 demands on prevalence of low personal accomplishment.

| | Model 1 | | | Model 2 | | | Model 3 | | | Model 4 | | | Model 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PR | 95% CI | *p* value | PR | 95% CI | *p* value | PR | 95% CI | *p* value | PR | 95% CI | *p* value | PR | 95% CI | *p* value |
| **Covariates** | | | | | | | | | | | | | | | |
| **Teacher type** | | | | | | | | | | | | | | | |
| Block teacher | 1.13 | (0.51, 2.51) | 0.95 | 1.19 | (0.53, 2.63) | .92 | 1.19 | (0.53, 2.64) | 0.91 | 1.06 | (0.48, 2.34) | 0.96 | 1.13 | (0.49, 2.59) | 0.95 |
| Other | 1.03 | (0.50, 2.12) | | 1.10 | (0.53, 2.26) | | 1.02 | (0.50, 2.10) | | 0.95 | (0.46, 1.95) | | 1.00 | (0.47, 2.10) | |
| Classroom teacher | REF | | | REF | | | REF | | | REF | | | REF | | |
| **Gender** | | | | | | | | | | | | | | | |
| Male | 1.42 | (0.69, 2.90) | 0.39 | 1.47 | (0.70, 3.09) | .37 | 1.30 | (0.63, 2.69) | 0.51 | 1.28 | (0.62, 2.63) | 0.53 | 1.30 | (0.60, 2.81) | 0.54 |
| Female | REF | | | REF | | | REF | | | REF | | | REF | | |
| **Tenure** | | | | | | | | | | | | | | | |
| 0–5 years | 0.61 | (0.25, 1.51) | 0.22 | 0.64 | (0.25, 1.57) | 0.27 | 0.61 | (0.24, 1.53) | 0.23 | 0.61 | (0.26, 1.45) | 0.20 | 0.62 | (0.26, 1.45) | 0.21 |
| >5 years | REF | | | REF | | | REF | | | REF | | | REF | | |
| **Working time characteristics** | | | | | | | | | | | | | | | |
| Low schedule control | | | | 1.08 | (0.84, 1.38) | 0.54 | | | | | | | 1.03 | (0.82, 1.30) | 0.78 |
| Evening hours | | | | 0.91 | (0.64, 1.30) | 0.60 | | | | | | | 0.98 | (0.70, 1.38) | 0.91 |
| Long hours per day | | | | 1.20 | (0.84, 1.72) | 0.31 | | | | | | | 1.20 | (0.83, 1.73) | 0.33 |
| Work unexpectedly | | | | **1.42** | **(1.06, 1.90)** | **0.02** | | | | | | | 1.27 | (0.96, 1.68) | 0.10 |
| Weekends | | | | 0.77 | (0.56, 1.07) | 0.12 | | | | | | | 0.77 | (0.55, 1.07) | 0.11 |
| **COVID-19 impact** | | | | | | | | | | | | | | | |
| COVID-19 financial impact | | | | | | | 1.14 | (0.96, 1.36) | 0.13 | | | | 1.09 | (0.93, 1.27) | 0.27 |
| COVID-19 resources impact | | | | | | | 1.06 | (0.86, 1.29) | 0.60 | | | | 1.00 | (0.81, 1.23) | 0.98 |
| **Work resources** | | | | | | | | | | | | | | | |
| Remote work resources | | | | | | | | | | 0.93 | (0.73, 1.18) | 0.55 | 0.94 | (0.71, 1.24) | 0.66 |
| Coworker relationships | | | | | | | | | | **0.63** | **(0.49, 0.82)** | **<0.01** | **0.68** | **(0.53, 0.87)** | **<0.01** |

*Note*: **Bold** indicates $p < 0.05$.

Abbreviations: CI, confidence interval; PR, prevalence ratio.

**TABLE 5** The effects of covariates, working time characteristics, work resources, and COVID-19 demands on emotional exhaustion prevalence.

| | Model 1 | | | Model 2 | | | Model 3 | | | Model 4 | | | Model 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PR | 95% CI | *p* value | PR | 95% CI | *p* value | PR | 95% CI | *p* value | PR | 95% CI | *p* value | PR | 95% CI | *p* value |
| **Covariates** | | | | | | | | | | | | | | | |
| **Teacher type** | | | | | | | | | | | | | | | |
| Block teacher | 1.14 | (0.86, 1.50) | 0.37 | 1.13 | (0.87, 1.48) | 0.53 | 1.13 | (0.86, 1.49) | 0.30 | 1.15 | (0.88, 1.51) | 0.27 | 1.09 | (0.96, 1.24) | 0.32 |
| Other | 0.92 | (0.70, 1.20) | | 0.97 | (0.75, 1.26) | | 0.91 | (0.70, 1.18) | | 0.92 | (0.70, 1.20) | | 1.01 | (0.89, 1.13) | |
| Classroom teacher | REF | | | REF | | | REF | | | REF | | | REF | | |
| **Gender** | | | | | | | | | | | | | | | |
| Male | 0.95 | (0.68, 1.33) | 0.77 | 0.96 | (0.70, 1.33) | 0.81 | 0.90 | (0.64, 1.27) | 0.55 | 0.94 | (0.67, 1.31) | 0.70 | 0.93 | (0.80, 1.07) | 0.29 |
| Female | REF | | | REF | | | REF | | | REF | | | REF | | |
| **Tenure** | | | | | | | | | | | | | | | |
| 0–5 years | 1.19 | (0.93, 1.53) | 0.18 | 1.21 | (0.95, 1.54) | 0.14 | 1.17 | (0.92, 1.50) | 0.22 | 1.15 | (0.90, 1.47) | 0.27 | 1.01 | (0.89, 1.14) | 0.91 |
| >5 years | REF | | | REF | | | REF | | | REF | | | REF | | |
| **Working time characteristics** | | | | | | | | | | | | | | | |
| Low schedule control | | | | 1.07 | (0.98, 1.18) | 0.15 | | | | | | | 1.05 | (0.95, 1.15) | 0.36 |
| Evening hours | | | | 1.04 | (0.91, 1.19) | 0.53 | | | | | | | 1.05 | (0.92, 1.21) | 0.46 |
| Long hours per day | | | | 1.02 | (0.91, 1.15) | 0.72 | | | | | | | 1.03 | (0.91, 1.16) | 0.65 |
| Work unexpectedly | | | | **1.21** | **(1.10, 1.35)** | **<0.01** | | | | | | | **1.17** | **(1.05, 1.30)** | **<0.01** |
| Weekends | | | | 0.96 | (0.85, 1.08) | 0.50 | | | | | | | 0.95 | (0.84, 1.07) | 0.37 |
| **COVID-19 impact** | | | | | | | | | | | | | | | |
| COVID-19 financial impact | | | | | | | 1.02 | (0.95, 1.08) | 0.66 | | | | 1.00 | (0.94, 1.08) | 0.89 |
| COVID-19 resources impact | | | | | | | **1.09** | **(1.01, 1.17)** | **0.02** | | | | 1.03 | (0.96, 1.11) | 0.43 |
| **Work resources** | | | | | | | | | | | | | | | |
| Remote work resources | | | | | | | | | | **0.87** | **(0.79, 0.96)** | **<0.01** | 0.91 | (0.82, 1.01) | 0.07 |
| Coworker relationships | | | | | | | | | | 0.91 | (0.82, 1.01) | 0.08 | 0.94 | (0.85, 1.05) | 0.28 |

*Note*: **Bold** indicates $p < 0.05$.

Abbreviations: CI, confidence interval; PR, prevalence ratio.

**TABLE 6** The effects of covariates, working time characteristics, work resources, and COVID-19 demands on depersonalization prevalence.

| | Model 1 | | | Model 2 | | | Model 3 | | | Model 4 | | | Model 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PR | 95% CI | *p* value | PR | 95% CI | *p* value | PR | 95% CI | *p* value | PR | 95% CI | *p* value | PR | 95% CI | *p* value |
| **Covariates** | | | | | | | | | | | | | | | |
| **Teacher type** | | | | | | | | | | | | | | | |
| Block teacher | 1.03 | **(0.54, 1.96)** | **0.01** | **1.09** | **(0.57, 2.09)** | **0.04** | **1.07** | **(0.56, 2.05)** | **0.01** | **1.04** | **(0.54, 1.98)** | **0.01** | **1.18** | **(0.61, 2.30)** | **0.03** |
| Other | 0.38 | (0.17, 0.84) | | 0.43 | (0.19, 0.96) | | 0.38 | (0.17, 0.83) | | 0.38 | (0.17, 0.84) | | 0.43 | (0.19, 0.98) | |
| Classroom teacher | REF | | | REF | | | REF | | | REF | | | REF | | |
| **Gender** | | | | | | | | | | | | | | | |
| Male | 1.52 | (0.75, 3.11) | 0.30 | 1.50 | (0.71, 3.18) | 0.34 | 1.34 | (0.62, 2.92) | 0.49 | 1.49 | (0.73, 3.04) | 0.33 | 1.43 | (0.65, 3.17) | 0.41 |
| Female | REF | | | REF | | | REF | | | REF | | | REF | | |
| **Tenure** | | | | | | | | | | | | | | | |
| 0–5 years | 0.87 | (0.41, 1.85) | 0.71 | 0.89 | (0.43, 1.84) | 0.74 | 0.89 | (0.42, 1.87) | 0.74 | 0.85 | (0.39, 1.85) | 0.68 | 0.89 | (0.42, 1.90) | 0.76 |
| >5 years | REF | | | REF | | | REF | | | REF | | | REF | | |
| **Working time characteristics** | | | | | | | | | | | | | | | |
| Low schedule control | | | | 1.15 | (0.89, 1.48) | 0.29 | | | | | | | 1.16 | (0.90, 1.50) | 0.26 |
| Evening hours | | | | 1.12 | (0.81, 1.55) | 0.48 | | | | | | | 1.08 | (0.77, 1.53) | 0.65 |
| Long hours per day | | | | 0.99 | (0.73, 1.36) | 0.97 | | | | | | | 0.99 | (0.72, 1.36) | 0.95 |
| Work unexpectedly | | | | **1.45** | **(1.07, 1.96)** | **0.02** | | | | | | | **1.40** | **(1.02, 1.92)** | **0.03** |
| Weekend | | | | 0.80 | (0.56, 1.14) | 0.22 | | | | | | | 0.81 | (0.58, 1.14) | 0.23 |
| **COVD-19 impact** | | | | | | | | | | | | | | | |
| COVID-19 financial impact | | | | | | | 1.11 | (0.93, 1.32) | 0.26 | | | | 1.11 | (0.93, 1.33) | 0.25 |
| COVID-19 resources impact | | | | | | | 1.18 | (0.98, 1.41) | 0.07 | | | | 1.11 | (0.90, 1.35) | 0.33 |
| **Work resources** | | | | | | | | | | | | | | | |
| Remote work resources | | | | | | | | | | 0.90 | (0.69, 1.17) | 0.42 | 0.97 | (0.74, 1.28) | 0.85 |
| Coworker relationships | | | | | | | | | | 0.90 | (0.67, 1.20) | 0.46 | 1.03 | (0.77, 1.36) | 0.85 |

*Note*: **Bold** indicates $p < 0.05$.

Abbreviations: CI, confidence interval; PR, prevalence ratio.

pandemic. We observed a statistically significant association between teacher type and depersonalization with "subject-specific teachers" reporting a higher prevalence of depersonalization symptoms as compared to classroom teachers. Other studies have failed to see a differentiation in mental health outcomes by grade level, with no statistical differences in stress or burnout seen by grade level in a cohort of teachers from the greater Cincinnati area in Spring 2021.[23] This differentiation by teacher type may be linked to the difference in work organization between teacher types. Subject-specific teachers often see numerous groups of students and hence interact with more students each day for less amount of time as compared to classroom teachers who interact with a smaller number of students and spend longer amounts of time with each student. This difference in student interaction patterns may affect student relations which in turn may contribute to the increased prevalence of depersonalization observed. This is consistent with prior research recognizing the role of teacher-student relationships in educator burnout.[23]

In the present study, a core finding is that teachers working remotely tended to have more depressive and burnout symptoms when they had to work unexpectedly. These results correspond to an exposure-response relationship, where greater frequencies of unexpected work resulted in an increased prevalence of depressive symptoms as well as an increased prevalence of each component of burnout (emotional exhaustion, loss of personal accomplishment, and depersonalization). Yet, we observed no association between the remaining working time variables and symptoms of depression and burnout. Unpredictable work time is one component of non-standard work arrangements, that along with night work, long hours, irregular hours and weekend work has been shown to reduce social and family well-being.[12] Within the same Working Time Cohort, we observed a higher prevalence of depressive symptoms among transportation and corrections workers reporting more frequent unpredictable work schedules.[24] An association between unpredictable work schedules and depressive symptoms has also been observed in a population of Korean workers, even after controlling for other working time characteristics.[25] After controlling for other work schedule characteristics, unpredictable work schedules have been linked to work-life conflict, time-based conflict, and strain-based conflict in retail workers.[26] The exact pathway between the unpredictable work schedule and mental health outcomes observed in this cohort of educators working remotely remains unclear. However, the mediating roles of COVID-related demands as well as work resources may further illuminate the relationships.

Workers reporting perceived COVID-related financial and resource problems reported higher prevalence of burnout symptoms although the relationships were not consistently statistically significant. Workers reporting difficulty obtaining resources such as food or toilet paper due to the COVID-19 pandemic reported a significantly higher prevalence of emotional exhaustion, which appeared independent of the effect of working unexpectedly. Interestingly, we observed a linear exposure-response relationship with increasing agreement with perceived difficulty obtaining resources associated with increasing prevalence of mental health outcomes. In addition to the anxiety manifested through this process, the depletion of personal resources that occurs can also be tied to increased emotional exhaustion, as personal resources are a protective factor against pandemic-related emotional exhaustion.[27] This is consistent with prior research indicating a positive association between COVID-19 anxiety and teacher burnout.[28]

Work resources appeared to have a positive effect on teachers' mental health. Workers were asked the extent to which they agreed that the information they received from work or education made them feel prepared to work at home. With increasing agreement, we observed a decrease in prevalence of symptoms of depression and emotional exhaustion. It is unclear both what type of information as well as the source (education or work) contributed to the workers feeling more prepared to work from home. Yet, this is consistent with research findings that show an association between perceived organizational support and increased job satisfaction and reduced psychological strain among teleworkers.[29] Coworker relationships appear to play a key role in buffering teachers' symptoms of burnout. Increasing agreement with ability to keep good relationships with colleagues when working from home was associated with lower prevalence of low personal accomplishment symptoms. Interestingly, coworker relationships appeared to have buffered the impact of unexpected work with regard to low personal accomplishment.

The adverse mental health effects experienced by the educators within this population can be viewed through the conceptual framework proposed by Beckel and Fisher that explains the process by which telework alters worker well-being using the JDR model.[10] While remote work may be a resource to employees by providing flexibility that is health and well-being promoting, there are important moderators of telework that can lead to poor health outcomes. This is especially true for the educator population who were working remotely during the early COVID-19 pandemic. Voluntary versus mandated or involuntary telework is associated with lower levels of perceived stress.[30] Furthermore, flexibility plays a key role and has been suggested as an important moderating effect between telecommuting and job satisfaction.[31] Among this population of educators who were forced to work from home during the pandemic, remote work was a demand, rather than a resource offering more flexibility. Yet, the role of work schedule characteristics, specifically the impact of unexpected work, may be a source of stress for other work groups regardless of the work content. Furthermore, the problems arising from unexpected work while working remotely more broadly deserve additional investigation.

While the current study examines the challenges faced by teachers during remote instruction at the height of the pandemic in May 2020, changes in isolation, quarantining, testing and masking continued in the years following the pandemic and may affect teacher well-being since returning to in-person learning. Although this was an emergency situation in response to the onset of the pandemic at the time of data collection, and teachers are mostly back to in-person teaching now, there is still value in understanding the impacts that the relatively quick switch to remote learning had on educators in case a future disaster requires them to involuntarily work from home again. Furthermore, even after the initial lockdown, teacher mental health as suffered. In a study of over

700 educators in the Greater Cincinnati, Ohio area, in the Spring of 2021, 72% of teachers reported feeling very or extremely stressed and 57% very or extremely burned out.[32] Likewise, declined teacher morale has yet to rise back to the same levels as before the pandemic.[7] Within our population, we observed a trend of teachers working a high frequency of weekends and evenings, outside of school hours. This was one of the largest work schedule characteristics observed in this sample. It is unclear how this observation corresponds to pre-pandemic and current working schedule characteristics. It is also unclear whether working on weekends and evenings during the pandemic set up lasting expectations about teachers' working hours from parents, students, and administrators. These examples show the impact remote work had on teachers, which may have resulted in an ongoing challenge for them. Therefore, it is important to consider how remote work has changed the number and types of stressors teachers face.

This study has many strengths including the comprehensive characterization of working time and the use of validated outcome measures. While this work illuminates important work schedule characteristics associated with poor mental health in educators who work remotely, there are limitations. We used a cloud-based, rather than a population-based, survey which may not be representative of all educators across the U.S. However, selection bias is not likely driving the study results as participation within the survey was not likely based on both mental health symptomology and working time characteristics. A small sample size may have limited our ability to capture statistically significant relationships. For example, we observed a lower, yet not statistically significant, prevalence of depression symptoms among males compared to females. In general, as compared to men, women who telework have more adverse physical and psychosocial health outcomes, which may be due to their socialization within traditional gender roles which often obliges them to assume multiple caregiving roles while teleworking.[10] Additional studies should explore the impact of additional working hours in larger teacher cohorts, as increased frequency of both low schedule control and evening hours were positively associated with symptoms, yet not significant. While we choose validated survey items to assess working time, the survey asks respondents about their working time patterns over the last year, which expands beyond the period of their remote work. This exposure misclassification of working time may have further limited our ability to detect statistically significant associations. Lastly, the population was limited to U.S.-based Kindergarten through 8th grade teachers, and studies suggest that the anxiety, depression, and stress more generally may vary based on educational level as well as by country.[33] Furthermore, like so many workers during the COVID-19 pandemic, these teachers were involuntary, rather than voluntary workers, which may affect our study results.

## 5 | CONCLUSIONS

Among teachers working remotely during the COVID-19 pandemic, working unexpectedly was associated with poor mental health symptoms. Workplaces should support predictable working times to lessen the disruption caused by unexpected work to promote worker well-being. Workplaces should also consider resources and ways to encourage social support as additional supports for worker well-being.

## AUTHOR CONTRIBUTIONS

*Conceptualization*: Jennifer M. Cavallari, Jennifer L. Garza, Alicia G. Dugan, Lisa M. H. Sanetti. *Methodology*: Jennifer M. Cavallari, Jennifer L. Garza, Alicia G. Dugan, Lisa M. H. Sanetti, Rick A. Laguerre. *Formal analysis*: Jennifer M. Cavallari, Jennifer L. Garza. *Writing—original draft preparation*: Jennifer L. Garza and Jennifer M. Cavallari. *Data interpretation*: Jennifer M. Cavallari, Natalie R. Charamut, Cheyenne Szarka, Spencer D. Perry, Alicia G. Dugan. *Writing—review and editing*: Jennifer M. Cavallari, Natalie R. Charamut, Cheyenne Szarka, Spencer D. Perry. *Funding acquisition*: Jennifer M. Cavallari, Alicia G. Dugan. All authors have read and agreed to the published version of the manuscript.

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## CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

## DISCLOSURE BY AJIM EDITOR OF RECORD

John Meyer declares that he has no conflict of interest in the review and publication decision regarding this article.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

## ETHICS STATEMENT

The study was conducted according to the guidelines of the Declaration of Helsinki with approval by the Institutional Review Board of UConn Health (IRB Number 18-094-2, initial approval 2/12/2018).

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