School districts across the United States faced an unprecedented disruption during the spring of 2020 and the 2020–21 academic year due to the COVID-19 pandemic (Kamenetz, 2020). Little focus has been given to teachers’ mental health during the pandemic and how the instructional modalities, and changes in them, might relate (Singer, 2020). The American Psychological Association (2022) defines mental health as “a state of mind characterized by emotional well-being, good behavioral adjustment, relative freedom from anxiety and disabling symptoms, and a capacity to establish constructive relationships and cope with the ordinary demands and stresses of life.” The aim of the current study is to elucidate associations between the COVID-19 pandemic and teachers’ mental health, focusing on three specific outcomes: depressive symptoms, anxiety symptoms, and feelings of isolation. We first examine differences in mental health during the pandemic between teachers and professionals in other occupations. Focusing on teachers specifically, we then compare mental health outcomes during the pandemic between teachers teaching in person versus in remote modalities. Findings indicate that teachers reported a greater prevalence of anxiety symptoms than did those in other professions and that remote teachers reported significantly higher levels of distress than did those teaching in person. We summarize the policy implications of these results.

Keywords: health; policy; policy analysis; survey research; teacher research

Methods

Study Design and Procedures

Data come from the U.S. COVID-19 Trends and Impact Survey, a large online survey developed in collaboration between Carnegie Mellon University’s Delphi Group and Facebook (Delphi Group, 2021; Salomon et al., 2021). This daily survey invites a stratified random sample of Facebook users to respond to questions related to physical and mental health symptoms, and more (Salomon et al., 2021). We use data from adult (18 years or older) participants who responded to the survey from September 8, 2020, until March 28, 2021. Table 1 provides demographic information by job type across all employed respondents ($N = 2,775,974$) and by in-person and remote modality for teachers only ($N = 134,693$). See the online appendix for technical details of the survey instrument and design.

Measures

Three measures of mental health are examined: (a) depressive symptoms, (b) anxiety symptoms, and (c) feelings of isolation. All three items share the following question stem: “In the past 7 days, how often have you . . . ?” The three items were originally scored along a 4-point Likert scale, with responses ranging from 1 = “none of the time” to 4 = “all of the time.” Although the items demonstrate relatively strong internal consistency (Cronbach’s $\alpha = 0.80$), we analyze each as a distinct outcome to understand any differential relationships among the specific indicators. We recode each item into a dichotomous indicator, where 0 = “none or some of the time” and 1 = “most or all of the time.” In an effort to

1Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
understand differences in mental health outcomes among teachers versus other workers, we classify respondents into one of four groups (Standard Occupational Classification System; see https://www.bls.gov/soc/): (a) teachers (defined as pre-kindergarten, elementary, middle, or secondary teachers), (b) healthcare workers (e.g., nurses, physicians, or dentists), (c) office professionals (e.g., customer service representatives or administrative support), and (d) “other” occupations (e.g., military, farming, legal, or any other occupational group). Sociodemographic characteristics (e.g., gender, age, education level, number of children, household size, and level of financial worry) are included in the models as covariates. We also control for a set of county-level covariates—urbanicity (U.S. Census) and COVID-19 cases and deaths (lagged by 2 weeks; Dong et al., 2020)—in addition to including state and month as fixed effects.

### Analyses

We first assess differences in mental health between teachers and other types of workers during the pandemic by using a logistic regression of each outcome as a function of profession and the individual- and county-level covariates. Using the same approach but fit only among teachers, we then compare differences in mental health outcomes, with in-person versus remote modality as the key predictor of interest. Each model is weighted for nonresponse and coverage bias, following the weighting scheme outlined in Salomon et al. (2021) and using the survey package in R (Lumley, 2020), with a survey design...
stratified by state (see the appendix for more details). In an effort to avoid the limitations of significance testing due to the large sample size and to provide substantively meaningful estimates, we report odds ratios and standardized estimates by using Cohen’s $d$ (Borenstein et al., 2009).

## Results

### Comparison of Outcomes Among Teachers and Other Professionals

Logistic regression results indicate that, relative to teachers, healthcare workers (odds ratio $[\text{OR}] = 0.70$, $d = -0.20$), office workers (OR = 0.81, $d = -0.12$), and other workers (OR = 0.78, $d = -0.14$) were significantly less likely to report anxiety symptoms. Similarly, in comparison to teachers, healthcare workers were less likely to report depression symptoms (OR = 0.95, $d = -0.03$) and feelings of isolation (OR = 0.96, $d = -0.02$), although we note that the effect sizes may be considered “small.” It is worth noting that, relative to teachers, office workers (OR = 1.20, $d = 0.10$) and other workers (OR = 1.10, $d = 0.05$) were significantly more likely to report feelings of isolation. Additional subgroup analyses reveal that men were significantly less likely to report anxiety symptoms (OR = 0.53, $d = -0.36$), depression symptoms (OR = 0.71, $d = -0.19$), and feelings of isolation (OR = 0.81, $d = -0.11$) than were women. Similar findings hold true for older workers (see Table 2 for results).
Comparison of Outcomes Among In-Person and Remote Teachers

Among teachers, those teaching remotely were significantly more likely to report depressive symptoms (OR = 1.12, \( d = 0.06 \)) and feelings of isolation (OR = 1.56, \( d = 0.25 \)) than those teaching in person. See Figure 1 for a depiction of the model-adjusted probability of mental distress across the four occupation groups (top panel) as well as a comparison of those teaching in the different modalities (bottom panel).

Discussion

Our study indicates that teachers showed a significantly higher prevalence of negative mental health outcomes during the pandemic when compared to healthcare and office workers. Further, those teaching remotely reported significantly higher levels of distress than did those teaching in person for all three mental health items considered in the study, even when controlling for individual sociodemographic variables and county-level COVID-19 spread. In particular, professionals in other work categories were significantly less likely to report anxiety symptoms than teachers. Focusing on teachers exclusively, those teaching remotely were significantly more likely to report feelings of isolation than were those teaching in person. However, office and other workers indicated a higher prevalence of isolation symptoms than did teachers, highlighting that all work environments are not equal. Future research should consider examining occupation-level factors or contexts that may contribute to or explain such differences. This study is not without its limitations: Notably, the cross-sectional nature of the data precludes any comparison of baseline measures of pre-pandemic mental health outcomes to current measures. More high-quality data and analyses are needed to assess the extent to which such heightened mental health distress, as well as its disparity between in-person and remote teachers, might be long lasting.

Although various guidelines have been proposed for safe and supportive learning environments as schools reopen (U.S. Centers for Disease Control and Prevention, 2021), these reports often fail to consider the magnitude and scope of possible negative effects on mental health outcomes among teachers, nor do they propose appropriate alternative methods and interventions to address such troubles. Following Rossi et al. (2018), we argue that incorporating information gathered from multiple stakeholders (including teachers) into decision-making processes is paramount for effective learning environments. Further, tools and programs are needed to support and safeguard the mental health of teachers during and potentially after the pandemic, as such measures have the potential to improve working conditions, teacher retention, and, ultimately, student learning outcomes.
NOTE

This research is based on survey results from Carnegie Mellon University’s Delphi Group. The work was funded through a Discovery Award from Johns Hopkins University (PI: Stuart) and NIMH R01MH115487 (National Institute of Mental Health).

REFERENCES

American Psychological Association. (2022). APA dictionary of psychology. https://dictionary.apa.org/mental-health
Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). Introduction to meta-analysis. John Wiley and Sons. https://doi.org/10.1002/9780470743386
Delphi Group. (2021). COVID symptom survey. https://cmu-delphi.github.io/delphi-epidata/symptom-survey/
Dong, E., Du, H., & Gardner, L. (2020). An interactive web-based dashboard to track COVID-19 in real time. The Lancet, Infectious Diseases, 20(5), 533–534. https://doi.org/10.1016/S1473–3099(20)30120–1
Kamenez, A. (2020, December 4). 5 things we’ve learned about virtual school in 2020. National Public Radio. https://www.npr.org/2020/12/04/938050723/5-things-weve-learned-about-virtual-school-in-2020
Lumley, T. (2020). Survey: Analysis of complex survey samples. R package version 4.0.
Rossi, P. H., Lipsey, M. W., & Freeman, H. E. (2018). Evaluation: A systematic approach (7th ed.). Sage Publications.
Salomon, J. A., Reinhart, A., Bilinski, A., Chua, E. J., La Motte-Kerr, W., Rönn, M. M., Reitsma, R., Morris, K. A., LaRocca, S., Farag, T., Kreuter, F., Rosenfeld, R., & Tibshirani, R. J. (2021). The U.S. COVID-19 trends and impact survey. 2020–2021: Continuous real-time measurement of COVID-19 symptoms, risks, protective behaviors, testing and vaccination. medRxiv. https://doi.org/10.1101/2021.07.24.21261076
Singer, N. (2020, December 3). Teaching in the pandemic: “This is not sustainable.” New York Times. https://www.nytimes.com/2020/11/30/us/teachers-remote-learning-burnout.html

U.S. Centers for Disease Control and Prevention. (2021). Guidance for COVID-19 prevention in K–12 schools. https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/k-12-guidance.html

AUTHORS

JOSEPH M. KUSH, PhD, is an assistant professor in the Department of Graduate Psychology at James Madison University, 1122 Lakeview Hall, 298 Port Republic Road, Harrisonburg, VA 22807; kushjm@jmu.edu. His research focuses on multilevel structural equation modeling, causal inference methodology, and research design considerations for the social sciences.

ELENA BADILLO-GOICOECHEA, MS, is a research associate in the Department of Mental Health at Johns Hopkins University, 624 North Broadway, Hampton House 123, Baltimore, MD 21205; egoicoe1@jhu.edu. Her research focuses on the computational implementation of statistical methods, applied to public health.

RASHELLE J. MUSCI, PhD, is an associate professor in the Department of Mental Health and the Department of Population, Family and Reproductive Health at Johns Hopkins University, 624 North Broadway, Hampton House 831, Baltimore, MD 21205; rmusci1@jhu.edu. Her research focuses on quantitative methodology, particularly advanced latent variable methodology for use in developmental science and prevention science.

ELIZABETH A. STUART, PhD, is a professor in the Departments of Mental Health, Biostatistics, and Health Policy and Management and the executive vice dean for academic affairs at Johns Hopkins University, 615 North Wolfe Street, W1513, Baltimore, MD 21205; estuart@jhu.edu. Her research uses statistical methods to help explain the effects of education or public health programs and policies, often with a focus on mental health and substance use.

Manuscript received October 8, 2021
Revisions received April 7, 2022; August 2, 2022
Accepted September 22, 2022