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Mental Health Problems among Elementary School Students Mandated to e-Learning: A COVID-19 Rapid Review Caveat

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Abstract

Extended lockdowns during the COVID-19 pandemic mandated millions of students worldwide to e-learning and by default made many of their parents proxy homeschool teachers. Preliminary anecdotal, journalistic and qualitative evidence suggested that elementary school children and their parents were probably most vulnerable to this stressor and most likely to experience mental health problems because of it. We responded with a rapid review of 15 online surveys to estimate the magnitude of such risks and their predictors between 2020 and 2021. The pooled relative risk of mental health problems among school children and their parents was substantial (RR = 1.97). Moreover, this synthetic finding did not differ significantly between 10 child mental health outcomes (primarily measures of anxiety or depression) and five parental stress outcomes. Such risks to children and parents were incrementally greater among Latinx (RR = 1.81) and Black families (RR = 2.50) than among non-Hispanic White families (RR = 1.58) in the USA. Finally, such risks in the West (RR = 2.12) were observed to be greater than those in the East (RR = 1.36). Grave risks were experienced worldwide, but the pandemic once again clarified for the world that such structural violence, in this instance, in elementary school systems, was much more prevalent and virulent among Black and Brown families in places like the USA. Educational practice implications, future research and pandemic preparedness needs are discussed.

Keywords

Anxiety, Coronavirus Pandemic, COVID-19, Elementary School, e-Learning, Homeschooling, Mental Health, Online Learning, Parental Stress, School Children

Cover Page Footnote

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Introduction

The novel viral respiratory disease, SARS-CoV2 (Covid-19), outbreak struck in late 2019. Originating in China, this illness quickly spread around the globe, triggering a worldwide pandemic. Billions of lives were affected not only psychologically and socially, but also economically and academically (Atuahene et al., 2020; Gibson, 2021; Psacharopoulos et al., 2020). Perhaps most notable for its potential harm to an extraordinarily large, potentially vulnerable, population of young school children; the pandemic caused an unprecedented and unparalleled disruption in their education worldwide (Golberstein et al., 2020). As schoolhouse doors closed, approximately 1.6 billion children and young people, which equates to about nine of every 10 of the worldwide student population, were mandated to online learning (United Nations Educational, Scientific, Cultural Organization, 2021). Virtual education or e-learning was implemented along with a host of other public health measures in the hopes of decreasing infections and ultimately, ending the pandemic. Such educational and related interventions surely saved countless lives. However, as billions of children and their parents were essentially forced overnight into homeschooling, regardless of their inclinations, preparations, or lack thereof, it is not difficult to imagine the extraordinary challenges and consequent harms many probably experienced within such a potential stress pressure cooker.

The first country to implement school closures was China. Early evidence found transitioning to e-learning successfully reduced the spread of Covid-19; thus, most other countries quickly followed suit. As virtual learning became the norm from preschool to university, some extraordinary challenges, especially among young school children and their parents, began to be noted. Preliminary evidence suggested severe health risks, especially mental health risks (Cluver et al., 2020; Golberstein et al., 2020). Related challenges began to be noticed among parents, especially mothers, most of whom became, by proxy, homeschool teachers. High levels of stress and consequent mental health challenges were also detected among them. Moreover, uncertainties that are part and parcel of a novel viral pandemic seemed to exacerbate the stressors and consequent mental health

challenges experienced by the youngest school children and their parents (Gavin et al., 2020). Extant pre-COVID-19 research consistently showed social isolation and prolonged stress could lead to myriad symptoms of mental illnesses (or diagnoses) such as anxiety and depression among children and adults (Hankin, 2015; Orgilés et al., 2020; Urbina-Garcia, 2020). We do not yet know just how strong the e-learning stress and mental illness associations among young children, and their parents during the COVID-19 pandemic's lockdowns is. This review aims to retrieve and synthesize the research on such mental health problems among young school children (and their parents) mandated to e-learning during the COVID-19 pandemic. This seems essential knowledge for educators and allied practitioners, including social workers, as we develop best practices and policies to ensure future pandemic preparedness.

Review of Previous Reviews and Hypotheses

We are aware of only one previous, centrally relevant review (Chaabane et al., 2021). A rapid review of 10 primary studies across broad health outcomes accomplished during the first year of the pandemic, qualitatively noted elevated levels of anxiety and sadness among children after their schools closed. However, as it did not have a synthetic or meta-analytic component, it could not estimate the magnitude of these developing mental health problems. This analysis extends that review by a year and adds a pooled synthesis. Moreover, the pandemic has revealed again the much more significant relative health risks experienced by racialized/ethnic people of colour such as Latinx, Black and Indigenous peoples. These have been codified in several recent reviews, rapid and systematic (e.g., Mackey et al., 2021; Williams et al., in press), that implicated their more prevalent experiences of structural violence and consequent, relative economic hardships (Alberton, 2020; Katz et al., 2017). We anticipated similar evidence of structural violence and harm among minoritized children in this field. We, therefore, tested these hypotheses: (1) Mental health problems were more prevalent among elementary school-aged students (and their parents) mandated to e-learning during the COVID-19 pandemic. (2) Morbid risks were more significant among racialized/ethnic children of colour (and their parents).

Methods

Study Selection

Under temporal, fiscal and logistic constraints, aiming to synthesize knowledge expeditiously and efficiently for decision-makers, public and future researchers, we performed a rapid review and pooled observational analysis (Deeks et al., 2021; Ganann et al., 2010; Stroup et al., 2000; Tricco et al., 2015). The following research literature databases were searched from January 1, 2020 to September 1, 2021: *Center for Disease Control and Prevention COVID-19 Database*, *Cochrane Database of Systematic Reviews*, *Cumulative Index of Nursing and Allied Health Literature Complete, Educational Resources Information Center, Google Scholar*, *ProQuest Coronavirus Research Database*, *ProQuest Dissertations and Theses*, *PubMed/Medline*, *PsycINFO*, *Social Services Abstracts*, *Social Work Abstracts*, *Sociological Abstracts*, *StatsCan COVID-19* and the *WHO Covid-19 Database.* Peer-reviewed, published, and so-called grey, unreviewed unpublished sampling frames such as government documents or community-based reports were searched to guard against publication bias (de Smidt & Gorey, 1997; Grenier & Gorey, 1998).

Research literature databases were searched with exhaustive iterations of this broad keyword search scheme that was then systematically replicated with subject terms specific to each database: (COVID-19 or SARS-CoV-2 or coronavirus [anywhere]) and (e-learning or e-teaching or distance or electronic or online or remote or virtual or homeschool [title/abstract]) and (classroom or education or instruction or learning or teaching [title/abstract]) and (anxiety or depression or emotional problems or mental health or well-being or stress [title/abstract]). Eligible studies also had to meet these inclusion criteria: (1) Participants were elementary school-aged children and or their parents or guardians (children in preschool, kindergarten, primary, elementary, grade or grammar school or junior high school to grades 8 or 9, but not older teenagers in senior high school). Studies of children and adolescents at different school levels were included if more than 50% were elementary school aged. (2) Primary study findings were reported in enough detail to allow for the calculation of a practical effect size metric as well as for the assessment of its statistical significance and precision (i.e., reported relative risks indicative of lockdown online teaching/learning or e-learning-mental health associations among school-aged children and or their parents). And (3), study reports were written in English. Then the bibliographies and principal, anchor and corresponding authors of retrieved studies were snowball-searched for additional eligible studies. The selection process, cross-validated by three cooperating reviewers, first screened studies based on their titles and abstracts (one

reviewer), and then finally selected studies based upon a review of full manuscripts (three reviewers). Modest within reviewer group disagreements (16.7%) were resolved to consensus through discussion. Included studies are indicated with an asterisk in the reference list.

Synthesis of Study Findings

The unit of analysis for this synthesis was the unique hypothesis test. Groups of school-aged children and or their parents were compared pre-post COVID-19 lockdown, or such groups who experienced online (e-learning) versus offline (traditional) teaching during the pandemic were compared on measures of mental health (primarily anxiety and or depression among children) and stress (primarily perceived stress among parents). These were treated as independent hypotheses. Each primary study contributed only once to a hypothesis test. If a primary study provided multiple outcomes related to the same hypothesis, they were pooled so that study contributed only one data point for that synthetic hypothesis test. A total of 15 independent study findings from 13 primary studies were included in this synthesis. Between primary study group risk ratios, prevalence ratios, odds ratios, rate ratios or similar measures of effect estimated primary study relative risks (RR). Natural logarithms of study RRs were weighted by their inverse variances so that larger studies carried more weight. Sample-weighted, random effects were then pooled within domains of interest using sample-weighted meta-regression models (Cooper, 2017; Fleiss et al., 2003; Greenland, 1987; Stroup et al., 2000). Pooled RRs within 95% confidence intervals (CI) were calculated from regression statistics, as were tests of heterogeneity and between-groups synthetic comparisons, distributed as chi-square (χ^2) and I^2 statistics. Finally, after reliable data extraction of the study variables displayed in Table 1 (90.6% initial agreement between one experienced reviewer and three cooperating junior reviewers reached consensus after discussion), this synthesis was accomplished with version 3 of Comprehensive Meta-Analysis (Borenstein et al., 2013).

Results

Sample Description

Descriptive characteristics of the 15 independent study outcomes are displayed in Table 1. Fourteen peer-reviewed articles and one grey report were published in 2020 or 2021. The primary target population was most typically children in primary

grades one to eight along with one study that targeted preschool and two studies of middle school children. Most studies (12 of 15 outcomes) were accomplished in the West, most typically in the USA or Italy, the remainder in the East, that is, in China or India. As for racialized/ethnic group status, only six USA studies described their samples. Four seemed largely representative of non-Hispanic White people, while one overrepresented Latinx people and another overrepresented Black people. Moving to the right of the table, one sees all the studies were online analytic surveys, though four were embedded within longitudinal designs, panel, or cohort. Most used standardized measures of anxiety, depression, or stress, and all minimally adjusted for the potential confounding influence of age via sample restrictions. Nine study outcomes were additionally adjusted for three to 11 additional covariates via regression modeling. Finally, though 68,968 children and parents participated in aggregate, study samples ranged widely from 87 to 32,217 families (*Mdn* = 857).

Synthetic Findings

Consistent support of our first or main hypothesis was observed. The 15 point-estimate outcomes displayed in the far-right column of Table 1 were all in the hypothesized direction and statistically significant: RR range = 1.16 to 5.37, Mdn = 2.06. The overall pooled relative risk of mental health problems among school children (and stress among their parents) due to mandated e-learning was RR = 1.97 (95% CI 1.52, 2.55). Moreover, this central synthetic finding did not differ significantly between the 10 child mental health outcomes (RR = 2.04 95% CI 1.47, 2.84) and the five parental stress outcomes (RR = 1.80 95% CI 1.28, 2.55); χ^2 (1) = 0.26, p = .61. Therefore, they were treated together in exploring potential moderations of the main effect. That distribution was observed to be significantly heterogeneous, nearly all of its variability potentially being explained by systematic factors like characteristics of the primary study participants, contexts or research designs; χ^2 (14) = 1,405.88, p < .05, I^2 = 99.0%.

Though based on only six USA study outcomes, consistent support was also found for our second or moderator hypothesis. Risks of experiencing mental health challenges as e-learning was mandated and consequently, parents becoming proxy teachers were incrementally greater among the Latinx (RR = 1.81 95% CI 1.62, 2.08) or Black overrepresented samples (RR = 2.50 95% CI 2.42, 2.58) than among the predominantly non-Hispanic White sample (RR = 1.58 95% CI 1.33, 1.88); χ^2 (2) = 53.73, p < .05. Finally, our explorations found one other significant moderator. Risks to children (and parents) in the West (RR = 2.12 95% CI 1.63, 2.77) were observed to be greater than those in the East (RR = 1.36 95% CI 1.11, 165); χ^2 (1) = 7.01, p < .05. No other study characteristic displayed in Table 1 significantly

moderated risk.

Discussion

This rapid meta-analytic review of 13 online surveys clarified the mental health risks experienced by elementary school children and their parents during the COVID-19 pandemic. The central outcome involved mental health challenges among school children who were mandated to e-learning at home. Consequently, they were twice as likely, as they themselves or otherwise similar other children in in-person classrooms were, to experience significant mental health challenges. These challenges were primarily elevated anxiety and or depressive symptoms. Such symptoms are of profound developmental life space importance, as they are well-known to be strongly associated with future diagnoses of anxiety and depressive disorders as well as lack of academic achievement in later elementary grades or such academic failures as dropping out of high school (Bennett et al., 2015; Dupéré et al., 2018; Kovacs & Lopez-Duran, 2010). Their parents, primarily mothers, most of whom had not intended on homeschooling their children, experienced similarly elevated levels of psychological distress. Of additional importance, a pooled analysis of the USA studies found an even greater relative risk of mental health problems among African American and Latinx children. This is quite consistent with the well-established pattern of much greater relative morbid and mortal risks experienced by racialized Black, Brown and other people of colour (Mackey et al., 2021; Williams et al., in press). It also fits a pattern of racial/ethnic minoritized households having experienced more prevalent structural violence in education and health care prior to and during the COVID-19 pandemic (Alberton, 2020; Katz et al., 2017). Finally, familial mental health challenges were observed to be less prevalent in Eastern Hemisphere countries than in the West. An exploratory subsample analysis, it perhaps suggests lesser social inequities and so less prevalent oppression and structural violence in eastern educational and healthcare systems.

Implication for Social Work Practice and Future Pandemic Preparedness

These findings have clear implications for current and future preventive and therapeutic practices as they offer insights about needed pandemic preparedness policies. It probably goes without saying that we ought to plan educational infrastructure budgets that will allow for the safest possible learning environments. We have learned much about such provisions, for example, about the importance of high-quality air filtration systems and high-quality personal protective

equipment. We ought not become complacent as we move from pandemic to endemic COVID-19. Rather, these ought to be, respectively, built into new and existing school buildings and stockpiled for future use. Notwithstanding the importance of such brick-and-mortar and public health strategies, there seems much that school social workers, working with allied educators and mental health professions can do to ensure our future pandemic preparedness.

Regrettably, future pandemics seem likely, and as social distancing will probably always be a central preventive measure, we ought to plan with parents for the most educationally effective and psychosocially supported e-learning at home whenever it should again become necessary. The COVID-19 pandemic was the first in which internet technology, and so online learning capabilities were widely available. Though this study and others have identified some of the risks and potential harms that may attend social isolation and various concomitant social media uses, potential opportunities are also apparent. For example, a recent meta-analysis of eight randomized controlled trials of online cognitive behavioural therapy with young adults with symptoms of anxiety and/or depression during the COVID-19 pandemic found such interventions to be highly effective. In fact, they were every bit as effective as similar services offered in the more traditional, face-to-face modality (Howes et al., 2021). Similar online, though less formal outreach and supportive psychosocial interventions using diverse social media, some self-support, others professional practitioner-led, have also been suggested to be highly effective in preventing or ameliorating mental health challenges among young people (Elias & Gorey, 2022). Futuristic preventative approaches may incorporate such methods. School social workers and allied professions may want to begin practicing and implementing such online methods today as one more important means of preparing for the potential pandemics of tomorrow. Because in addition to helping school children and their families during periods of forced lockdown, they may ultimately be extremely helpful in supporting the most developmentally and or socioeconomically vulnerable children (and their parents) who may be relatively isolated for any number of reasons, pandemic-related or otherwise (Brunelle et al., 2020).

Potential Limitations and Future Research Needs

The primary studies reviewed were not without their limitations. For example, two of them were quite small with samples of less than 100 participants. Such could have clearly limited their generalizability. However, given the typical primary study had more than 850 participants, the aggregated review sample was comprised of 68,968 participants and the pooled meta-analytic estimates were quite precise, we find this synthetic study's central findings quite statistically powerful,

generalizable and, in fact, confidence-inspiring (Cohen, 1988; Faul et al., 2007; Fleiss et al., 2003). Next, some will wonder about the limits of the primary studies as they were all accomplished online. Such online surveys are by definition nonprobability, convenience surveys that can be especially prone to underrepresenting the most socioeconomically vulnerable people (Wright, 2005). However, a strength of online surveys is their ability to reach isolated people, precisely the research method needed during a pandemic. Additionally, the typical survey was able to reach potentially vulnerable racialized people of colour and analytically accounted for five covariates, including a socioeconomic factor. For these reasons we do not believe the primary studies' online methods confounded this review's findings. It also ought to be noted that among the covariates or potential confounds included in the primary studies, none accounted for the potentially important factors of the online teaching proficiencies of either elementary school teachers or parents. Future studies ought to address this gap as its filling will further help plan future interventions.

Finally, all the primary studies were cross-sectional surveys, a perfectly legitimate research design for the intended purposes of the primary study authors as well as our own, that is, to estimate the magnitude of problems (mental health challenges) at one point in time. These baseline COVID-19 cross-sections, however, have not revealed anything about the long-term mental health and related life space effects of mandated online schooling along with the isolation and insecurities of living through a worldwide pandemic. As with the medical effects of so-called long COVID, these will require longitudinal studies. Gratefully, in doing this review we serendipitously observed some of these important longitudinal investigations are already underway.

Conclusion

This meta-analytic review found school-aged children, who were mandated to e-learning during the COVID-19 pandemic were at substantially increased risks of being anxious or depressed. And their parents, primarily mothers, experienced similar risks. Such clearly forebode future mental health, academic, and related life space risks. School social workers and allied mental health practitioners, using formal and informal online intervention methods to augment traditional ones can be keys to effectively helping such vulnerable children and their parents today as they prepare preventive interventions in preparation for future pandemics.

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Table 1 Descriptive characteristics and mental health outcomes of the 13 online studies included in the review

Reference	Target population Country Time frame	Online survey design Mental health measure(s) Sampling frame Participants Covariates accounted For	Outcomes Descriptive statistics Risk ratio (95% CI)
	Mental health problems among children		
Chen et al., 2020	School children grades 7 to 12 66% middle school China February to March 2020	GAD-7 & PHQ-9 Wuhan, Beijing & Hangzhou 7,772 children Age	Online learning vs not **1+ anxiety symptom** 27.8% vs 23.1% PR = 1.20 (1.09, 1.32) **1+ depression symptom** 44.2% vs 37.9% PR = 1.17 (1.09, 1.25) **PR_{pooled} = 1.17** (1.14, 1.20)
Acosta et al., 2021	School children grades K to 12 77% primary or middle school Florida, 25% Hispanic, 13% multiracial October 2020	Original anxiety & depression measures Prospective cohort 100 vs 45 parents Age	Online learning vs not **1+ anxiety symptom** 65.6% vs 34.4% PR = 1.91 (1.35, 2.71) **1+ depression symptom** 63.1% vs 36.9% PR = 1.71 (1.17, 2.49) **PR_{pooled} = 1.81** (1.62, 2.02)

Barnett & Jung, 2021	Preschool children ages 3 to 5 United States December 2020	Strengths & Difficulties Questionnaire Preschool Learning Activities Survey 981 parents vs general population Age	"**Mental health problems"** 15.0% vs 8.0% **PR = 1.88** (1.46, 2.76)
Giannotti et al., 2021	Elementary school-aged children Ages 3 to 11 Italy April to May 2020	Strengths & Difficulties Questionnaire COVID-19 Pandemic Crisis Survey 602 parents (87% mothers) Age & 5 covariates	**Worse externalizing (emotional problems)** **OR = 5.37** (1.96, 14.72)
Harjule et al., 2021	School children ages 5 to 18 74% primary school-aged India May to June 2020	Composite Anxiety Index Rajasthan & Uttar Pradesh schools 371 parents Age	Screentime increase 4+ hours/day vs no change **Severe anxiety** 22.3% vs 10.8% **PR = 2.06** (1.26, 3.37)
Li et al., 2021	Elementary school-aged children After two-month lockdown China March 2020	Strengths & Difficulties Questionnaire 28 provinces, WeChat-based 21,526 parents (elementary educated vs others) Age & 11 covariates	**Mental health problems** 35.4% vs 29.1% **PR = 1.42** (1.29, 1.57)
Mactavish et al., 2021	School children ages 8 to 13 Windsor-Essex County Southwestern Ontario, Canada June to July 2020	Retrospective cohort baseline SCARED, Southwestern Ontario Children's Mental Health Study 190 parents Age	**Psychological distress** Before vs after **OR = 4.18** (1.77, 9.86)
Martiny et al., 2021	Elementary school-aged children After two-month lockdown Norway June to July 2020	KIDSCREEN-10 Index 266 elementary schools 87 children vs general population Age	**Diminished well-being** **PR = 3.13** (1.54, 6.35)

			Anxious before vs after 12.6% vs 23.3% OR = 2.22 (2.06, 2.40)
	Elementary school children After three to four-month lockdown 61% minoritized, 22% Black, 30% Latinx Chicago	Online survey with telephone outreach Retrospective Single Items Chicago Public Schools 32,217 caregivers	**Depressed** before vs after 3.4% vs 14.0% OR = 3.27 (2.82, 3.78)
Raviv et al., 2021	June to July 2020	Age & 4 covariates	**OR_{pooled} = 2.50** (2.42, 2.58)
		Online panel study	
	Elementary school-aged children Ages 5 to 12 United States	"Worse mental or emotional health" NORC AmeriSpeak Panel 530 vs 434 parents	Virtual vs in-person learning **Worse mental health** 24.9% vs 15.9%
Verlenden et al., 2021	October to November 2020	Age & 4 covariates	**PR = 1.60** (1.20, 2.20)
	Stress & mental health problems among parents		
	Parents of child struggled With e-learning (51%) United States	Q-GAD-7 & Q-PHQ-9 National Panel Study COVID-19 Pandemic 857 parents	**Symptoms of** **Anxiety & depression[a]**
Davis et al., 2021	March to April 2020	Age, gender & 5 covariates	**OR = 2.26** (1.22, 4.20)
	Parents of elementary school-aged Children ages 3 to 11 Italy	Parental Stress Scale COVID-19 Pandemic Crisis Survey 602 parents (87% mothers)	Distance Learning Workload High vs Low **Perceived stress**
Giannotti et al., 2021	April to May 2020	Age & 5 covariates	**OR = 1.16** (1.06, 1.27)
	Parents of first grade child had Distance education difficulties Italy	Parental Stress Scale Elementary Schools in Padua 89 parents (89% mothers)	**Perceived stress**
Moscardino et al., 2021	April to June 2020	Age & 3 covariates	**OR = 2.59** (1.01, 6.71)

	Mothers of elementary school-aged children ages 7 to 13 Italy	Original, single-item measure Laboratory for Mother & Child Health 1,148 primary vs 453 middle school	**Difficulty supporting child's learning**
Scarpellini et al., 2021	May 2020	Age & 5 covariates	**OR = 3.16** (2.23, 4.47)
	Parents of elementary school-aged children ages 5 to 12 67% mothers United States	Online panel study "Became emotionally distressed" NORC AmeriSpeak Panel 530 vs 434 parents	Virtual vs in-person learning **Emotional distress** 54.0% vs 38.4%
Verlenden et al., 2021	October to November 2020	Age & 4 covariates	**PR = 1.40** (1.20, 1.60)

Notes. CI, confidence interval; NORC, National Opinion Research Center; OR, odds ratio; PR, prevalence ratio; Q-GAD-7, Quasi-General Anxiety Disorder-7 items; Q-PHQ-9, Quasi-Patient Health Questionnaire-9 items; SES, socioeconomic status; SCARED, Screen for Child Anxiety Related Emotional Disorders; WHO, World Health Organization.

[a] Effects on anxiety and depression did not differ significantly.