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ORIGINAL ARTICLE

The Unavailability of Computer for Online School during the COVID-19 Pandemic and Parental Mental Health

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ABSTRACT:

The outbreak of the coronavirus disease 2019 (COVID-19) causing millions of people to be infected has posed major public health and governance challenges. This study evaluates the extent to which the unavailability of computer for children to learn online during the pandemic affects parental psychological wellbeing. We find that parents having no computer for their children to learn online during to the pandemic are 36.95, 42.85, 38.94, and 40.65 percentage points more likely to feel anxious, worried, displeased, and depressed every day. The study calls for the expansion of supports for children and families during the pandemic, especially for disproportionately affected communities.

Keywords: COVID-19; Online School; Computer; Mental Health

INTRODUCTION

The outbreak of the coronavirus disease 2019 (COVID-19) in China in late 2019 has posed major public health and governance challenges as a worldwide pandemic emerged. The COVID-19 pandemic has caused millions of Americans to be infected and hundreds of thousands to die. In addition to a public health crisis, the economic turmoil caused by the pandemic is substantial. In light of such a humanitarian crisis, it is critical for researchers and policymakers to understand the extent to which the pandemic-related aspects alter people's health and wellbeing.

This study evaluates the extent to which the unavailability of computer for children to learn online during the pandemic affects parental psychological wellbeing in the context of the U.S. The study contributes to the literature by analyzing the less tangible impacts of COVID-19 related aspects, particularly, the impacts on mental health, whereas other studies tend to concentrate on the visible impacts such as those on infection, hospitalization, and death. By doing so, our study provides additional scientific evidence on the relationship between pandemic-related aspects and public welfare.

We find that having no computer for children to learn online during the pandemic significantly reduces parental mental health. Specifically, parents having no computer for their children to learn online during to the pandemic are 36.95, 42.85, 38.94, and 40.65 percentage points more likely to feel anxious, worried, displeased, and depressed every day. The results emphasize the less discernible effect of a pandemic-related aspect, having no computer for children to learn online during the pandemic, on the mental wellbeing of parents. The findings calls for the expansion of supports for children and families during the pandemic, especially for disproportionately affected communities.

DATA

Data on mental health are retrieved from the Household Pulse Survey Public Use File (HPS-PUF) conducted by the United States Census Bureau in cooperation with other U.S. government agencies. The HPS-PUF is a dataset that provides a good picture of American experiences during the COVID-19 pandemic. Besides rich information on mental health, the HPS-PUF also provides other characteristics of respondents such as race, age, marital status, education, state of residence, among others. Despite the weekly collection and dissemination of data in phase 1, the two-week collection and dissemination approach has been implemented since phase 2. It is worth noting that the collection periods are still called "weeks" in the HPS-PUF to maintain continuity [1]. In total, there are currently 35 survey weeks (waves) available, all of which are employed in this study.

Measures of individual mental health are based on responses to the questions about the frequency of displaying the following four psychological symptoms over the previous 7 days, including (i) the frequency of feeling nervous, anxious, or on edge, (ii) the frequency of not being able to stop or control worrying, (iii) the frequency of having little interest or pleasure in doing things, and (iv) the frequency of feeling down, depressed, or hopeless. Responses are put into a four-point scale as follows: 1-Not at all, 2-Several days, 3-More than half the days, and 4-Nearly every day. Based on these responses, we construct four measures of mental health, namely, Daily Anxiety, Daily Worry, Daily Displeasure, and Daily Depression. They are indicator variables equal to one if the respondent chooses the worst state (4-Nearly every day), and zero otherwise.

The HPS-PUF also asked the parents whether they currently have computer for their children to learn online during to the pandemic, and the responses can be 1-Always, 2-Usually, 3-Sometimes, 4-Rarely, and 5-Never. Therefore, our main explanatory variable of whether a respondent has no computer for their children to learn online is an indicator (*Computer Unavailability*) that takes a value of one if the answer is 4-Rarely or 5-Never (*Computer Unavailability = 1*), and zero if the answer is 1-Always, 2-Usually, or 3-Sometimes *(Computer Unavailability = 0*).

Our sample consists of over 580,000 parents. Descriptive statistics of our dependent and explanatory

(independent) variables are displayed in Panels A and B of Table 1, respectively. Evident from Panel A, approximately 18.55, 12.70, 8.74, and 9.05% of individuals report feeling anxious, worried, displeased, and depressed on a daily basis. As shown in Panel B, the average number of parents who have no computer for their children to learn online is 2.51%. The proportions of white, black, and other-race individuals are 78.94, 9.39, and 11.67%, respectively. The average age of the respondents is 44.013. Roughly 70.86% are married and 35.43% are male. The fraction of individuals having bachelor's degrees is 86.61% and the fraction working for the government is 13.59%.

Table 1: Summary Statistics

	Mean	SD	N
	(1)	(2)	(3)
Panel A: Dependent Variables			
Daily Anxiety	0.1855	0.3887	584393
Daily Worry	0.1270	0.3330	584393
Daily Displeasure	0.0874	0.2825	584393
Daily Depression	0.0905	0.2869	584393
Panel B: Independent Variables			
Computer Unavailability	0.0251	0.1565	584393
Respondent is white	0.7894	0.4077	584393
Respondent is black	0.0939	0.2916	584393
Neither White nor Black	0.1167	0.3211	584393
Age of Respondent	44.013	9.8308	584393
Respondent is married	0.7086	0.4544	584393
Respondent is male	0.3543	0.4783	584393
Respondent has bachelor's degree	0.8661	0.3406	584393
Respondent works for government	0.1359	0.3427	584393

EMPIRICAL DESIGN

To quantify the relationship between having no computer for children to learn online during to the pandemic and parental mental health, we estimate the following regression model,

$$Y_{isw} = \beta_0 + \beta_1 CU_{isw} + \delta_s + \theta_w + X'_{isw}\Omega + \epsilon_{isw}$$

where the subscripts correspond to individual *i*, state of residence *s*, and week of survey *w*. The dependent variable Y_{isw} represents various mental health outcomes, including Daily Anxiety (whether the individual feels anxious every day in the past seven days), Daily Worry (whether the individual feels worried on a daily basis in the past seven days), Daily Displeasure (whether the individual has the feeling of displeasure every day in the past seven days), and Daily Depression (whether the individual feels depressed on a daily basis in the past seven days).

The main explanatory variable, CU_{isw} (*Computer Unavailability*), is an indicator that takes a value of one if the individual has no computer for their children to learn online during to the pandemic, and zero otherwise. State and survey week fixed effects are captured by δ_s and θ_w. Vector X'_{isw} is our covariate of individual characteristics such as race, age, squared-age, marital status, gender, education, and occupation. The variable ϵ_{isw} is the error term. Standard errors throughout the paper are clustered at the state-by-week level.

Our coefficient of interest is β_1 which captures the effects of having no computer for children to learn online during to the pandemic on parental psychological well-being. In other words, β_1 reflects the difference in the psychological wellbeing of parents having and having no computer for children to learn online, conditional on other characteristics.

RESULTS

Main Results - The estimated impacts of having no computer for children to learn online during the pandemic on parental mental health are provided in Table 2. For each panel, each column represents a separate regression and the panel name indicates the outcome variable. Column 1 displays the estimates from the most parsimonious specification where we only control for our main explanatory variable, the indicator *Computer Unavailability*. In Column 2, we additionally control for a set of temporal and spatial fixed effects. Finally, Column 3 represents our most extensive specification where we further account for individual characteristics (race, age, squared-age, marital status, gender, education, and occupation), in addition to the set of fixed effects.

According to Column 1 of Table 2, we find that parents having no computer for their children to learn online during to the pandemic are 46.87, 57.44, 52.61, and 53.59 percentage points more likely to feel anxious, worried, displeased, and depressed every day. However, the estimates from the most parsimonious specification only reflect the correlation between having no computer for their children to learn online during the pandemic and mental health as important factors that could jointly affect access status and mental health are not accounted for. For example, highly educated individuals or white individuals tend to have computer for their children and better mental health simultaneously [2, 3, 4, 5].

Thus, we gradually include the set of fixed effects and individual characteristics from Columns 2 to 3. According to the most extensive specification (Column 3), we find that parents having no computer for their children to learn online during to the pandemic are 36.95, 42.85, 38.94, and 40.65 percentage points more likely to feel anxious, worried, displeased, and depressed every day. The estimates remain statistically significant.

Table 2: Computer Unavailability and Mental Health

	(1)	(2)	(3)
Panel A: Y = Daily Anxiety			
Computer Unavailability	0.4687***	0.4558***	0.3695***
	(0.0090)	(0.0091)	(0.0092)
Observations	584393	584393	584393
Panel B: Y = Daily Worry			
Computer Unavailability	0.5744***	0.5503***	0.4285***
	(0.0085)	(0.0090)	(0.0091)
Observations	584393	584393	584393
Panel C: Y = Daily Displeasure			
Computer Unavailability	0.5261***	0.5106***	0.3894***
	(0.0079)	(0.0088)	(0.0089)
Observations	584393	584393	584393
Panel D: Y = Daily Depression			
Computer Unavailability	0.5359***	0.5228***	0.4065***
	(0.0079)	(0.0090)	(0.0089)
Observations	584393	584393	584393
All Characteristics	.	.	X
All Fixed Effects	.	X	X

Note: *p<0.1, **p<0.05, ***p<0.01. Robust standard errors are clustered at the state-by-week level.

Other Outcome Measures - So far we have provided evidence that having no computer for children to learn online during to the pandemic can reduce parental mental health. Next, we adopt different measures of mental health. Recall that our main dependent variables are Daily Anxiety, Daily Worry, Daily Displeasure, and Daily Depression, which take the value of one if the individual reports feeling anxious, worried, displeased, and depressed on a daily basis, respectively, zero otherwise. Here, we utilize the uncoded measures of mental health, Uncoded Anxiety, Uncoded Worry, Uncoded Displeasure, and Uncoded Depression, which refers to the frequency of experiencing each feeling. Frequency is expressed in a four-point scale as follows: 1-Not at all, 2-Several days, 3-More than half the days, and 4-Nearly every day. Table 3 shows that adopting uncoded measures of mental health leaves our conclusion on the relationship between having no computer for children to learn online during the pandemic and parental mental health unchanged.

Table 3: Computer Unavailability and Mental Health - Uncoded Measures

	(1)	(2)	(3)
Panel A: Y = Uncoded Anxiety			
Computer Unavailability	0.1490***	0.1483***	0.1250***
	(0.0032)	(0.0038)	(0.0038)
Observations	584393	584393	584393
Panel B: Y = Uncoded Worry			
Computer Unavailability	0.1592***	0.1558***	0.1299***
	(0.0028)	(0.0036)	(0.0037)
Observations	584393	584393	584393
Panel C: Y = Uncoded Displeasure			
Computer Unavailability	0.1338***	0.1324***	0.1094***
	(0.0024)	(0.0034)	(0.0034)
Observations	584393	584393	584393
Panel D: Y = Uncoded Depression			
Computer Unavailability	0.1395***	0.1378***	0.1139***
	(0.0024)	(0.0034)	(0.0034)
Observations	584393	584393	584393
All Characteristics	.	.	X
All Fixed Effects	.	X	X
Note: *p<0.1, **p<0.05, ***p<0.01. Robust standard errors are clustered at the state-by-week level.			

DISCUSSION AND CONCLUSION

We contribute to the literature by analyzing the less tangible impacts of COVID-19 related aspects, particularly, the impacts on mental health, whereas other studies tend to concentrate on the visible impacts such as those on infection, hospitalization, and death. By doing so, our study provides additional scientific evidence on the relationship between pandemic-related aspects and public welfare.

Collectively, we have presented evidence that having no computer for children to learn online during to the pandemic reduces parental mental health. Specifically, parents having no computer for their children to learn online during to the pandemic are 36.95, 42.85, 38.94, and 40.65 percentage points more likely to feel anxious, worried, displeased, and depressed every day. Our findings are insensitive to the utilization of different measures of outcome variables. The results emphasize the less discernible effect of a pandemic-related aspect, having no computer for children to learn online during the pandemic, on the mental wellbeing of parents. The findings calls for the expansion of supports for children and families during the pandemic, especially for disproportionately affected communities.

Our work is directly related to studies exploring the psychological effects of various COVID-19 related aspects. For example, COVID-19 severity, as measured by mortality rate, has been shown to impose damaging consequences on American mental health [6]. Policy responses such as massive lockdown and mask mandates have also been reported to entail non-negligible costs on individual mental wellbeing [7, 8]. The study can also be related to studies looking into the health impacts of various factors. For example, severe rainfall and temperature may raise the risk of undernutrition and illnesses [9, 10, 11, 12]. Political violence, food shortage, and starvation have also been shown to significantly impair nutritional status and survival [13, 14, 15, 16]. Various interventions on health literacy, nutrition, and land reforms have also been documented to be beneficial to individual health [17, 18, 19, 20, 21, 22].

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