



Evaluating the Costs of School and Daycare Closure on Family Well-Being and Child Development During the COVID-19 Pandemic

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Abstract

When the COVID-19 pandemic struck, our research group set out to understand the effect of isolation on child development with the help of National Science Foundation (NSF) RAPID award #2030106. Our major results were unexpected. We found plenty of negative effects of pandemic-era policy on families, but they were driven primarily by loss of childcare support, rather than isolation or COVID itself. These results were repeated over and over across many large, national datasets, including both surveys and passive data. These

results are particularly striking in the context of a pandemic where children were at low risk of illness and had minimal impact on disease transmission. That is, the closure of schools and daycares came at enormous societal cost and with little benefit. In the future, policymakers should consider this cost-benefit ratio more carefully. In the event the cost-ratio benefit still motivates closure of schools and daycares, proactive measures should be taken to address the known harms.

Keywords

COVID-19 · Screen time · Mental health · Child development · Families

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17.1 Introduction

The COVID-19 pandemic was famously difficult for parents and children. It forced schools across the world to shut down in March 2020, disrupting the educations of roughly 55.1 million students in 124,000 schools across the United States (U.S.) alone (Week 2020). The impacts permeated almost every aspect of family life, with broad effects on both parents and children (Racine et al. 2022; Trott et al. 2022; Whaley and Pfefferbaum 2023). According to a national U.S. survey, just months after the onset of the COVID-19 pandemic in March 2020, 27% of parents reported worsening mental health for themselves

and 14% reported increased behavioral problems in their children (Patrick et al. 2020). Children's screen time increased by 52% from before the COVID-19 pandemic (Madigan et al. 2022), and students' test scores in fall 2021 were significantly lower than pre-pandemic levels, especially for students from historically disadvantaged backgrounds (Goldhaber et al. 2022).

While it is unreasonable to expect pandemics to be cost-free for families or anyone else, the obvious question is whether we could have avoided some of these harms to families and mitigated the others (Whaley and Pfefferbaum 2023; Muldrew et al. 2022; Viner et al. 2021; Esposito and Principi 2020; Roos et al. 2021; Moss et al. 2023, 2022). Answering this question requires a better understanding of what caused those harms (Whaley and Pfefferbaum 2023; Muldrew et al. 2022). Were they the outcome of policy decisions such as school closures, or were they consequences of people being sick and scared? That is, perhaps the direct impacts of the pandemic on health and stress were sufficiently strong that while school closures and social distancing did nothing to promote family flourishing, they did not make it much worse.

While there has been a mountain of research on these questions, most of it is correlational (e.g., Aiano et al. 2021; Buja et al. 2021; Stage et al. 2021; Walsh et al. 2021). In particular, the effect of school closures is subject to confounding and collinearity from other concurrent interventions making it difficult to isolate the effects of school closures alone. Whether the strictness of social distancing policies is correlated with various metrics of child development is informative but not determinative. It is famously difficult to disentangle correlations between complex social phenomena. For instance, the fact that middle children are more likely to go to jail has proved to be less a result of middle child criminality per se but because children in large families are more likely to go to jail for a variety of reasons, including the fact that large families tend to have low socioeconomic status (Hartshorne et al. 2009; Rahav 1980; Cundiff 2013; for a similar example, see D'Onofrio et al. 2010). By analogy, pandemic-era public policies were not

distributed randomly but rather are themselves the result of cultural differences across polities—cultural differences that themselves are known to affect child development and family flourishing.

In our studies reviewed below, we used natural experiments to tease out the causal relationship between pandemic-era social distancing policies and familial flourishing. Lockdown and unplanned homeschooling are believed to have been two major stressors among the many pandemic-related challenges faced by families. While much of the work to date has focused on the direct effect of school closures on student learning (e.g., Goldhaber et al. 2022; Contini et al. 2021; Blainey and Hannay 2021; Engzell et al. 2021), our focus was on how the resulting increase in childcare burden on parents affected family flourishing. Critically, we sought to disentangle the effects of school shutdowns from other losses of support and other COVID-related stressors (for a broad discussion of such stressors, see Whaley and Pfefferbaum 2023).

To measure familial flourishing, we focused on parent mental health and child recreational screen time. There were three primary reasons. First, as a practical matter, we were able to obtain reasonably comprehensive data about both that allowed us to address a number of confounds.

Second, both factors are of significant independent interest. Poor parent mental health is obviously a problem both for parents and for children and is a known risk factor for any number of poor outcomes (Smith 2004; Mensah and Kiernan 2010). More broadly, mental health in the general population has been steadily declining for decades, putting both society and individuals in a less-than-ideal position to weather additional shocks. Children's recreational screen time has been a topic of persistent concern in child development and care, since it is linked with risks across a range of developmental and health outcomes, such as attention deficits, social and behavioral concerns, cognitive difficulties, language delays, sleeping disorders, and obesity (Calvert and Wilson 2011). Pandemic-era increases in children's recreational screen time were well-documented and the topic of extensive public and scientific discussion and

concern (Bergmann et al. 2022; Hedderson et al. 2023; Eales et al. 2021; Richtel 2021; McClain 2022). Note also that poor parent mental health is itself known to be associated with increased child recreational screen time (Seguin et al. 2021; Stienwandt et al. 2022).

Third and finally, understanding the etiology of children's recreational screen time during the pandemic informs a long-running debate. While there is no doubt that recreational screen time is *associated* with poor developmental outcomes, causality is debated. Public policy has been predicated on the assumption that screen time displaces more enriching but less attractive activities (Roberts et al. 1993; Lizandra et al. 2019; Chen et al. 2020) and thus has focused on training parents to control children's access to screens (Hill et al. 2016; Organization et al. 2019). However, there is some reason to believe that that screen time is more of a default backup activity when more enriching activities are not available (Oh and Vukina 2022). In that case, policy experts may be doing no more than haranguing parents about something outside their control. Indeed, given growing evidence that screen time is actually beneficial in some circumstances (e.g., Jing et al. 2023; Kirkorian et al. 2016; Zack and Barr 2016; Egami et al. 2024), they may be doing more harm than good.

17.2 Overview of the Studies

As reviewed above, the fact that child recreational screen time had increased dramatically and parental mental health declined precipitously is well-established and was clear even early in the pandemic. The question is whether this (a) could have been avoided, or (b) mitigated.

The answer depends on causation. If, for instance, parents were deliberately using recreational screen time to address children's anxiety, a potential strategy would be to provide parents and children with more effective and healthful soothing techniques, like mindfulness meditation. If, instead, recreational screen time increased because many schools provided students with laptops which were then

repurposed for recreational uses, we might want to consider more effective device controls.

In the research reviewed in this chapter, we tested the hypothesis that increases in child recreational screen time and declines in parental mental health were both direct consequences of the closure of schools and daycares, mediated by parenting burden: the more pressure on parents' time, the more children utilized recreational screen time and the worse the parents felt. While there is some evidence that unmet childcare needs are associated with degraded parenting (e.g., Roos et al. 2021; Baldus et al. 2022), evidence to date is primarily correlational, again raising questions about causation.

We investigated the causal relationship between childcare burden and familial flourishing in two related natural experiment studies we conducted. The first study considered increases in recreational screen time and decreases in parent mental health early in the pandemic. We find that both changes were tightly time-locked to the closure of schools and daycares. The second study considered what happened when schools reopened, finding that this reversed the negative effects of the pandemic. In both studies, the causal mechanism appears to be time pressure: the more parents were childcare-burdened, the worse the problems. We also were able to rule out a number of potential confounds.

We describe the two studies in the next two sections. Both studies focused exclusively on the United States. We conclude with lessons and strategies for future pandemics.

17.3 Study 1: Lessons from Closures

Our first study (Hartshorne et al. 2021) focused on the early days of the pandemic in 2020. Our approach was to get temporally fine-grained measures of our outcome variables (parent mental health and child recreational screen time) and see how closely time locked they were to temporally fine-grained measures of potential predictors (COVID rates, mobility data, school lockdown policies, and parent childcare burden). If,

for instance, changes in our outcome measures tracked changes in COVID rates rather than mobility data, that would suggest parent mental health and child recreational screen time were driven directly by disease: perhaps sick people (or their friends and relatives) were stressed out and watching TV.

At the time we conducted this study, the reported studies were not sufficiently fine-grained to answer this question. Some initial data suggested that viewership of child-related TV channels increased in the immediate wake of the pandemic (O'Reilly 2020). In a mid-April survey of members of a parent advocacy organization, 49% of parents ($N > 3000$) reported their children spending more than 6 h per day online, with 26% reporting more than 8 h, compared to an estimated 8 and 4%, respectively, before the pandemic (ParentsTogether 2020). Small studies in Canada, China, and South Korea showed similar patterns (Moore et al. 2020; Xiang et al. 2020; Guan et al. 2020). The most fine-grained data came from SuperAwesome, a kid-safe advertising service, which reported kids' weekday internet traffic in the US and the UK approximately doubled in mid-March—roughly coinciding with school closures—though the organization noted that their data did not clearly distinguish recreational screentime from remote schooling (SuperAwesome 2020).

While the above results were suggestive of a sharp change somewhere in March or April 2020, many things were happening in those months, so more systematic analysis was required. In Study 1, we and our colleagues set out to address this gap.

17.3.1 Method

We were able to obtain eight large data sets that provided good geographic and temporal resolution. Below, we briefly describe the samples we analyzed:

- Kaiser Family Foundation Health Tracking Poll: Four nationally representative surveys (March 11–15, March 23–30, May 13–18, July

14–19, 2020) including a total of 1310 parents and 3626 non-parents (Kirzinger et al. 2020; Hamel et al. 2020a, 2020b).

- AP-NORC: Two nationally representative surveys (March 26–29, July 16–20, 2020) including a total of 587 parents (Associated Press-NORC Center for Public Affairs Research 2020a, b).
- NORC COVID-19 Household Impact Survey: Three national surveys with regional oversamples (April 20–26, May 4–10, May 30–June 8, 2020) including a total of 5996 parents and 19,273 non-parents (Wozniak et al. 2020).
- Understanding America: A tracking poll that re-surveyed the same 2331 parents every two weeks from March 10 through July 20, 2020 (Understanding America Study 2020; Alattar et al. 2018).
- KidTalk Survey: Survey data collected through our own KidTalk project, with responses from 1120 U.S.A.-based parents who responded between April 16 and September 11, 2020, with 94% of responses coming by June 15 (Hartshorne et al. 2021).
- ReelGood: Weekly state-by-state data on average number of initiations of child-related streaming content, provided by ReelGood, a streaming search app, from December 30, 2019 to July 19, 2020 (Hartshorne et al. 2021).

In addition, we obtained fine-grained school closure dates from MCH Strategic Data (<http://www.mchdata.com/>); daily state-level COVID rates from the New York Times COVID tracker (New York Times 2020); daily, geographically localized estimates of time spent at home from the Google Community Mobility Reports (Aktay et al. 2020); and state-by-state population estimates from the 2019 U.S. Census report (U.S. Census Bureau 2019).

17.3.2 Results and Discussion

For full statistical results, see the original paper on “Screen time as an index of family distress” (Hartshorne et al. 2021). Key findings are depicted in two interactive figures, available

online (jkhartshorne.shinyapps.io/Spaghetti and jkhartshorne.shinyapps.io/Heatmap). To summarize, the many datasets show a consistent pattern: a sharp increase in child recreational screen time and decline in parent mental health in late March 2020. This was essentially unrelated to actual COVID case rates, either in aggregate or on a state-by-state level.

However, the spikes in recreational screen time and parents reporting poor mental health both coincided with lockdown measures: school closures, increases in time spent at home, and decreases in time spent at work. Notably, while school closures and changes in mobility were initially coupled, schools remained closed even though mobility numbers started recovering almost immediately, even in states that officially maintained social distancing policies. Critically, our outcome measures remained roughly stable after the initial spike—tracking school closures and not mobility measures.

Tellingly, not only did parents report a sharp uptick in time spent on childcare, there was a dose-dependent relationship with our outcome measures: the more extra time a particular parent reported spending on childcare, the worse their mental health and the more the children engaged in recreational screen time. Strikingly, parents who reported having no change in childcare (presumably because they were already caring for their children exclusively at home) also appeared to be largely unaffected with respect to our outcome measures.

Thus, it seems likely that the problem was not school and daycare closures per se but the strain those closures put on parents. Families fared better or worse depending on how great the resulting strain was. In contrast, the disease itself had no measurable impact, nor did non-school-related social distancing.

17.4 Study 2: Lessons from Reopenings

While Study 1 tied increased child recreational screen time and decreased parent mental health specifically to school and daycare closures (rather

than work-at-home policies, unemployment, fluctuating COVID rates, etc.), losses are different from gains, and just because losing childcare hurts families does not mean increasing childcare will help them. In the second study, we thus focused on the effects of school reopenings during the COVID-19 pandemic on child recreational screen time and parental mental health. This study capitalized on the fact that schools and daycares reopened at different times across different regions, providing a natural experiment for examining how returning to in-person schooling affected these family outcomes.

17.4.1 Method

We made use of three pre-existing datasets as well as two waves of our own KidTalk survey:

- Adolescent Brain and Cognitive Development (ABCD) study: Survey data of 5953 adolescents and their parents, collected as part of a large longitudinal study (Jernigan et al. 2020).
- Understanding America COVID Panel: A tracking poll that re-surveyed the same 2694 adults (Understanding America Study 2020; Alattar et al. 2018). We used weeks 11 through 28.
- Census Household Pulse Survey: Conducted every two weeks on a national scale. We included data from September 2, 2020 to May 24, 2021, for a total of 270,265 respondents (Fields et al. 2020).
- KidTalk: A survey conducted through our KidTalk app, with 162 respondents in Wave 2 and 459 in Wave 3 (Hartshorne et al. 2021).

These data captured family experiences as schooling formats varied, allowing for a cross-sectional comparison of families whose children were attending in-person schooling, virtual schooling, or a hybrid of both. The key outcome measures were changes in child recreational screen time and parental mental health, assessed through surveys administered to parents across different schooling conditions. The richness of the data also allowed us to control for a number

of potential confounding factors, such as local COVID-19 prevalence, loss of employment, and whether parents were working from home.

17.4.2 Results and Discussion

For full statistical results, see the original paper (Hartshorne 2020). The findings were consistent across multiple datasets, showing that parents whose children returned to in-person schooling reported significantly better mental health, and significantly lower childcare burden, compared to those whose children remained in virtual or hybrid schooling. The results suggested that the reduction in childcare burden played a key role in this improvement.

Similarly, children who returned to in-person schooling exhibited significantly lower levels of recreational screen time compared to those in virtual or hybrid models. The reduction in screen time was most pronounced in families where children were fully back to in-person schooling.

Interestingly, the study found that hybrid schooling did not significantly alleviate parental stress or reduce screen time compared to fully virtual schooling. This suggests that hybrid models, which often require complex scheduling and additional supervision, may not provide enough relief to parents compared to fully in-person schooling.

The study controlled for several potential confounds, such as employment status and work-from-home policies, and found that the positive effects of school reopenings were robust even when these factors were taken into account. Other factors that could not explain the results were COVID-19 prevalence, employment status, and parental remote work. This strengthens the conclusion that schooling format, and the related childcare burden, was a primary driver of the observed outcomes.

Thus, the driving factor behind the improvements in both parental mental health and child screen time was the alleviation of parental childcare burden. When children were home for virtual learning, parents had to take on more childcare responsibilities, leading to increased stress

and reliance on screen time as a way to occupy children. In contrast, the return to in-person schooling provided parents with much-needed relief, reducing the time pressure they faced and improving their overall mental health.

This study provides strong evidence that reopening schools had a direct, positive impact on both parent mental health and child screen time, primarily by reducing the childcare burden that parents faced during school closures. The reduction in childcare demands allowed parents to better manage their own mental health, and children benefited from reduced screen time as they returned to structured learning environments. The findings suggest that policymakers should prioritize keeping schools and daycares open during future crises, as the availability of childcare is critical to maintaining family well-being. Moreover, the limited impact of hybrid schooling raises important questions about the effectiveness of such models in reducing parental stress.

In summary, the second study demonstrates that the negative effects of school closures were largely reversible once schools reopened, reinforcing the importance of childcare in supporting family flourishing during times of crisis.

17.5 Lessons and Suggestions for the Future

School and daycare closures came at considerable cost even without taking into account children's lost learning and parents' lost professional advancement. That said, the costs of public policy have to be measured against the expected gains. With respect to COVID-19, with its low incidence in young children and low rates of transmission by children—and given that private schools in the U.S. and many school systems abroad were able to offer in-person instruction with low case rates—it is increasingly clear that school and daycare closures did little or nothing to lessen spread of the disease (Walsh et al. 2021; Donohue and Miller 2020; Wu et al. 2022; Chen et al. 2022; Neil-Sztramko et al. 2024). Moreover, the fact that public schools remained closed while

many private schools successfully opened appears to have driven a significant exodus of families from public education, exacerbating inequalities and heightening demographic pressures on public school systems (Lieberman 2023; Dee 2023; Dee et al. 2023; Azevedo et al. 2022).

However, this will not be true of all pandemics. Some diseases are more severe in children or transmit more readily in children than adults (Goldstein et al. 2018; Zheng et al. 2022; Fang et al. 2014). Indeed, even more recent variants of COVID-19 are more readily transmitted by children than were earlier variants (Zhu et al. 2023). In some cases, it may nonetheless be possible to keep schools and daycares open by using strategies that became familiar during the pandemic: cohorting students, proactive testing, quarantine protocols, using outdoor learning, or improving hygiene and ventilation procedures (e.g., McGee et al. 2021; Colosi et al. 2022; Burke et al. 2021).

In cases where daycare and school closures are nonetheless judged to be worth the cost, it is still possible to spread that cost more equitably. For instance, the increased childcare burden might be somewhat ameliorated by subsidizing (socially distanced) services, such as grocery and meal delivery. While less is currently known about the learning efficacy and disease-prevention success of home learning pods, it would be worth exploring in advance whether wide-spread, official support for such programs might be helpful. Providing affected parents with targeted professional development opportunities post-pandemic could help address long-term costs borne by parents. Announcing those opportunities in advance might help alleviate stress. Our point here is not to make specific policy suggestions but rather to suggest that there should be a policy.

That said, there is one policy that we would caution against: attempting to train parents to control children's screen time. The studies described above are yet more evidence that screen time is a symptom, not a disease. Moreover, it is a very difficult symptom to intervene on directly. If screens are the babysitter of last resort, by definition there is no additional resort to turn to. In

short, diatribes against screens may, at best, stress out parents (Wolfers et al. 2024) and, at worst, take away a valuable coping device. Indeed, one large correlational study showed positive effects of video-gaming on mental health during the pandemic (Egami et al. 2024).

The silver lining of the COVID-19 pandemic is that we have learned a great deal. Now we need to put that knowledge into practice.

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