COVID-19 PANDEMIC AND CHILD MENTAL HEALTH: AN INVITED DISCUSSION SECTION

Rejoinder 1: Advocating for children in the presence of imperfect evidence: A reply to Black et al

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“The deconstruction of studies is easy—the placing of evidence into the broader literature and making policy recommendations to benefit all youth is hard” (1, p.e2).

Science is a community effort; thus, we appreciate the opportunity to respond to Black et al.’s (2) commentary. The crux of Black et al.’s argument is that the quality of studies referenced by Canadian institutions about the negative mental health (MH) impact of pandemic school closures was poor, and therefore, the assertions were “misleading”, and “amount to unfortunate misinformation” (2, p.77). To support this criticism, Black et al., conducted a “selected reanalysis of the data” (2, p.72) used by the Canadian Paediatric Society (CPS; 3) and Royal Society of Canada (RSC; 4). Although Black et al. claim to provide a needed “critical appraisal of evidence cited in position statements” (2, p.72), they do not apply this rigour to their own commentary. Moreover, evidence-based disagreement and further analysis are necessary and normal parts of advancing knowledge; dismissing prior scholarship as “misinformation” is not, and can cloud reasoned debate.

Black et al. focus on three studies which were used by CPS and RSC in their advocacy statements. First, they replot data by Cost et al. (5) by re-grouping three categories into dichotomous classifications of deteriorated versus not-deteriorated (combining “unchanged” + “improved”), purporting that Cost et al. ignored children and adolescents (henceforth children) who fared better in one MH domain, despite not doing well in others. Collapsing ordinal data into dichotomous categories is problematic; it reduces power and can lead to inaccurate parameter estimates (6,7). Dichotomizing is also at odds with Black et al.’s call to consider pediatric MH with “more nuance”. Following Black et al.’s suggestion, we examined cross-domain MH, but retained the original three categories (deteriorated, improved, unchanged). Contrary to Black et al’s interpretation, we found greater deterioration in a more nuanced analysis of depression,

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anxiety, irritability, attention, hyperactivity, and obsessive-compulsive symptoms in children aged 6 to 18 and emotional problems, conduct problems, and hyperactivity in children aged 2 to 5. Specifically, a third of 6-18-year-olds experienced deterioration in at least 4 of the 6 domains and only 2.5% improved in at least 4 of 6 domains (see Table 1). We did not find support for Black et al.’s assertion that MH was largely unchanged—15% of 6-18-year-olds reported no changes and 10.6% experienced concurrent improvement and deterioration across the domains (see Table 2). The pattern of results for preschoolers was similar to school-age children’s (see Tables 1 and 2).

Black et al.’s re-plotting was an attempt to demonstrate scenarios not originally considered like doing “better in one domain but worse in another” (2, p.72), but this premise is unreasonable clinically. Improvement in one domain does not balance out deterioration in another. Children who are depressed, for example, cannot be assumed to be doing well because they are not hyperactive. Still, it is important to consider improvement and deterioration to inform interventions and public health policies that enhance the well-being of children. However, given that most children in Cost et al. (5) fared worse, we cannot ignore that pandemic experiences were, for the most part, to their detriment.

Second, Black et al.’s concerns with Racine et al.’s (8) meta-analysis were that the method of schooling was not considered, and that the pooled point prevalence estimate had “extremely high heterogeneity” and “was nearly halved when comparing high- and low-quality studies” (2, p.74). Black et al. are correct that most studies did not report on the method of schooling; only 9 of 29 studies detailed school attendance. More studies are needed to better understand school closure effects. It is worth noting that a recent systematic review did find that school closures had an adverse effect on children’s MH, but the impact could not be differentiated from “social lockdowns” (9).

Black et al. were also concerned with the “extremely high heterogeneity” in Racine et al.’s meta-analysis. Heterogeneity is common (and expected) in most random-effects meta-analyses due to the inherent variation in sample and study characteristics, as well as the quality of included studies (10). Heterogeneity in meta-analyses affords the examination of moderators, which provide more nuanced findings as to who was impacted (11). Still, we appreciate Black et al.’s point that in the examined high-quality studies, the

<table>
<thead>
<tr>
<th>Number of domains</th>
<th>Experiencing deterioration [Proportion [95% CI]]</th>
<th>Experiencing improvement [Proportion [95% CI]]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2–5-year-olds (n = 54)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0.333 [0.215, 0.476]</td>
<td>0.685 [0.543, 0.801]</td>
</tr>
<tr>
<td>1</td>
<td>0.426 [0.295, 0.567]</td>
<td>0.204 [0.111, 0.339]</td>
</tr>
<tr>
<td>2</td>
<td>0.185 [0.097, 0.319]</td>
<td>0.111 [0.046, 0.233]</td>
</tr>
<tr>
<td>3</td>
<td>0.056 [0.014, 0.163]</td>
<td>0.000 [0.000, 0.000]</td>
</tr>
<tr>
<td>6–18-year-olds (n = 959)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0.254 [0.226, 0.285]</td>
<td>0.792 [0.763, 0.818]</td>
</tr>
<tr>
<td>1</td>
<td>0.158 [0.134, 0.184]</td>
<td>0.109 [0.090, 0.132]</td>
</tr>
<tr>
<td>2</td>
<td>0.114 [0.094, 0.137]</td>
<td>0.047 [0.034, 0.064]</td>
</tr>
<tr>
<td>3</td>
<td>0.131 [0.110, 0.156]</td>
<td>0.026 [0.017, 0.040]</td>
</tr>
<tr>
<td>4</td>
<td>0.152 [0.129, 0.178]</td>
<td>0.015 [0.006, 0.026]</td>
</tr>
<tr>
<td>5</td>
<td>0.107 [0.088, 0.130]</td>
<td>0.007 [0.003, 0.016]</td>
</tr>
<tr>
<td>6</td>
<td>0.084 [0.067, 0.105]</td>
<td>0.003 [0.001, 0.011]</td>
</tr>
</tbody>
</table>

*a See Cost et al. [5] for detailed information on the sample, measures, and analytic approach.

*b Three mental health domains: emotional problems, conduct problems, and hyperactivity.

c Six mental health domains: depression, anxiety/emotional problems, inattention, hyperactivity, irritability/conduct problems, obsessive-compulsive symptoms.
pooled point prevalence rates were lower than in low-quality studies. However, in the high-quality studies (12-16), the pooled point prevalence rates for clinically significant depression (18%) and anxiety symptoms (12%) were both higher than pre-pandemic reports in large samples of children (e.g., 7.5% depression, 17; 10% anxiety disorders, 18).

Third, Black et al. re-graphed Duckworth et al.’s (19) results, concluding that a small effect size was now “visually obvious”. They further stated that effect sizes were “clinically meaningless” without citation for this assertion. We assume they were referring to Cohen’s (20) frequently cited guidelines, which Cohen admitted were subjectively developed and should be applied with caution (21). Even so, can a small effect size be meaningful? We believe so, especially when assessing population risk, requiring measurement in absolute rather than relative terms. As Rose (22) noted, a “large number of people exposed to a low risk is likely to produce more cases than a small number of people exposed to a high risk” (p. 1849). During the pandemic, 90% of children worldwide experienced school closures (23). A small effect size implicating 1.5 billion children can profoundly

### Table 2. Cross-tabulation of parent-reported outcomes of change in 3 mental health domains (emotional problems, hyperactivity, conduct problems) in 2-5-year-olds (top panel) and parent-reported outcomes of change in 6 mental health domains (depression, anxiety, inattention, hyperactivity, irritability, obsessive-compulsive symptoms) 6-18-year-olds (bottom panel).

<table>
<thead>
<tr>
<th>Deterioration</th>
<th>Improvement in 2-5-year-olds</th>
<th>Improvement in 6–18-year-olds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of domains</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>12.96%</td>
<td>12.96%</td>
</tr>
<tr>
<td>1</td>
<td>31.48%</td>
<td>7.41%</td>
</tr>
<tr>
<td>2</td>
<td>18.52%</td>
<td>0.00%</td>
</tr>
<tr>
<td>3</td>
<td>5.56%</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>14.38%</td>
<td>0.46%</td>
</tr>
<tr>
<td>5</td>
<td>10.36%</td>
<td>0.35%</td>
</tr>
<tr>
<td>6</td>
<td>8.40%</td>
<td>-</td>
</tr>
</tbody>
</table>

**Note.** 12.96% of 2-5-year-olds did not experience deterioration or improvement in any of the 3 domains (were “unchanged”); 20.37% experienced only improvement or unchanged in all domains, without concurrent deterioration in any domain. Sum = 11.1% of 2-5-year-olds who experienced deterioration in at least 1 domain and improvement in at least 1 domain.

**Note.** 14.96% of 6-18-year-olds did not experience deterioration or improvement in any of the 6 domains (were “unchanged”); 10.48% experienced only improvement or unchanged in all domains, without concurrent deterioration in any domain. Sum = 10.63% of 6-18-year-olds who experienced deterioration in at least 1 domain and improvement in at least 1 domain.
impact on any country’s ability to provide resources and services for the population.

Black et al. conclude their commentary by expressing concern around the “moral panic about the negative effects of school closures and other pandemic related responses on children’s mental health” (2, p.76). They contend that high quality evidence portrays a more “complex picture of improvements, deteriorations, and within-prevous-trend shifts of pediatric mental health outcomes” (2, p.77). We agree about the complexity—heterogeneity should always be expected (24, 25), but we disagree that deteriorations observed during the pandemic represent a continuation of a previous trend. New evidence suggests otherwise. In an overview of 18 systematic reviews of 366 studies, the pooled point prevalence in children was 32% for depression and 32% for anxiety following pandemic mitigation measures (26). These rates are far higher than pre-pandemic estimates. A meta-analysis of 42 studies representing 11.1 million unique pediatric emergency department (ED) visits across 18 countries indicated a 22% increase in ED visits for attempted suicide from pre- to during the pandemic (27). Though rates of ED visits for other MH indications declined, so too did ED visits for all health indications. New evidence also points to notable increases in ED MH visits during the pandemic in relation to school closures. An analysis of >30,000 ED MH visits made by Albertan children during the first four pandemic waves showed that visits rates were higher during, than before the pandemic, most noticeably among adolescents when schools closed for the first time from March-June 2020 (108.6% increase from pre-pandemic; 28). Moreover, MH ED visit rates during school-closure periods were greater than during school-open periods, implicating the specific negative role of school closures on children’s MH.

At the beginning of the pandemic, there were few published longitudinal studies on children’s MH that included pre-pandemic data. Moreover, the ability to rapidly disentangle the independent impact of pandemic lockdowns, school closures, or similar events precluding school attendance or normal life routine was limited. Longitudinal studies have since emerged and have shown consistent increases in depression symptoms in relation to the pandemic and smaller increases in anxiety symptoms in children (e.g., 29-35). But again, small changes at the population level are not consequential, nor is it moral panic to point them out. Of course, some children fared better after early pandemic deterioration (36), and some stayed the same (37), but many suffered, and did so across multiple domains. Learning loss was profound (38), daily physical activity decreased by 20% (39), screen time increased by 52% (40), children were lonelier (41), and parental mental distress (42) and family violence increased (43).

The pandemic presented unique and unprecedented changes that necessitated rapid action based on the available science. High quality evidence is ideal, but under the precautionary principle (44), it is inappropriate to wait for more data to emerge when the risks to children are imminent and when true experiments to demonstrate causality are impossible. So, how do we do good in the absence of perfect evidence? We contend that imperfect data must be interpreted in the context of the broader literature when making recommendations; potential harms must be judged against potential benefits. This point is well illustrated when we contemplate why schools were closed during the pandemic. Based in part on early transmission data, schools were closed worldwide under the assumption that doing so would help reduce the spread of SARS-CoV-2. Despite this informed assessment, recent meta-analytic findings suggest that SARS-CoV-2 was “markedly lower in schools compared with household settings” (45, p.361). Does this then mean that school closures were the result of misinformation? Of course not. It highlights the complexities associated with decision-making during a rapidly evolving global crisis. The same can be said about the advocacy to open schools.

Advocating for the rights of children by carefully balancing risks and benefits and making recommendations to alleviate this burden is not misinformation. Our work has been done in good faith with the intention of improving outcomes for children through rigorous science. We welcome dialogue, healthy debate, and the sharing of diverse opinions, which ultimately improve the overall quality of our work, thus benefitting children. However, introducing terms like “moral panic” and “misinformation” is inaccurate and a distraction from meaningful discussion of evidence and methodology. Data discrepancies will always exist in science. In reconciling these differences however, we need to keep children in the forefront, as they are the ones who stand to lose the most (1).

Conflicts of Interest

TV is the chair of the Royal Society of Canada (RSC) COVID-19 Task-Force and was the chair of the RSC Children and Schools working group. TV is the president of the International Society for Research on Aggression whose Media Violence Commission states that “…exposure to media violence is one risk factor for increased aggression”. TV receives funding from Canadian Institutes of Health Research (CIHR), the Social Sciences and Humanities Research Council of Canada (SSHRC), and the Canada Research Chairs (CRC) program. DK is the chair of the Canada Research Chairs (CRC) program. DK is the chair of the Canada Research Chairs (CRC) program.
of the Mental Health Task Force, Canadian Paediatric Society and receives funding from CIHR, the Ontario Ministry of Health, the SickKids Foundation, and the University of Toronto for COVID-19 and mental health related research. SM receives funding from SSHRC, CIHR, the University of Calgary, the Alberta Children’s Hospital Foundation, an anonymous donor, and the CRC program. KTC receives funding from the Psychiatry Endowment Fund at the Hospital for Sick Children, CIHR, the Ontario Ministry of Health, the SickKids Foundation, and the University of Toronto for COVID-19 and mental health related research. NR receives funding from the CIHR, SSHRC, and is the Chair in Child and Youth Mental Health at the Children’s Hospital of Eastern Ontario Research Institute. PS receives funding from CIHR, the Centre for Addiction and Mental Health, and royalties from Guildford Press and Simon & Schuster. KTC conducted the analyses.

References

27. Madigan S, Korczak DJ, Vaillancourt T, Racine N, Hopkins WG, Pador P, Hewitt JMA, AlMousawi B, McDonald S, Neville, RD. Comparison of paediatric emergency department visits for attempted...
suicide, self-harm, and suicidal ideation before and during the COVID-19 pandemic: a systematic review and meta-analysis. The Lancet. 2023; online first.


