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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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**Table 1. Proportion of children and adolescents with parent reported mental health deterioration and improvement by number of mental health domains with 95% confidence intervals[a]**

| Number of domains | Experiencing deterioration Proportion [95% CI] | Experiencing improvement Proportion [95% CI] |
|---|---|---|
| | 2–5-year-olds (n = 54)[b] | |
| 0 | 0.333 [0.215, 0.476] | 0.685 [0.543, 0.801] |
| 1 | 0.426 [0.295, 0.567] | 0.204 [0.111, 0.339] |
| 2 | 0.185 [0.097, 0.319] | 0.111 [0.046, 0.233] |
| 3 | 0.056 [0.014, 0.163] | 0.000 [0.000, 0.000] |
| | 6–18-year-olds (n = 959)[c] | |
| 0 | 0.254 [0.226, 0.285] | 0.792 [0.763, 0.818] |
| 1 | 0.158 [0.134, 0.184] | 0.109 [0.090, 0.132] |
| 2 | 0.114 [0.094, 0.137] | 0.047 [0.034, 0.064] |
| 3 | 0.131 [0.110, 0.156] | 0.026 [0.017, 0.040] |
| 4 | 0.152 [0.129, 0.178] | 0.015 [0.008, 0.026] |
| 5 | 0.107 [0.088, 0.130] | 0.007 [0.003, 0.016] |
| 6 | 0.084 [0.067, 0.105] | 0.003 [0.001, 0.011] |

[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.

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 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).**

| | | Improvement in 2-5-year-olds | | | |
|---|---|---|---|---|---|
| | *# of domains* | *0* | *1* | *2* | *3* |
| **Deterioration** | *0* | 12.96% | 12.96% | 7.41% | 0.00% |
| | *1* | 31.48% | 7.41% | 3.70% | - |
| | *2* | 18.52% | 0.00% | - | - |
| | *3* | 5.56% | - | - | - |

*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.

| | | Improvement in 6–18-year-olds | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | *# of domains* | *0* | *1* | *2* | *3* | *4* | *5* | *6* |
| **Deterioration** | *0* | 14.96% | 4.14% | 2.30% | 1.96% | 1.15% | 0.58% | 0.35% |
| | *1* | 11.05% | 2.53% | 1.27% | 0.46% | 0.35% | 0.12% | - |
| | *2* | 8.63% | 1.96% | 0.58% | 0.23% | 0.00% | - | - |
| | *3* | 11.39% | 1.50% | 0.23% | 0.00% | - | - | - |
| | *4* | 14.38% | 0.46% | 0.35% | - | - | - | - |
| | *5* | 10.36% | 0.35% | - | - | - | - | - |
| | *6* | 8.40% | - | - | - | - | - | - |

*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.

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

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-previous-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 inconsequential, 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 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

1. Korczak DJ, Madigan S, Vaillancourt T. Data divide—Disentangling the role of the COVID-19 pandemic on child mental health and well-being. JAMA Pediatrics. 2022.
2. Black TR, Virk P, Woodward ML, Stea JN, Doan Q. School closures, the pandemic, and pediatric mental health: Scrutinizing the evidence. Journal of the Canadian Academy of Child and Adolescent Psychiatry. 2023; 32(2):71-78.
3. Grimes R. Remote Learning [Internet]. Canadian Paediatric Society. 2022 [cited 2023 Jan4]. Available from: https:// https://cps.ca/uploads/advocacy/Remote_learning_in_ON.pdf
4. Vaillancourt T, Beauchamp M, Brown C. Children and schools during COVID-19 and beyond: Engagement and connection through opportunity. In Royal Society of Canada. 2021.
5. Cost KT, Crosbie J, Anagnostou E, Birken CS, Charach A, Monga S, et al. Mostly worse, occasionally better: Impact of COVID-19 pandemic on the mental health of Canadian children and adolescents. European Child & Adolescent Psychiatry. 2021:1-14.
6. Sankey SS, Weissfeld LA. A study of the effect of dichotomizing ordinal data upon modeling. Communications in Statistics-Simulation and Computation. 1998;27(4):871-887.
7. Strömberg U. Collapsing ordered outcome categories: A note of concern. American Journal of Epidemiology. 1996:144(4):421-424.
8. Racine N, McArthur BA, Cooke JE, Eirich R, Zhu J, Madigan S. Global prevalence of depressive and anxiety symptoms in children and adolescents during COVID-19: A meta-analysis. JAMA Pediatrics. 2021;175(11):1142-1150.
9. Viner R, Russell S, Saulle R, Croker H, Stansfield C, Packer J, et al. School closures during social lockdown and mental health, health behaviors, and well-being among children and adolescents during the first COVID-19 wave: A systematic review. JAMA Pediatrics. 2022.
10. Matthias Egger M, Ebrahim S, Smith GD. Where now for meta-analysis? International Journal of Epidemiology. 2002.
11. Hall JA, Rosenthal R. Testing for moderator variables in meta-analysis: Issues and methods. Communications Monographs. 1991;58(4):437-448.
12. Glynn LM, Davis EP, Luby JL, Baram TZ, Sandman CA. A predictable home environment may protect child mental health during the COVID-19 pandemic. Neurobiol Stress. 2021; 14:100291. doi:10.1016/j.ynstr.2020.1002
13. MacTavish A, Mastronardi C, Menna R, et al. The acute impact of the COVID-19 pandemic on children's mental health in southwestern Ontario. PsyArXiv. Preprint posted online September 19, 2020. doi:10.31234/osf.io/5cwb4
14. Tang S, Xiang M, Cheung T, Xiang YT. Mental health and its correlates among children and adolescents during COVID-19 school closure: the importance of parent-child discussion. J Affect Disord. 2021;279:353-360. doi:10.1016/j.jad.2020.10.016
15. Yue J, Zang X, Le Y, An Y. Anxiety, depression and PTSD among children and their parent during 2019 novel coronavirus disease (COVID-19) outbreak in China. Curr Psychol. 2020;1-8.
16. Zhang L, Zhang D, Fang J, Wan Y, Tao F, Sun Y. Assessment of mental health of Chinese primary school students before and after school closing and opening during the COVID-19 pandemic. JAMA Netw Open. 2020;3(9):e2021482. doi:10.1001/jamanetworkopen.2020.21482
17. Avenevoli S, Swendsen J, He JP, Burstein M, Merikangas KR. Major depression in the national comorbidity survey–Adolescent supplement: Prevalence, correlates, and treatment. Journal of the American Academy of Child & Adolescent Psychiatry. 2015;54(1):37-44.
18. Steinsbekk S, Ranum B, Wichstrøm L. Prevalence and course of anxiety disorders and symptoms from preschool to adolescence: A 6-wave community study. Journal of Child Psychology and Psychiatry. 2022;63(5):527-534.
19. Duckworth AL, Kautz, T, Defnet A, Satlof-Bedrick E, Talamas S, Lira B, et al. Students attending school remotely suffer socially, emotionally, and academically. Educational Researcher. 2021;50(7):479-482.
20. Cohen, J. The effect size. Statistical Power Analysis for The Behavioral Sciences. 1988;77-83.
21. Funder DC, Ozer DJ. Evaluating effect size in psychological research: Sense and nonsense. Advances in Methods and Practices in Psychological Science. 2019;2(2):156-168.
22. Rose G. Strategy of prevention: Lessons from cardiovascular disease. British Medical Journal (Clinical Research ed.). 1981;282(6279):1847.
23. UNESCO. Global monitoring of school closures. 2022. [cited 2023 Jan4] https://www.unesco.org/en/covid-19/education-response
24. Cicchetti D, Rogosch FA. Equifinality and multifinality in developmental psychopathology. Development and Psychopathology. 1996;8(4):597-600.
25. Vaillancourt T, Szatmari P. Child development, major disruptive events—Public health implications. In Oxford Research Encyclopedia of Global Public Health. 2022.
26. Harrison L, Carducci B, Klein JD, Bhutta ZA. Indirect effects of COVID-19 on child and adolescent mental health: An overview of systematic reviews. BMJ Global Health. 2022;7(12):e010713.
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.

28. Newton AS, Xie J, Wright B, Lategan C, Winston K, Freedman SB. Child and adolescent visits to emergency departments for mental health concerns during the first four waves of the covid-19 pandemic: An examination of visit trends in relation to school closures and openings [unpublished data].
29. De France K, Hancock GR, Stack DM, Serbin LA, Hollenstein T. The mental health implications of COVID-19 for adolescents: Follow-up of a four-wave longitudinal study during the pandemic. American Psychologist. 2022;77(1):85.
30. Gladstone TR, Schwartz JA, Pössel P, Richer AM, Buchholz KR, Rintell LS. Depressive symptoms among adolescents: Testing vulnerability-stress and protective models in the context of COVID-19. Child Psychiatry & Human Development. 2021;1-11.
31. Houghton S, Kyron M, Hunter SC, Lawrence D, Hattie J, Carroll A, Zadow C. Adolescents' longitudinal trajectories of mental health and loneliness: The impact of COVID-19 school closures. Journal of Adolescence. 2022;94(2):191-205.
32. Magson NR, Freeman JY, Rapee RM, Richardson CE, Oar EL, Fardouly J. Risk and protective factors for prospective changes in adolescent mental health during the COVID-19 pandemic. Journal of Youth and Adolescence. 2021;50:44-57.
33. Rogers AA, Ha T, Ockey S. Adolescents' perceived socio-emotional impact of COVID-19 and implications for mental health: Results from a US-based mixed-methods study. Journal of Adolescent Health. 2021;68(1):43-52.
34. Sadeghi N, Fors PQ, Eisner L, Taigman J, Qi K, Gorham LS, et al. Mood and behaviors of adolescents with depression in a longitudinal study before and during the COVID-19 pandemic. Journal of the American Academy of Child & Adolescent Psychiatry. 2022;61(11):1341-1350.
35. Shoshani A, Kor A. The mental health effects of the COVID-19 pandemic on children and adolescents: Risk and protective factors. Psychological Trauma: Theory, Research, Practice, and Policy. 2021.
36. Hawes MT, Szenczy AK, Olino TM, Nelson BD, Klein DN. Trajectories of depression, anxiety and pandemic experiences; A longitudinal study of youth in New York during the spring-summer of 2020. Psychiatry Research. 2021;298:113778.
37. Bélanger RE, Patte KA, Leatherdale ST, Gansaonré RJ, Haddad S. An impact analysis of the early months of the COVID-19 pandemic on mental health in a prospective cohort of Canadian adolescents. Journal of Adolescent Health. 2021:69(6):917-924.
38. Betthäuser BA, Bach-Mortensen AM, Engzell P. A systematic review and meta-analysis of the evidence on learning during the COVID-19 pandemic. Nature Human Behaviour. 2023. https://doi.org/10.1038/s41562-022-01506-4
39. Neville RD, Lakes KD, Hopkins WG, Tarantino G, Draper CE, Beck R, et al. Global changes in child and adolescent physical activity during the COVID-19 pandemic: A systematic review and meta-analysis. JAMA Pediatrics. 2022.
40. Madigan S, Eirich R, Pador P, McArthur BA, Neville RD. Assessment of changes in child and adolescent screen time during the COVID-19 pandemic: A systematic review and meta-analysis. JAMA Pediatrics. 2022.
41. Farrell AH, Vitoroulis I, Eriksson M, Vaillancourt T. Loneliness and well-being in children and adolescents during the COVID-19 pandemic: A systematic review. Children. 2023;10(2):279.
42. Racine N, Hetherington E, McArthur BA, McDonald S, Edwards S, Tough S, et al. Maternal depressive and anxiety symptoms before and during the COVID-19 pandemic in Canada: A longitudinal analysis. The Lancet Psychiatry. 2021;8(5):405-415.
43. Letourneau N, Luis MA, Kurbatfinski S, Ferrara HJ, Pohl C, Marabotti F, et al. COVID-19 and family violence: A rapid review of literature published up to 1 year after the pandemic declaration. EClinicalMedicine. 2022;53:101634.
44. SARS Commission Executive Summary, 2007. [cited 2023 Jan4] http://www.archives.gov.on.ca/en/e_records/sars/report/v1-pdf/Vol1Chp3.pdf
45. Viner R, Waddington C, Mytton O, Booy R, Cruz J, Ward J, et al. Transmission of SARS-CoV-2 by children and young people in households and schools: A meta-analysis of population-based and contact-tracing studies. Journal of Infection. 2022;84(3):361-382.