

# Assessing the Quality of Research Examining Change in Children's Mental Health in the Context of COVID-19

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## ABSTRACT

There is an urgent need to disseminate findings on the impact of COVID-19 so that appropriate steps can be taken to provide suitable services for those in need. In the area of children's mental health and the pandemic, many published and preprint studies do not meet the standard of good research practices. One common error is the use of cross-sectional data to describe change (e.g., saying children are more depressed during the pandemic). Although an all too familiar occurrence, statements about change require longitudinal data that pre-date the pandemic along with follow-up evaluations that are carefully timed to assess differences. In this commentary, we outline gold-standard research practice guidelines when assessing change in children's mental health in the context of the pandemic.

## RÉSUMÉ

Il est impératif de partager les trouvailles sur l'impact de la COVID-19 afin que des mesures appropriées puissent être prises pour fournir des services adéquats à ceux qui en ont besoin. Dans le domaine de la santé mentale des enfants et de la pandémie, de nombreuses études publiées et préimprimées ne répondent pas aux normes des bonnes pratiques de recherche. Une erreur courante est l'utilisation de données transversales pour décrire un changement (par exemple, dire que les enfants sont plus déprimés à cause de la pandémie). Bien qu'il s'agisse d'un phénomène bien trop familier, les déclarations sur le changement nécessitent des données longitudinales antérieures à la pandémie, ainsi que des évaluations de suivi soigneusement programmées pour bien évaluer les différences. Dans cet article commentaire, nous présentons des lignes directrices de référence en recherche lors de l'évaluation des changements dans la santé mentale des enfants dans le contexte de la pandémie.

**Keywords:** *Children's Mental Health, COVID-19, Pandemic, Impact of COVID-19*

In their policy brief on the impact of COVID-19 on children and youth, the United Nations identified the need for “a rapid accumulation of data on the scale and nature of

impacts among children.”<sup>1</sup> Although an important goal, this call to action defies how research typically unfolds. Science is a slow, methodical process that requires careful

consideration of prior evidence, ethics, measurement, sampling, analysis, and implications, to name a few. Still, we appreciate the call to shift priorities and allocate resources to conduct research about this global event. The stakes are high, and information is needed to guide us on how children and youth are faring during this unprecedented time. One problem is that sub-standard studies, often released as non-peer reviewed preprints, are being promoted on social media and in news outlets, and this attention can influence the public's perception of risk, the credibility of scientists, and policy makers' decisions related to funding and programming. Some scholars and medical professionals see preprints as a necessity during the pandemic to circumvent the lengthy review process and to arm professionals with the most up-to-date data.<sup>2</sup> Others see this growing trend as facilitating the spread of misinformation because, unlike scientists who approach non-peer reviewed research with caution, popular news outlets and the public may take preprints at face value.<sup>3,4</sup> Our goal is thus to remind readers of what constitutes good science in the field of child and youth mental health.

### ASSESSING CHANGE AND TEMPORAL PRIORITY IN CHILD AND YOUTH MENTAL HEALTH

Since COVID-19 was declared a global pandemic, it is common to hear about how children and adolescents have become more depressed, anxious, or lonely. Although a familiar occurrence in the literature, statements about change cannot be made based on cross-sectional or retrospective data. Rather, assessing change in mental health requires longitudinal data that pre-dates the pandemic in addition to follow-up evaluations that are carefully timed to assess differences. This type of design also requires a close consideration of developmental norms. Some change, like the development of language, takes place quickly in the early years and then levels off over time.<sup>5</sup> Other change occurs over a longer time frame, like the development of personality.<sup>6</sup> Change, especially in child and youth mental health, is often non-linear and therefore requires the assessment of the phenomenon over an extended period of time using an analytic approach that can account for heterogeneity, such as person-centered approaches. Take for example the development of depression symptoms. Vaillancourt and Haltigan<sup>7</sup> examined the trajectories of depression symptoms from Grade 7 to Grade 12 in a sample of 700 Canadian children and youth and found that 75.8% followed a trajectory of

low depression symptoms over time, 15.7% followed an increasing trajectory, and 8.5% followed a trajectory that began high in early adolescence and decreased over time. Longitudinal studies that include only three time points cannot examine this type of non-linear change.<sup>8</sup> However, this type of analytic approach, centered on heterogeneity, cannot adequately assess temporal priority (i.e., the sequential ordering of variables across time).

The assessment of temporal priority requires the use of variable-centered approaches, like cross-lagged panel models. For example, in a Canadian sample of 612 children and youth assessed yearly from Grade 7 to Grade 11, Lee and Vaillancourt<sup>9</sup> found that elevated levels of disordered eating consistently predicted depression, and not the reverse, suggesting the temporal ordering was from disordered eating to depression and not from depression to disordered eating. Lee and Vaillancourt suggested in their study that "early interventions that target problematic eating behavior may mitigate the risk of future depression."<sup>9</sup> Knowing what initiates a cascade is important for intervention and prevention work. More recently, analytic approaches have expanded on this type of cross-lagged panel model to disaggregate within-person relations (e.g., a child's level of depression relative to their own level) and between-person relations (e.g., a child's level of depression relative to other children's levels<sup>10,11</sup>). This separation allows for the interpretation of true age-related processes. Autoregressive latent trajectory models with structured residuals are now being used to provide stringent tests of within-person cross-lagged associations. Using this analytic approach, Lee and Vaillancourt<sup>12</sup> examined the intraindividual (within-person) temporal patterning of internalizing symptom development in a sample of 669 Canadian children and youth assessed yearly from age 11 to 17, and found that generalized anxiety consistently predicted depression, while anxiety and depression consistently predicted somatization. Of note, anxiety also had an indirect effect (mediating) on somatization via depression. These results suggest that focusing on anxiety could potentially help "curb symptom continuity and the development of comorbidity."<sup>12</sup>

Longitudinal research is complicated. In addition to planning and collecting data, which takes time, the analysis must be carefully selected to answer the specific a priori research question and the conclusions must be precisely drawn to match the specific analytic approach used. Assessing

change also requires the use of measures that are developmentally appropriate and psychometrically sound; they need to have demonstrated reliability and validity within prior research, but also within the study sample. Particular attention should be paid to measurement invariance; that is, whether a scale represents a construct in the same way across different contexts or conditions.<sup>13</sup> Measures need to be invariant across time, and ideally, across gender and other features that have a notable impact on the prevalence and presentation of children's mental health. For example, normative discontent (i.e., weight dissatisfaction) is common in adolescent girls and so the assessment of cognitive features of eating disorders may be different for girls and boys.<sup>14,15</sup> Therefore, measures of adolescent eating disorders need to, at a minimum, demonstrate invariance across gender.<sup>16</sup> Verbal ability is a key indicator of autism spectrum disorder (ASD), and verbal ability is strongly linked to age. ASD is also more commonly diagnosed in boys than in girls and the clinical presentation differs across gender as well.<sup>17-19</sup> Thus, when examining the autism phenotype, it is important to use measures that demonstrate equivalence across subgroups of participants (age, verbal ability, and gender; see Duku et al.<sup>20</sup> for example). Establishing measurement invariance helps demonstrate that the same empirical meaning is present for key modifiers like age and gender.<sup>21</sup>

### COMMON CHALLENGES AND LIMITATIONS WITH LONGITUDINAL STUDIES

Although longitudinal studies are better than cross-sectional studies, they often suffer from a loss of participants over time (i.e., attrition) and rely on convenience sampling, which means that extrapolating findings to other populations must be done with caution. Loss of participants in longitudinal studies tends to be systematic rather than random, resulting in a less representative sample.<sup>22,23</sup> In fact, the participants you most want to retain in the study tend to be the ones to drop out early.<sup>24</sup> For example, children and youth often systematically drop out of studies because of their mental health difficulties and/or behavioural problems (see Wolke et al.<sup>25</sup> for example). It is also common to lose participants from lower socioeconomic brackets and racialized communities (see Lee and Vaillancourt<sup>12</sup> for example). Accordingly, attrition must be carefully considered in the study design. At the onset of the study, decisions need to be made about how to reduce attrition

(e.g., renumeration participants),<sup>26</sup> how to manage attrition (e.g., imputation, the use of statistical weighing), and identifying the minimum sample size (i.e., power) required to address the questions of interest.<sup>24</sup>

Ideally, population-based longitudinal studies that use probability-based sampling methods (random selection) should be used to assess the impact of COVID-19 on child and youth mental health. The problem is that in Canada, there are no such studies. And because Canada has no population-based longitudinal study on child and youth mental health, we cannot "obtain accurate information about how the pandemic is affecting all Canadian children, and how some are being disproportionately affected."<sup>27</sup> We also cannot compare how children and youth in different provinces and territories are affected by their local or provincial/territorial COVID-19 public health policies. Rigorous studies are needed to identify specific conditions that leave children particularly vulnerable to mental health problems. We do have one great hope to remedy this issue. There is mounting pressure to quickly extend the Canadian Health Survey of Children and Youth (CHSCY).<sup>27</sup> The CHSCY is ideal for monitoring changes in the mental health of Canadian children and youth in the context of the pandemic and in the future. In 2019, the CHSCY collected data on children and youth mental health in a nationally representative sample of 42, 871 completed cases of children aged 1–17. Survey sample weights were applied so that the analyses would be representative of the Canadian population. Moreover, the Canadian Child Benefit File was used as the sampling frame, thus the study captured 98% of Canadian children and youth in all provinces and 96% of children and youth in all territories.<sup>28</sup> What is now needed is for Statistics Canada to add more data collection waves to this study to see how Canadian children and youth compare across provinces and territories and to other nations. There are precedents for this type of study design. An exemplar is the follow-up of the Mental Health of Children and Young People (MHCYP) survey which provided early evidence about the impact of the pandemic on child and youth mental health in the UK. This rare resource signaled to the world there was indeed a deterioration of mental health afoot in this vulnerable age group.<sup>29</sup> Additional waves of data collection have also been planned to improve the UK Government's "understanding of the differential effects of the pandemic and inform the policy, commissioning, and practice response."<sup>29</sup>

## PROCESSES AND MECHANISMS: UNDERSTANDING CONTEXT

Finally, studies that can answer questions about processes and mechanisms impacting child development are greatly needed. We need to know if the pandemic has led to increases in adversities for some children (e.g., increases in child maltreatment),<sup>30</sup> or if others have seen a reprieve under pandemic conditions (e.g., reduced bullying victimization).<sup>31</sup> Importantly, an increase or decrease in mental health symptoms and the occurrence of a pandemic does not necessitate causality; the impact of specific moderators (which influence the strength of relations) or mediators (which explain the relation) on development must also be assessed. For example, fear of COVID-19 or specific public health interventions during specified periods of time for different geographic areas could impact the development of mental health symptoms. Another possible mechanism could be school closures. According to the United Nations Educational, Scientific, and Cultural Organization's COVID-19 global monitoring of school closures, half of the world's students are still affected by partial or full school closures. In Ontario, all schools have been closed since April 12, 2021.<sup>32</sup> Researchers need to be specific when identifying the processes and modifiers of changes in mental health symptoms of children and youth in relation to the pandemic. Examining mediators and moderators is far more useful for determining what may have helped or harmed different populations because of the myriad of changes that have occurred since the pandemic began. Unfortunately, because of budgetary restrictions, population-based longitudinal studies are often restricted in the number of assessments and measures they can include, which hampers the ability to understand the role of moderators and mediators in child and youth mental health. Thus, comprehensive and/or targeted longitudinal studies are also needed to compliment these larger population-based studies. These more focused studies should still aim to randomly select their sample from the population of interest when possible. This targeted approach will also be needed to complement the CHSCY because children and youth living on "First Nation reserves and other Aboriginal settlements in the provinces" were excluded from the study population. This is a significant omission given that the "pandemic has not only added to the social and educational inequities among young people, but it has also exacerbated the racial injustices with which racialized and Indigenous youth must contend."<sup>33</sup>

## UNDERSTANDING AND PLANNING FOR MENTAL HEALTH SERVICES

Good science takes time and investment. Unfortunately, many researchers have not had time to mount good longitudinal studies during the pandemic because we were unprepared for this global event. The dearth of knowledge about how Canadian children are coping during the pandemic signals what our priorities are in Canada; after all, we measure what we value, and we value what we measure. To date, we have not measured the mental health of *all* Canadian children and youth using a longitudinal approach. This is a notable miss. According to Vaillancourt et al.,<sup>34</sup> Canada is failing when it comes to the mental wellbeing of children and youth in part because we have no longitudinal population-based data on them. This gap in knowledge is problematic. How can we engage in evidence-based practice if we do not know what Canadian children and youth have gone through? Moreover, how can we be prepared for another disaster if we do not prioritize the continuous assessment of their wellbeing? These concerns were addressed in a recent commentary by Kurdyak and Patten,<sup>35</sup> who argued that the current dearth of information on mental health burden and associated need for services in relation to the pandemic hampers policy makers' and planners' ability to "meaningfully respond to increased need [for services] if it exists."<sup>35</sup>

In sum, it is important that medical and graduate students, who are consumers of research, recognize that the current quality of COVID-19 research does not often meet the minimum standard to pass the peer-review process (*see Table 1*). Moreover, although routinely done, most COVID-19 studies cannot comment on mental health changes in children and youth because longitudinal data were not used. Nevertheless, decisions about the welfare of children and youth are being made using an incomplete, and at times, a faulty knowledge base. Now more than ever, consumers of scientific information need to be vigilant and exercise critical thinking when assessing research on how COVID-19 has purportedly impacted the mental health and functioning of children and youth. We are hopeful that more researchers, and students as upcoming scientists, will attend to rigor in the development (and assessment) of longitudinal studies through the careful attention to ethics, methodology, sample selection, generalizability, selected statistical analyses, and implications, while

also acknowledging the limitations of their study designs. Students, researchers, and physicians alike can also advocate for the continuation of well-designed Canadian studies, like the CHSCY. Only then, will we better understand the impact of the COVID-19 pandemic on specific groups of children and youth and under what conditions. This knowledge will in turn enhance our ability to make evidence-based decisions on their mental health and the services they require.

**Table 1: Factors to Consider when Assessing the Quality of Studies Examining Change**

1. How many assessments were included and do the intervals between assessments adequately capture change and developmental norms? Non-linear change cannot be assessed with three time points. Moreover, inadequate spacing between assessments (i.e., high stability) can obscure the ability to detect cross-lagged associations.
2. Are the measures used psychometrically sound? Of particular importance when examining change, measures need to be invariant across different groups and across time.
3. Are baseline assessments included? Examining change, especially in the context of the pandemic, requires appropriate baseline assessments.
4. Is the sample randomly drawn? If not, generalizability is challenged.
5. How is attrition managed and what is the level of attrition? Attrition is often systematic and can impact generalizability, especially when not managed statistically.
6. Is the sample size adequate? An appropriate sample size needs to be established formally with suitable power analyses and re-assessed in relation to attrition.
7. Were moderators and mediators examined? Processes and mechanisms should not be discussed in the absence of a formal examination of moderators and mediators.
8. Does the analytic approach match the research question? The examination of heterogeneity requires person-centered approaches, while temporal priority requires variable-centered approaches that ideally account for within- and between-person change.
9. Are the inferences drawn in the discussion consistent with the results? All results should be discussed, even null findings, and study limitations must be clearly articulated.
10. Was the study peer-reviewed? Studies must be assessed by expert reviewers as a quality assurance measure.

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