

## Article

# The Role of Online Schooling, Screen-Based Activities, and Parent Coping in Canadian Children's COVID-19-Related Trauma and Anxiety Symptoms

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**Abstract:** This study investigated the effects of online schooling and screen-based activities on Canadian children's COVID-19-related trauma and generalized anxiety symptoms and how parents' coping strategies influenced these associations. The participants were 121 Canadian children aged from 7 to 12. Parents were asked to report on their children's school attendance, screen-based activities, and trauma and generalized anxiety symptoms, as well as their own coping strategies during the COVID-19 pandemic. Online schooling was associated with less trauma and generalized anxiety symptoms in children than school non-attendance. Screen-based activities were not directly associated with children's trauma and anxiety symptoms, but the way parents coped with pandemic stressors moderated these associations. Parents' active and adaptive coping strategies mitigated the effects of school non-attendance and increased screen-based activity use on children's COVID-19-related symptoms. The findings not only highlight the detrimental effects of complete school closures, but they also underscore the importance of better equipping parents to cope with pandemic stressors. The findings also suggest that virtual school attendance might have similar benefits to in-person attendance, as it appears to protect against adverse mental health outcomes.

**Keywords:** anxiety; trauma; COVID-19 pandemic; online schooling; screen-based activities; parent coping



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## 1. Introduction

During the first wave of the coronavirus disease (COVID-19) pandemic in early 2020, strict precautionary measures were implemented in several countries, including Canada, many of which required families to quarantine in their homes for months [1–3]. While these measures were evidently used to protect individuals from spreading COVID-19, many parents expressed concerns regarding how an extended quarantine would have an impact on their children's mental health [4]. These concerns were not unfounded, as evidence suggests that children who quarantine during health crises tend to display higher levels of acute stress and trauma than children who do not [5]. Moreover, studies suggest that children who experience health crises such as epidemics and natural disasters suffer from greater stress and trauma than adults, since they have not yet fully developed adaptive coping strategies [6,7]. The COVID-19 pandemic and its restrictions have also led to increased trauma symptoms such as watchfulness, sleep disturbances, and avoidance and generalized anxiety symptoms such as excessive worries in children [8–10]. Trauma and generalized anxiety symptoms seem to be attributable to the nature of the pandemic, as it is an unpredictable and scary situation where children can worry about their own and their family members' safety but also about the precautionary measures such as home

confinement, deferred back-to-school, and lifestyle changes [10]. Therefore, it is essential to have a better understanding of factors that can be associated with COVID-19-related anxiety and trauma symptoms in children.

During the first COVID-19 lockdown, home confinement engendered significant changes in children's lives [8]. First, schools were closed all over the world, including in Canada, because of inherent risks in terms of disease transmission. This resulted in children either attending school virtually or not attending school at all [1–3]. This was concerning, as school attendance appears to be protective against adverse mental health outcomes in children. For example, chronic school absenteeism is associated with higher rates of anxiety, loneliness, and sadness in children [11]. Moreover, emotional support received at school contributes to children's development of resilience, while positive interactions with peers and teachers are protective factors against psychopathology [12,13]. However, it is unclear whether online schooling is associated with similar benefits when compared to in-person school attendance. Given that the COVID-19 pandemic has led a significant proportion of children to virtually attend school in Canada, it is important that we gain a better understanding of how this shift has affected their mental health.

Second, during home confinement, children are believed to have spent increased time on screen-based activities [14,15]. It has been argued that children's exposure to these activities can be beneficial for reducing stress, connecting with others, and increasing physical activity (i.e., exergames) [16,17]. On the other hand, increased exposure to screen-based activities can amplify anxiety, sleep problems, and trauma symptoms. For instance, children who play video games frequently are more likely to develop anxiety and sleep problems than other children [18,19]. Indeed, these children seem to experience worries and lack of sleep because of the frequent exposure to light and stimulation, especially when playing video games at night. Moreover, social media platforms and news stations can spread rumors and misinformation, which can exacerbate fear and worries in children, especially during health crises [20–22]. Furthermore, Duan and colleagues [8] found that around 30% of their youth sample was at risk of smartphone and Internet addictions during the COVID-19 pandemic, which are both associated with depression and anxiety. Therefore, it is unclear whether parents should limit their children's access to screen-based activities or if some screen time can alleviate psychological difficulties.

Another important factor to consider is the effect of parents' behavior on children's mental health problems during the COVID-19 pandemic. It has been suggested that parents' inability to cope with stressors (e.g., financial, emotional, and social losses) can exacerbate the anxiety-inducing and potentially traumatic nature of the pandemic for children [23]. Indeed, parents who rely on unhelpful or maladaptive coping strategies such as avoidance, denial, and substance use are more likely to have children developing distress and post-traumatic stress disorder (PTSD) [8]. For example, following Hurricane Katrina in the United States, parents' maladaptive coping predicted children's development of PTSD [24]. Conversely, some evidence suggests that parents' use of active and adaptive coping such as acceptance and planning helped children's mental health adjustment post-disaster [25]. It has also been suggested that parents could have a positive influence by facilitating online schooling and by modeling the effective use of screen-based activities such as finding fact-based information and entertainment [10]. Given these findings, it is important to consider how parent coping strategies influence children's mental health symptoms during the COVID-19 pandemic.

### *The Present Study*

The first objective of this study was to investigate whether virtual school attendance and screen-based activities influenced children's generalized anxiety and trauma symptoms during the first COVID-19 lockdown, while controlling for child ethnicity, household annual income, and parental education. We hypothesized that children who did not attend school would exhibit more symptoms of generalized anxiety and trauma than children who were virtually attending school, as online schooling could have benefits similar to

in-person school attendance. It was also predicted that children spending increased time on screen-based activities would exhibit more generalized anxiety and trauma symptoms than others, as evidence suggests that frequent screen-based activity is associated with children's psychopathology. The second objective was to examine the unique and moderating role of parent coping strategies in the previous associations, while controlling for child ethnicity, household annual income, and parental education. Specifically, we predicted that parents' maladaptive coping would be associated with generalized anxiety and trauma symptoms in children. Moreover, parents' adaptive and active coping strategies would weaken the associations between children's school non-attendance or increased screen-based activities use and generalized anxiety and trauma symptoms. As an exploratory objective, age and gender differences were investigated.

## 2. Materials and Methods

### 2.1. Sample

The sample comprised 121 Canadian children (boys = 70; girls = 60) aged between 7 and 12 ( $M = 9.02$ ) from 97 families. Parents were recruited to complete an online survey regarding their children's and their own mental health during the first wave of the COVID-19 pandemic. Recruitment took place on social media platforms (e.g., Facebook), in Canadian journal ads, and through email threads between June and July 2020.

### 2.2. Procedure and Ethical Considerations

This study was approved by the University of Ottawa Office of Research Ethics and Integrity (#H-05-20-5756). Informed written consent was appropriately obtained before completion of the online survey. All instruments were administered in either English or French, depending on the preference of the parent. On average, participants completed the quantitative online survey in less than 25 min.

### 2.3. Measures

#### 2.3.1. Generalized Anxiety Symptoms

Children's generalized anxiety symptoms were measured using four items ("This child worries about things", "This child worries that something awful will happen to someone in our family", "This child worries that something bad will happen to him/her", and "This child can't seem to get bad or silly thoughts out of his/her head") of the parent-reported Spence Child's Anxiety Scale, Short Version [26]. Parents rated each item on a 4-point scale ranging from 1 (never) to 4 (always), and the results were summed to yield a global generalized anxiety symptom score ( $M = 6.5$ ,  $SD = 3.2$ ,  $\alpha = 0.76$ ).

#### 2.3.2. School Attendance

Parents were asked if their children were attending school in person, virtually, or not at all in the last month. In the initial sample, 9 children attended school in person, 73 attended school virtually, and 48 were not attending school at all. Given that the "in-person attendance" group was too small ( $n = 9$ ) to perform meaningful statistical comparisons to the "virtual attendance group", it was removed from the analyses, yielding a dichotomous score of school attendance (0 = virtual school attendance and 1 = no school attendance).

#### 2.3.3. Parent Coping

Parent coping was measured using the Brief COPE questionnaire [27], which assessed 14 coping strategies. Parents were asked to rate, on a 4-point scale ranging from 1 (never) to 4 (always), their use of each coping strategy since they found out about the COVID-19 pandemic: acceptance ("I've been learning to live with it"), active coping ("I've been taking action to try to make the situation better"), behavioral disengagement ("I've been giving up trying to deal with it"), denial ("I've been refusing to believe that it is happening"), humor ("I've been making fun of the situation"), planning ("I've been trying to come up with a strategy about what to do"), positive reframing ("I've been looking for something

good in what is happening”), religion (“I’ve been trying to find comfort in my religion or spiritual beliefs”), self-blame (“I’ve been blaming myself for things that are happening”), self-distraction (“I’ve been turning to work or other activities to take my mind off things”), substance use (“I’ve been using alcohol or drugs to help me get through it”), use of emotional support (“I’ve been getting emotional support from others”), use of instrumental support (“I’ve been getting help and advice from other people”), and venting (“I’ve been expressing my negative feelings”). Each coping strategy was assessed separately as suggested by Carver [27].

#### 2.3.4. Screen-Based Activities

Screen-based activities were measured using parent reports of the daily number of hours children spent on (a) TV, movies and videos; (b) social media; and (c) video/online games. The three types of activities were averaged to yield a global score of screen-based activities ( $M = 1.8$ ,  $SD = 1.3$ ). Parents were also asked if their children’s use of screen-based activities increased, decreased, or stayed the same when compared to their average use before the COVID-19 pandemic.

#### 2.3.5. Trauma Symptoms

Children’s trauma symptoms were measured using eight items deemed observable by parents from the Children’s Revised Impact of Event Scale [28]. For example, parents were asked if, since the COVID-19 pandemic lockdown, they noticed the child would “startle more easily or feel more nervous than he/she did before” and “get alert and watchful even when there is no obvious need to be”. The items were rated on a 4-point scale ranging from 1 (never) to 4 (always) and were summed to yield a global trauma symptom score ( $M = 13.0$ ,  $SD = 3.6$ ,  $\alpha = 0.78$ ).

#### 2.4. Plan of Analyses

Analyses were conducted using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics were computed on the characteristics of the sample and on the frequency of children’s screen-based activities during the first wave of the COVID-19 pandemic. Then, as preliminary analyses, Pearson correlations (for child-level variables) and multilevel regression analyses (for family-level variables) were performed to assess associations between study variables. We were unable to run classical analyses for family variables because some parents responded on behalf of more than one child and this violated the assumption of data independence (i.e., siblings are similar to one another). This issue was resolved by conducting multilevel regressions using generalized estimating equations (GEE).

The main analyses consisted of four sets of multilevel regression analyses using GEE. In each set of analyses, the first model tested was an unconditional model (i.e., without any predictor), which provided preliminary information about the model fit. In the second model, child gender and age, control variables (i.e., child ethnicity, household annual income, and parental education) and main predictors (i.e., child school attendance or screen-based activities) were added to predict children’s trauma (or generalized anxiety) symptoms. In the third model, each coping strategy (e.g., parent active coping) and two-way interaction terms (e.g., parent active coping  $\times$  child school attendance) were added separately per predictor to test whether each coping strategy would predict or moderate the associations between the predictors and children’s mental health symptoms. In the fourth model, two-way and three-way interaction terms between child gender (or age), the predictors, and each coping strategy (e.g., child gender  $\times$  child school attendance  $\times$  parent active coping) were added separately to test the moderating effect of child gender (or age) in the associations between children’s school attendance (or screen-based activities) and mental health symptoms. In order to illustrate significant interaction effects, the association between the predictors and the dependent variables was examined in different cases: when either one or both moderators were at high levels (1SD above the mean) or when gender

was coded “boys = 0”, and when either one or both moderators were at low levels (1SD below the mean) or when gender was coded “girls = 1”. Supplemental analyses were conducted when significant results emerged regarding screen-based activities to investigate the specific nature of the effects.

Each model was compared to the preceding one to evaluate whether the inclusion of additional predictors provided a better fit to the data. Goodness of fit was evaluated based on the Quasi-likelihood under independence model criterion (QIC). While this fit index does not allow formal model comparisons, it can be used as a guideline for model selection, with lower values indicating a better overall model fit [29]. All variables except child sex were z-standardized prior to the analyses to facilitate interpretation of effect sizes. An average of 7.21% (range = 2.3–9%) of the data were missing for the variables included in the study. Little’s Test of Missing Completely at Random (MCAR) indicated that the data were missing completely at random,  $\chi^2(87) = 107.91, p = 0.06$ . Missing data at the item level were imputed using the Estimation Maximization algorithm with 25 iterations.

### 3. Results

#### 3.1. Descriptive Statistics: Sample Characteristics

The descriptive statistics indicate that 69.2% of the sample lived in Ontario, 20.3% in Quebec, 2.3% in Alberta, less than 1% in Nova Scotia and in Newfoundland, and the remaining 6.8% did not indicate in which Canadian province they resided. In the sample, 73.6% of parents indicated that their children were White, 12.4% were mixed race, 4.7% were Black, 3.1% were Asian, 3.1% were Latino/a, and the remainder (3.1%) identified as other ethnicities. Most respondents were biological mothers (86.2%), 10.8% were biological fathers, 2.3% were stepmothers, and 1 respondent was the legal guardian. Most children (83.8%) lived with the parent respondent on a full-time basis, whereas 16.4% of the sample lived in shared custody. In 58.2% of the samples, the respondent was married, while 17.3% were in a common-law partnership, 9.2% were divorced, 8.2% were single, and the remaining 7.1% did not indicate their relationship status. Most of the parents (36.8%) reported having over CAD 120,000 as their annual household income, 30.6% reported CAD 80,000–119,999, 11.2% reported CAD 60,000–79,000, 5.1% reported CAD 40,000–59,999, 6.1% reported less than CAD 39,999, and 10.2% did not indicate their annual income. Most parents had a college diploma (30.6%), 5.1% a doctoral degree, 18.4% a master’s degree, 29.6% a bachelor’s degree, 5.1% a university certificate, 2% a high school diploma, 1% finished elementary school, and 8.2% did not indicate their level of education.

#### 3.2. Descriptive Statistics: Children’s Screen-Based Activities Use

Most parents (84.7%) reported that their children’s use of screen-based activities increased during the first wave of the COVID-19 pandemic when compared to their children’s average use before the pandemic. Of the remaining parents, 13.7% reported the same frequency and 1.6% reported a decrease in frequency. Watching TV, movies, and videos was the most frequent form (in hours/day) of screen-based activity ( $M = 2.47, SD = 1.62$ ), followed by online and video games ( $M = 2.04, SD = 1.77$ ), and social media ( $M = 0.89, SD = 1.97$ ).

#### 3.3. Preliminary Analyses

The Pearson correlations for child-level variables and multilevel regression coefficients for family-level variables are presented in Table 1. There was a significant association between gender and age; the boys in our sample were older than the girls. Age and screen-based activities were also related; older children spent more hours on screen-based activities than younger children. Screen-based activities were positively correlated with children’s trauma, while school non-attendance was associated with higher scores of trauma and generalized anxiety symptoms. Parents with lower education reported more frequently that their children were not attending school and had generalized anxiety symptoms. Lower levels of parental education and income were associated with higher

levels of screen-based activities and trauma in children. Coping strategies are not shown in Table 1 for parsimony but were not strongly correlated with other predictors, i.e., with school attendance ( $r_s$  range = 0.04–0.24) and screen-based activities ( $r_s$  range = 0.02–0.18).

**Table 1.** Bivariate correlations and multilevel regression coefficients for child- and family-level variables.

Variables	1	2	3	4	5	6	7	8	9
1. Gender	-	-0.19 * [-0.35, -0.01]	0.12 [-0.04, 0.29]	0.13 [-0.05, 0.29]	0.03 [-0.16, 0.19]	0.16 [-0.03, 0.33]	0.08 [-0.09, 0.24]	0.17 [-0.50, 0.85]	0.18 [-0.31, 0.67]
2. Age		-	0.04 [-0.14, 0.21]	-0.10 [-0.26, 0.09]	0.26 ** [0.08, 0.44]	0.08 [-0.11, 0.25]	-0.03 [-0.20, 0.17]	-0.04 [-0.24, 0.15]	-0.08 [-0.20, 0.05]
3. Ethnicity			-	0.04 [-0.14, 0.22]	-0.02 [-0.15, 0.15]	-0.03 [-0.22, 0.17]	0.14 [-0.04, 0.31]	0.02 [-0.07, 0.10]	0.00 [-0.06, 0.06]
4. School attendance				-	0.09 [-0.09, 0.27]	0.22 * [0.04, 0.40]	0.29 ** [0.13, 0.45]	-0.12 [-0.94, 0.69]	-0.89 ** [-10.42, -0.37]
5. Screen-based activities					-	0.22 * [0.02, 0.42]	-0.02 [-0.16, 0.14]	-0.36 * [-0.65, -0.07]	-0.39 * [-0.62, -0.17]
6. Trauma						-	0.17 [-0.04, 0.35]	-0.55 ** [-0.88, -0.21]	-0.26 * [-0.52, 0.00]
7. Generalized anxiety							-	0.06 [-0.30, 0.41]	-0.43 ** [-0.68, -0.18]
8. Household income								-	0.38 * [0.27, 0.49]
9. Parental education									-

Note. N = 121 children. N = 97 families. 95% confidence intervals are presented in brackets. Gender was coded as 0 = boys, 1 = girls. School attendance was coded as 0 = virtually attending, 1 = not attending. \*  $p < 0.05$ , \*\*  $p < 0.01$ , two-tailed.

### 3.4. Main Analyses: Associations Between School Attendance, Parent Coping, and Children's Trauma

The first step was the unconditional model (i.e., without any predictor) to provide a model fit index (QIC = 110.90). In the second model, household income ( $b = -0.16$ ,  $SE = 0.06$ ,  $p = 0.01$ ) and school attendance ( $b = -0.47$ ,  $SE = 0.12$ ,  $p = 0.02$ ) were associated with trauma. Hence, children of families with higher income and children virtually attending school displayed less trauma than others did. Inclusion of these predictors resulted in a better model fit compared to the previous model, as the model fit index decreased (QIC = 108.51). In the third model, the two-way interaction effect of "school attendance \* emotional support" was significant ( $b = 0.44$ ,  $SE = 0.20$ ,  $p = 0.03$ ; QIC = 107.89). Specifically, when parents rarely sought emotional support as a coping strategy, school non-attendance was associated with more trauma symptoms in children ( $b = 0.82$ ,  $SE = 0.28$ ,  $p = 0.003$ ). However, when parents often sought emotional support, school attendance was not associated with trauma ( $b = -0.05$ ,  $SE = 0.27$ ,  $p = 0.85$ ). The two-way interaction effect "school attendance \* denial" was also significant ( $b = -0.32$ ,  $SE = 0.13$ ,  $p = 0.02$ ; QIC = 98.12). Specifically, when parents rarely relied on denial as a coping strategy, school non-attendance was not associated with children's trauma symptoms ( $b = 0.16$ ,  $SE = 0.24$ ,  $p = 0.05$ ). However, when parents often relied on denial as a coping strategy, school non-attendance was associated with more trauma symptoms in children ( $b = 0.81$ ,  $SE = 0.19$ ,  $p < 0.001$ ). Parents' substance use was also associated with more child trauma symptoms ( $b = 0.30$ ,  $SE = 0.09$ ,  $p = 0.001$ ), whereas the use of positive reframing was associated with fewer child trauma symptoms ( $b = -0.17$ ,  $SE = 0.09$ ,  $p = 0.05$ ).

### 3.5. Main Analyses: Associations Between School Attendance, Parent Coping, and Children's Generalized Anxiety

The first step was the unconditional model (i.e., without any predictor; QIC = 116.90). In the second model, school attendance ( $b = -0.47$ ,  $SE = 0.21$ ,  $p = 0.02$ ) and parental education ( $b = -0.24$ ,  $SE = 0.09$ ,  $p = 0.01$ ) were negatively associated with generalized anxiety. Specifically, children who attended school virtually and who had parents with

higher education levels displayed less generalized anxiety symptoms than others did. Inclusion of these predictors resulted in a better model fit when compared to the previous model (QIC = 108.42). In the third model, the two-way interaction effect of “school attendance \* behavioral disengagement” was significant ( $b = -0.36$ ,  $SE = 0.17$ ,  $p = 0.04$ ; QIC = 108.31). Specifically, when parents often relied on behavioral disengagement as a coping strategy, school non-attendance was associated with more generalized anxiety symptoms in children ( $b = 0.76$ ,  $SE = 0.27$ ,  $p < 0.01$ ). However, when parents rarely relied on behavioral disengagement, school non-attendance was not associated with children’s generalized anxiety symptoms ( $b = 0.05$ ,  $SE = 0.25$ ,  $p = 0.85$ ). The two-way interaction effect of “school attendance \* religion” was also significant ( $b = 0.41$ ,  $SE = 0.12$ ,  $p = 0.04$ ; QIC = 108.84). Specifically, when parents often relied on religion or spiritual beliefs as a coping strategy, school non-attendance was not associated with children’s generalized anxiety symptoms ( $b = 0.03$ ,  $SE = 0.28$ ,  $p = 0.92$ ). However, when parents rarely relied on religion or spiritual beliefs, school non-attendance was associated with more generalized anxiety symptoms in children ( $b = 0.85$ ,  $SE = 0.28$ ,  $p = 0.002$ ).

### 3.6. Main Analyses: Associations Between Screen-Based Activities, Parent Coping, and Children’s Trauma

The first step was the unconditional model (i.e., without any predictor; QIC = 110.90). In the second model, household income ( $b = -0.13$ ,  $SE = 0.05$ ,  $p = 0.02$ ) was associated with children’s trauma. Specifically, children from families with higher income had fewer trauma symptoms than others did. However, inclusion of these predictors did not result in a better model fit when compared to the previous model (QIC = 112.88). In the third model, the two-way interaction effect of “screen-based activities × positive reframing” was significant ( $b = -0.15$ ,  $SE = 0.06$ ,  $p = 0.01$ ; QIC = 110.27). Specifically, when parents rarely relied on positive reframing as a coping strategy, social media use was associated with more trauma symptoms in children ( $b = 0.25$ ,  $SE = 0.08$ ,  $p = 0.001$ ). However, when parents often relied on positive reframing, screen-based activities were not associated with children’s trauma symptoms ( $b = -0.10$ ,  $SE = 0.09$ ,  $p = 0.31$ ). The two-way interaction effect of “screen-based activities \* venting” was also significant ( $b = 0.19$ ,  $SE = 0.10$ ,  $p = 0.06$ ; QIC = 114.75). Specifically, when parents often relied on venting as a coping strategy, social media use ( $b = 0.21$ ,  $SE = 0.09$ ,  $p = 0.03$ ) and watching TV and movies ( $b = 0.24$ ,  $SE = 0.12$ ,  $p = 0.05$ ) were associated with more trauma symptoms in children. However, when parents rarely relied on venting, screen-based activities were not associated with children’s trauma symptoms ( $b = -0.03$ ,  $SE = 0.16$ ,  $p = 0.87$ ). Parent’s behavioral disengagement ( $b = 0.30$ ,  $SE = 0.13$ ,  $p = 0.01$ ), denial ( $b = 0.27$ ,  $SE = 0.11$ ,  $p = 0.01$ ), substance use ( $b = 0.26$ ,  $SE = 0.12$ ,  $p = 0.02$ ), and self-blame ( $b = 0.39$ ,  $SE = 0.10$ ,  $p < 0.001$ ) as coping strategies were also associated with increased trauma symptoms in children. In the fourth model, the three-way interaction term “screen-based activities \* self-distraction × gender” was significant ( $b = 0.56$ ,  $SE = 0.23$ ,  $p = 0.01$ , QIC = 111.70). Supplemental analyses revealed that more frequent video game playing was associated with more trauma symptoms, but only in boys who had parents who often used self-distraction as a coping strategy ( $b = 0.21$ ,  $SE = 0.10$ ,  $p = 0.03$ ).

### 3.7. Main Analyses: Associations Between Screen-Based Activities, Parent Coping, and Children’s Generalized Anxiety

The first step was the unconditional model (i.e., without any predictor; QIC = 116.90). In the second model, household income ( $b = 0.13$ ,  $SE = 0.06$ ,  $p = 0.02$ ) and parental education ( $b = -0.33$ ,  $SE = 0.08$ ,  $p < 0.001$ ) were associated with generalized anxiety symptoms in children. Specifically, children with parents who were less educated and had higher income displayed more generalized anxiety symptoms than other children. Inclusion of these predictors resulted in a better model fit when compared to the previous model (QIC = 111.20). In the third model, parents’ reliance on planning as a coping strategy was associated with fewer generalized anxiety symptoms in children ( $b = -0.19$ ,  $SE = 0.10$ ,  $p = 0.04$ ). In the fourth step, the three-way interaction term “screen-based activities × venting × age” was significant ( $b = 0.11$ ,  $SE = 0.04$ ,  $p = 0.003$ , QIC = 114.20). Supplemental

analyses revealed that watching TV and movies was associated with more generalized anxiety symptoms in older children ( $b = 0.89$ ,  $SE = 0.42$ ,  $p = 0.04$ ). This association was even stronger in younger children ( $b = 1.51$ ,  $SE = 0.66$ ,  $p = 0.02$ ) whose parents often relied on venting as a coping strategy. The three-way interaction effect of “screen-based activities  $\times$  acceptance  $\times$  gender” was also significant ( $b = 0.34$ ,  $SE = 0.17$ ,  $p = 0.05$ ,  $QIC = 113.97$ ). Supplemental analyses revealed that social media use was associated with fewer generalized anxiety symptoms, but only in girls whose parents often relied on acceptance as a coping strategy ( $b = -0.69$ ,  $SE = 0.27$ ,  $p = 0.01$ ).

#### 4. Discussion

The preliminary analyses suggest that children from disadvantaged families (i.e., parents with less education and lower income) are more likely to use screen-based activities, not attend school, and display greater generalized anxiety and trauma symptoms than others. Children from these families may spend more time on screen-based activities because parents that are struggling financially may have difficulties in effectively balancing their personal and working life, leading to an overreliance on screen-based activities to keep their children occupied [30,31]. These children might also have less access to resources and adequate space at home for remote learning, which can put them at risk for both school non-attendance and mental health problems [32].

Confirming our first hypothesis, school non-attendance was associated with children’s trauma and generalized anxiety symptoms. These results are in line with a systematic review, which suggests that complete school closures create a significant risk for mental health problems as children lose a safe, supportive, and structured environment [33]. Our study provides novel findings and suggests that online schooling could be as protective as in-person attendance as it also alleviates significant risk factors associated with home confinement, including lack of social interactions and daily routine. However, there seems to be significant variability in the quality of online school programs. Indeed, few programs contain components such as student activities and group sessions that foster motivation and engagement, which may, in turn, reduce internalizing symptoms in students [34]. Future studies are needed to measure the effectiveness of different forms of online schooling and their effects on children’s mental health symptoms.

Contrary to our hypothesis, screen-based activities were not directly associated with children’s generalized anxiety and trauma symptoms. These results are encouraging, since the frequency of screen-based activities increased in the vast majority of the children in our sample (i.e., around 85%). During the first COVID-19 pandemic lockdown in Canada, children spent significant time at home. It is, therefore, not surprising that children’s use of screen-based activities significantly increased as they were accessible, could palliate for in-person social interactions with peers and extended family, and were essential for online education [30]. However, our results suggest that the way parents coped with pandemic stressors played a significant role in determining how screen-based activities influenced children’s mental health symptoms. Depending on the coping strategies used by parents, screen-based activities were either a tool for children to deal with social isolation, boredom, and distress, or they exacerbated children’s worries [17,20]. Other moderators worthy of future investigation include screen-based activity content (e.g., competitive or violent video games, nightly news or cartoons, etc.), parental supervision, and the reason for engaging in screen-based activities (e.g., distraction, entertainment, education, and socialization).

In line with our hypotheses, parents’ use of maladaptive (i.e., self-blame and venting) and avoidant strategies (i.e., substance use, behavioral disengagement, and denial) had a deleterious effect on children’s trauma symptoms. Parents who model these strategies seem to negatively affect their children’s ability to resolve traumatic experiences. This may be because they do not provide a safe space for children to express their feelings and difficulties [35]. Parents’ avoidant and maladaptive coping strategies (i.e., behavioral disengagement and venting) were also associated with children’s generalized anxiety symptoms. Parents’ disengagement may decrease children’s perceived controllability over

situations, especially in the context of the COVID-19 pandemic, and, consequently, increase their anxiety symptoms [36]. This was especially true for children not attending school, as they might be more exposed to their parents' daily stress and maladaptive coping strategies. Parents' venting also intensified generalized anxiety symptoms, especially in children who were frequently watching TV, movies and videos. Parents with a propensity to vent may frequently watch and talk about COVID-19 related news, which could increase their children's anxiety symptoms, especially during catastrophic events [22,23,37].

On the other hand, parents' active and adaptive coping strategies (e.g., planning and emotional support use) were associated with fewer mental health symptoms in children. Evidence suggests that active coping leads to perceived control over a situation and to an increased focus on potential solutions instead of the problems [38]. Moreover, parents' use of positive reframing, another active strategy, weakened the association between children's use of social media and trauma. Parents who use positive reframing may model effective and beneficial screen-based activity use in their children. Parents' reliance on religion and spiritual beliefs as an adaptive coping strategy was also associated with fewer anxiety symptoms in children. This is in line with prior findings, as religious and spiritual involvement has been associated with a greater sense of meaning, which, in turn, predicts better mental health outcomes in children, especially during stressful circumstances [39,40].

Finally, there were some significant gender differences in the findings regarding the associations between screen-based activities, parent coping, and children's mental health symptoms. Parents' use of self-distraction exacerbated the association between video gaming and trauma symptoms in boys, while parents' acceptance mitigated the association between social media use and anxiety in girls. These results are consistent with prior studies, as video gaming is a common avoidance strategy for boys during stressful events [41], whereas girls are especially susceptible to negative influences through social media [42].

## 5. Conclusions

This study has several limitations that need to be considered. First, due to the cross-sectional and correlational design, this study cannot ascertain the directionality of the results; there were no pre-pandemic data available to measure direct effects. Therefore, we cannot comment on the causal links between the variables of interest. Second, single items were used for parent coping strategies, which can impact the instrument validity. Third, the study relied exclusively on parent reports (i.e., questionnaires completed by one parent), which may have increased the risk of measurement error. Future studies would benefit from obtaining self-report data on internalized symptoms directly from children, as there may be important differences between parents' and children's perceptions. Moreover, having both parents' perceptions would be more informative. Finally, our sample size was relatively small and unbalanced, which limits the generalizability of our findings and the external validity. Future research should try to replicate previous results using experimental and longitudinal designs with larger and more diverse samples. The results should, therefore, be interpreted with caution and warrant further study.

Despite these limitations, the results suggest that online schooling can provide support for children during health crises and that adaptive parent coping is central in mitigating the effects of school non-attendance and screen-based activities on children's trauma and generalized anxiety symptoms. These findings highlight not only the importance of monitoring mental health symptoms associated with home confinement, but they also encourage clinicians and knowledge mobilization efforts to focus on better equipping parents to cope with pandemic stressors (especially disadvantaged families). The findings also highlight the detrimental effects of completely closing schools. Although longitudinal and multi-informant studies are needed, the present study suggests that virtual school attendance might have similar benefits to in-person attendance as it seems to protect children against adverse mental health outcomes. When in-person school attendance is not

safe (e.g., in a health crisis), virtual attendance should be considered instead of complete school closures.

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