RESEARCH ARTICLE

Children's Mental Health in Southwestern Ontario during Summer 2020 of the COVID-19 Pandemic

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Abstract

Objective: COVID-19 presents an unprecedented global crisis. Research is critically needed to identify the impact of the pandemic on children's mental health including psychosocial factors that predict resilience, recovery, and persistent distress. The present study collected data in June-July 2020 to describe children's mental health during the initial phase of the pandemic, including the magnitude and nature of psychiatric and psychological distress in children, and to evaluate social support as a putative psychosocial moderator of children's increased distress. **Method:** Children and parents from 190 families of children aged 8 to 13 from the Windsor-Essex region of Southwestern Ontario reported (i) retrospectively on children's well-being (e.g., worry, happiness) immediately prior to the pandemic and (ii) on children's current well-being; irritability; social support; and anxiety, depressive, and posttraumatic stress symptoms at the baseline assessment of an ongoing longitudinal study of the COVID-19 pandemic. **Results:** Children and parents reported worsened well-being and psychological distress during the pandemic compared to retrospective report of pre-pandemic well-being. Child-perceived social support from family and friends was associated with lower symptom severity and attenuated increase in psychological distress. **Conclusions:** Study findings suggest possible broad psychological impacts of the COVID-19 pandemic and are consistent with prior research that indicates a protective role of social support to mitigate the negative psychological impact of the pandemic. These findings may inform clinical assessments and highlight the need for public resources to safeguard children's mental health.

Key Words: COVID-19, anxiety, depression, irritability

Résumé

Objectif: La COVID-19 présente une crise mondiale sans précédent. La recherche est essentiellement nécessaire pour identifier l'effet de la pandémie sur la santé mentale des enfants, notamment les facteurs psychosociaux qui prédisent la résilience, le rétablissement, et la détresse persistante. La présente étude a recueilli des données en juin-juillet 2020 afin de décrire la santé mentale des enfants durant la phase initiale de la pandémie, y compris la magnitude et la nature de la détresse psychiatrique et psychologique chez les enfants, et d'évaluer le soutien social comme modérateur psychosocial putatif de la détresse accrue des enfants. **Méthode:** Les enfants et les parents de 190 familles d'enfants de 8 à 13 ans de la région Windsor-Essex du sud-ouest de l'Ontario ont déclaré (i) rétrospectivement sur le bien-être des enfants (p. ex., inquiétude, bonheur) immédiatement avant la pandémie et (ii) sur le bien-être actuel des enfants ; irritabilité; soutien

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social, et symptômes anxieux, dépressifs, et de stress post- traumatique à l'évaluation de base d'une étude longitudinale en cours de la pandémie de la COVID-19. **Résultats:** Enfants et parents ont déclaré un bien-être amoindri et une détresse psychologique durant la pandémie comparativement aux déclarations rétrospectives sur le bien-être pré-pandémique. Le soutien social de la famille et des amis perçu par les enfants était associé à une moins grande gravité des symptômes et atténuait la hausse de la détresse psychologique. **Conclusions:** Les résultats de l'étude suggèrent la possibilité d'effets psychologiques répandus de la pandémie de la COVID-19 et sont conformes à la recherche précédente qui indique le rôle protecteur du soutien social pour atténuer l'effet psychologique négatif de la pandémie. Ces résultats peuvent éclairer les évaluations cliniques et souligner le besoin de ressources publiques pour sauvegarder la santé mentale des enfants.

Mots clés: COVID-19, anxiété, dépression, irritabilité

The SARS-CoV-2 virus produced a global pandemic with wide-reaching effects. Beyond the immediate impact of the virus, the COVID-19 pandemic poses significant risks to mental health that may persist long after the pandemic. Internationally, mental health symptoms (e.g., anxiety, depression, insomnia) may have increased since the virus was declared a global health crisis (Racine et al., 2020; Torales et al., 2020). For example, early reports from China indicate a psychological impact of the outbreak in over half of adults surveyed; 16.5% reported depressive symptoms and 28.8% reported anxiety symptoms (Wang et al., 2020). Among children in grades 2-6 in China during the pandemic, 22.6% and 18.9% reported depressive and anxiety symptoms, respectively, within two months of the start of the provincial quarantine (Xie et al., 2020). The present study aimed to identify the magnitude of the impact of the COVID-19 pandemic on the mental health of children in Southwestern Ontario and to clarify the types of psychological and psychiatric distress children experience during the pandemic.

Previous work indicates that traumatic events, such as hurricanes, can have both acute and long-term effects on the mental health of affected individuals. Although most individuals who are exposed to a traumatic event are affected briefly, a significant number of those exposed develop psychopathology. The most common psychiatric outcome is the development of PTSD; up to a third of exposed individuals may meet criteria for a diagnosis immediately following a crisis (Foa et al., 2006; Galea et al., 2002, 2005; Green et al., 1992; Neria et al., 2008; North & Pfefferbaum, 2013). Traumatic experiences can also precipitate the emergence or worsening of other psychopathology, particularly anxiety and depressive disorders (North & Pfefferbaum, 2013), which are, respectively, the second and third most common mental health sequelae of traumatic events (Green et al., 1992). While psychiatric symptoms naturally subside for most people affected, for many others, PTSD, depressive, and anxiety symptoms can last for months following traumatic experiences and can have long-lasting effects on individuals' lives (Green et al., 1992; Ursano et al., 1995).

While most research on the psychological sequelae of trauma has been conducted with adults, research on prior crises indicates similar or worse outcomes for children whose safety, health, and psychological well-being depend on the safety and well-being of parents and caregivers (Evans & Oehler-Stinnett, 2006; Koplewicz et al., 2002). Consistent with research on the impact on adult mental health, PTSD, depressive episodes, and anxiety disorders are, in order, the most common mental health sequelae of trauma in children (Goldmann & Galea, 2014). Traumatic events may also have distinct acute and long-term impacts on the mental health of children. For example, immediately following a traumatic event, over a quarter of children may meet criteria for a diagnosis of PTSD or another internalizing disorder (Evans & Oehler-Stinnett, 2006; Hoven et al., 2005; Russoniello et al., 2002; Silva et al., 2000). While acute symptoms improve for many children (van Griensven et al., 2006), traumatic experiences can also have long-term effects for others. For example, nine months after the 1993 World Trade Center bombing, 87% of children from the site showed sustained mild to severe PTSD symptoms (Koplewicz et al., 2002).

Children are also vulnerable to stressful events and distressing experiences in childhood (Pine & Fox, 2015). Beyond traumatic experiences, broadly defined stressful life events are associated with increased emergence of myriad psychiatric disorders in childhood (e.g., Luby et al., 2006) and adulthood (e.g., Fergusson et al., 2011; Kendler et al., 1998). Childhood also presents a series of sensitive developmental periods for psychosocial (e.g., Bagner et al., 2010; Colombo, 1982) and neural development (Romeo, 2017) such that stress may alter child development in ways that persist into adulthood (Fox et al., 2010; Pine & Fox, 2015; Thompson, 2014). Therefore, children may be particularly vulnerable to persistent distress following both stressful events and traumatic experiences. Prior research documents acute and

long-term psychiatric sequelae of several distressing experiences in childhood including, but not limited to, maltreatment (Jaffee, 2017), parental psychopathology (e.g., Goodman et al., 2011), and parental loss (e.g., Agid et al., 1999). Despite secondary associations with depressive and anxiety symptoms, traumatic experiences may precipitate symptoms of PTSD. However, broad stressful events may precipitate a wide range of psychiatric and psychological distress without necessarily producing PTSD symptoms. For example, one study of individuals with major depression and panic disorder found that 35% of participants reported a history of childhood adversity (Young et al., 1997).

The COVID-19 pandemic presents a multisystem challenge to children and families, which influences children's well-being and resilience (Masten & Motti-Stefanidi, 2020). For example, children's dependence on the well-being of caregivers may render children particularly vulnerable in crises (Evans & Oehler-Stinnett, 2006; Koplewicz et al., 2002). The COVID-19 pandemic produced financial insecurity, burden, and stress for adults as well (Vigo et al., 2020), which may, in turn, result in increased stress and worsened outcomes for children (Prime et al., 2020). For example, the pandemic may limit the ability of family and friends to support children, which may act as a buffer to attenuate increased psychological distress following stress (e.g., Cohen & Wills, 1985; Ozbay et al., 2007).

Given children's vulnerability to life stress and traumatic experiences, the impact of the COVID-19 pandemic on the mental health of children is of paramount importance (Courtney et al., 2020; Norris et al., 2002). Given limited prior research on the mental health impacts of a global pandemic, it is unclear whether the COVID-19 pandemic presents a broad life stress or a specific traumatic experience. Based on prior research on stress and trauma, the pandemic may precipitate the emergence and worsening of psychopathology in children. For example, Hawke and colleagues (2020) report that, following the local onset of the COVID-19 pandemic, 39.9% of a community sample of youth aged 14 to 28 reported symptoms consistent with an internalizing disorder: 13.3% and 10.7% reported symptoms consistent with a depressive episode or anxiety disorder, respectively. The nature of the SARS-CoV-2 virus also necessitated public health measures that limited children's access to traditional sources of support in times of crisis (e.g., schools; Fegert et al., 2020). For example, a recent American study reported that 35% of students ages 12-17 receive mental health services through their school (Ali et al., 2019). Thus, school closures may reduce access to mental health services and resources (Golberstein et al., 2020) and disrupt children's lives and routines, which may precipitate psychological distress (Racine et al., 2020). Overall,

the COVID-19 pandemic presents an extraordinary combination of acute risk for psychopathology in children and reduced resources to address the psychological sequelae of this global crisis.

The Present Study

Given the urgent need for empirical data to inform public policy on education and social services for children, to document the perceived acute mental health impact of the pandemic, the present paper summarizes data from baseline assessment of the Southwestern Ontario Children's Mental Health Study, a longitudinal study of the impact of the COVID-19 pandemic on the mental health of children in Southwestern Ontario from June 2020 through October 2021. Specifically, the present study addresses two questions:

1) What is the magnitude and nature of psychological distress that children experience during the pandemic? The present study was designed to clarify whether children are experiencing specifically PTSD-related symptoms consistent with trauma exposure and/or broad symptoms of irritability, depressive, and anxiety syndromes consistent with chronic stress;

2) Do putative psychosocial correlates, such as perceived social support, mitigate the perceived impact of the COVID-19 pandemic on children's mental health? Given extant research on the role of social support to buffer against life stressors (e.g., Cohen & Wills, 1985), the present study sought to evaluate whether the perceived availability of social support from family and friends during the pandemic mitigate its impact on children's psychological distress.

Method

Participant Recruitment

Families were recruited in June and July 2020 from advertisements in local news outlets, social media, and a local school board. From each family, one child and one parent or guardian were recruited to participate in the online study. Inclusion criteria included regular access to the internet to complete study surveys online and sufficient mastery of the English language by both parents/guardians and children to complete study measures in English. There were no explicit exclusion criteria for the study.

Table 1. Descriptive statistics of perceived social support and internalizing symptom severity						
	α		M (SD)		n (%) above threshold [a]	
Measure	Parent	Child	Parent	Child	Parent	Child
SCARED: Total Score [b]	0.96	0.96	19.40 (13.18)	18.76 (14.06)	--	--
SCARED: Generalized Anxiety	0.92	0.93	6.39 (4.56)	5.42 (4.72)	60 (31.58)	36 (22.78)
SCARED: Separation Anxiety	0.88	0.90	4.05 (3.58)	3.96(3.72)	68 (35.79)	54 (34.18)
SCARED: Panic/ Somatization	0.93	0.93	3.68 (4.31)	3.86 (4.50)	37 (19.47)	35 (22.15)
SCARED: Social Anxiety	0.93	0.95	5.30 (3.97)	5.55 (4.39)	52 (27.51)	49 (31.01)
Depressive Symptoms (SMFQ)	0.94	0.95	5.38 (5.21)	4.78 (5.23)	49 (25.93)	40 (25.64)
Irritability (ARI)	0.94	0.92	3.19 (3.11)	2.95 (2.84)	65 (34.39)	80 (50.96)
PTSD Symptom Severity (CPSS-5)	0.93	0.96	10.60 (10.32)	11.86 (13.46)	13 (6.84)	17 (10.89)
Perceived Social Support	--	0.75	--	12.15 (2.70)	--	--

Alpha indexes interitem reliability of the scale or subscale per child or parent report; M(SD) reports on the mean and standard deviation of each scale or subscale per child or parent report. [a] the number and percentage of the sample who completed the given measure above the established threshold for a probable diagnosis (e.g., the threshold of the SMFQ that indicates a probable major depressive episode); thresholds are referenced in the text (see Measures section). [b] SCARED Total Score reflects the total of the four subscales included in the present study; the putative threshold for the SCARED total score includes the school avoidance items. SCARED indicates the Screen for Child Anxiety Related Emotional Disorders; SMFQ indicates the Short version of the Mood and Feelings Questionnaire; ARI indicates the Affective Reactivity Index; CPSS indicates the Child PTSD Symptom Scale.

Design and Procedure

Each family in the study completed or will complete baseline assessment, six monthly follow-up assessments, and one follow-up assessment nine months after baseline assessment; only baseline assessment data are reported in this paper. Each assessment includes child-report and parent/guardian-report about their child, consistent with best practices in child clinical assessment (De Los Reyes et al., 2015) to capture the diverse impact of the pandemic on the child. The study was approved by the University of Windsor Research Ethics Board.

Setting

During data collection in June-July 2020, the Windsor-Essex region averaged 98 infections per day and moved from Stage 1 to 2 of the provincial response plan (Government of Ontario, 2020): schools remained closed, restaurants permitted only outdoor seating, and indoor gatherings of up to ten people were allowed. By the end of July, the Windsor-Essex region had a cumulative total of 2285 cases and 71 deaths (Windsor-Essex County Health Unit, 2020).

Measures

The Screen for Child Anxiety Related Emotional Disorders (SCARED).
Dimensional severity of symptoms of generalized anxiety, separation anxiety, panic/somatization, and social anxiety over the past 2 weeks were assessed through parent- and child-report on the SCARED (Birmaher et al., 1997). Items that assess school avoidance were omitted due to the provincial closure of schools. Prior research supports use of the SCARED to assess anxiety symptom severity in community samples of children aged eight to 18 including disorder-specific thresholds indicative of probable diagnosis (Birmaher et al., 1999). In the present study, interitem reliability estimates were high (see Table 1); anxiety subscales correlated with other measures similarly to prior community samples (see Supplemental Table S1).

The Short Mood and Feelings Questionnaire (SMFQ).
Parents and children rated child depressive symptomatology over the past two weeks on the SMFQ, a subset of the Mood and Feelings Questionnaire (Angold et al., 2005). Prior research supports the SMFQ to assess children aged eight to 16, including a threshold that indicates probable diagnosis of a major depressive episode (Klein et al., 2005). In the present sample, interitem reliability was high (see Table 1); depressive severity correlated with other measures similarly to prior community samples (see Supplemental Table S1).

The Affective Reactivity Index (ARI).
Parents and children rated child irritability over the past two weeks on the ARI: six items rated on the ease and frequency with which the child becomes angry or irritated (Stringaris et al., 2012). Prior research supports use of the ARI to assess children

Table 2. Descriptive statistics for mean psychological distress and distress indices on the CRISIS measure

Item	Child Report			Parent Report About Child		
	Pre-pandemic M (SD)	Current M (SD)	Difference	Pre-pandemic M (SD)	Current M (SD)	Difference
Mean psychological distress	1.00 (0.61)	1.44 (0.80)	t(154)=8.72 +, d=0.70	1.00 (0.60)	1.57 (0.70)	t(186)=10.74 +, d=0.79
Worry	0.84 (0.96)	1.19 (1.14)	t(156)=4.26 +, d=0.34	0.84 (0.99)	1.19 (0.98)	t(189)=4.10 +, d=0.30
Happiness[a]	2.66 (0.98)	2.18 (1.08)	t(157)=-5.55 +, d=0.44	2.90 (0.93)	2.23 (1.00)	t(188)=-8.14 +, d=0.59
Enjoyment[a]	2.81 (1.05)	1.77 (1.18)	t(157)=-8.94 +, d=0.71	2.99 (0.93)	1.73 (0.99)	t(187)=-13.69 +, d=1.00
Felt relaxed[a]	2.58 (1.11)	2.35 (1.22)	t(157)=-2.75 **, d=0.22	2.52 (1.08)	2.25 (1.05)	t(189)=-3.21 **, d=0.23
Restlessness	1.00 (1.01)	1.25 (1.12)	t(157)=3.62 ***, d=0.29	0.92 (1.00)	1.31 (1.10)	t(189)=5.74 +, d=0.42
Fatigue	0.85 (0.95)	1.20 (1.17)	t(156)=4.31 +, d=0.34	0.68 (0.76)	1.16 (1.03)	t(188)=7.05 +, d=0.51
Concentration[a]	2.93 (1.05)	2.56 (1.10)	t(156)=-4.83 +, d=0.38	2.91 (1.09)	2.36 (1.08)	t(189)=-6.60 +, d=0.48
Irritability	1.03 (1.02)	1.41 (1.18)	t(156)=5.10 +, d=0.41	1.11 (0.94)	1.69 (1.05)	t(189)=8.20 +, d=0.60
Loneliness	0.48 (0.83)	1.06 (1.10)	t(157)=7.60 +, d=0.60	0.57 (0.83)	1.46 (1.14)	t(189)=10.91 +, d=0.79
Negative thoughts	0.89 (0.95)	1.12 (1.13)	t(157)=3.84 ***, d=0.31	1.18 (0.90)	1.45 (1.06)	t(189)=3.98 +, d=0.29

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$. + $p < 0.0001$. a indicates that item was reverse scored when computing mean psychological distress. Pre-pandemic and current reports were collected at the same occasion; while both rely on some retrospective report, pre-pandemic ratings rely on retrospective report prior to the COVID-19 pandemic.

aged six to 17 and indicates parent- and child-report thresholds that indicate possible Disruptive Mood Dysregulation Disorder (Stringaris et al., 2012). In the present sample, interitem reliability was high (see Table 1); irritability severity correlated with other measures similarly to prior community samples (see Supplemental Table S1).

The Child PTSD Symptom Scale for DSM-5 (CPSS-5).
Parents and children rated PTSD symptom severity on the CPSS-5 (Foa et al., 2018): participants indicate the frequency with which oneself or one's child experiences each of 20 PTSD symptoms. For consistency with other study measures, the CPSS-5 was adapted to reference the past two weeks. Prior research supports use of the CPSS-5 to assess PTSD severity in children aged eight to 18 including thresholds for minimal to very severe symptom severity (Foa et al., 2018). In the present sample, interitem reliability was high (see Table 1); PTSD severity correlated with other measures similarly to prior research (see Supplemental Table S1).

The CoRonavIruS Health Impact Survey (CRISIS) and Perceived Social Support Assessment. The CRISIS measure was developed to provide a comprehensive assessment of the impact of the COVID-19 pandemic on the daily lives of children, adolescents, and adults (Merikangas et al., 2020; Nikolaidis et al., 2020). Broadly, along with demographic information (e.g., child ancestry), the CRISIS assesses exposure to the SARS-CoV-2 virus; daily behaviours (e.g., school closures); emotions, distress, and well-being (e.g., loneliness, worry; see Table 2); media use; and substance use (i) retrospectively for the 3 months prior to the local impact of the COVID-19 pandemic and (ii) in the past two weeks at a single, baseline administration session. Merikangas and colleagues developed versions of the CRISIS for child-report about oneself and parent/guardian-report about a child. Nikolaidis et al. (2020) present psychometric data on parent-report of children's well-being in the United States and United Kingdom including evidence that the assessment of emotions, distress, and well-being measures a single dimension of psychological distress. The present

| Table 3. Sample demographic information (N = 190)		
Child characteristics (per parent report)	Number	Percent
Female sex identification	94	49.47%
Living with an essential worker	76	40.00%
England, Ireland, Scotland, Wales Ancestry[a]	95	50%
Western European ancestry[a]	48	25.26%
Southern European ancestry[a]	48	25.26%
North American, Non-Aboriginal ancestry[a]	46	24.21%
Eastern European ancestry[a]	29	15.26%
Middle Eastern ancestry[a]	16	8.42%
Aboriginal North American ancestry[a]	14	7.37%
Northern European ancestry[a]	6	3.16%
Eastern Asian ancestry[a]	6	3.16%
South Asian ancestry[a]	4	2.11%
Hispanic or Latin ancestry[a]	3	1.58%
Southeastern Asian ancestry[a]	3	1.58%
African Ancestry[a]	3	1.58%
Other Ancestry[a]	9	4.74%
Caregiver or Parent	Number	Percent
Female Sex Identification	170	89.47%
Received government assistance 3 months prior to the covid-19 pandemic	91	47.89%
Received graduate education	67	35.26%
Completed university degree	65	34.21%
Completed some college education	43	22.63%
Completed high school or less	14	7.37%
Other education	1	0.53%
[a] Participants could endorse multiple ancestries.		

report is the first to provide psychometric data on use of the CRISIS to assess child-reported impacts of the COVID-19 pandemic among children aged eight to 13. The present sample found high interitem reliability for a single factor of psychological distress indexed by all ten items of emotions, distress, and well-being assessed, retrospectively, for child-report pre- (α=0.82) and peri-pandemic periods (α=0.90) as well as for parent-report of pre- (α=0.85) and peri-pandemic periods (α=0.88). In subsequent analyses, we computed mean psychological distress; four items were reverse coded (see Table 2 note) such that higher scores indicate greater psychological distress.

The child-report baseline assessment, which was used in the present study, includes four questions that assess a child's perceived social support from family and friends. In the present study, interitem reliability of the 4-item assessment of perceived social support was high (see Table 1).

Data Analytic Plan
The present study used paired t-tests to evaluate differences between pre- and peri-pandemic child- and parent-report of child well-being indexed by the CRISIS at baseline assessment. Other measures (e.g., the SCARED) provided only current syndrome severity. We used structural equation modeling of child- and parent-report separately to regress overall current severity of internalizing syndromes on perceived social support. Based on the correlation of PTSD severity with internalizing syndromes (see Supplemental Table S1), PTSD severity was included as an indicator of overall internalizing severity. Next, as a set of follow-up

Figure 1. Regression of overall psychological distress on perceived social support
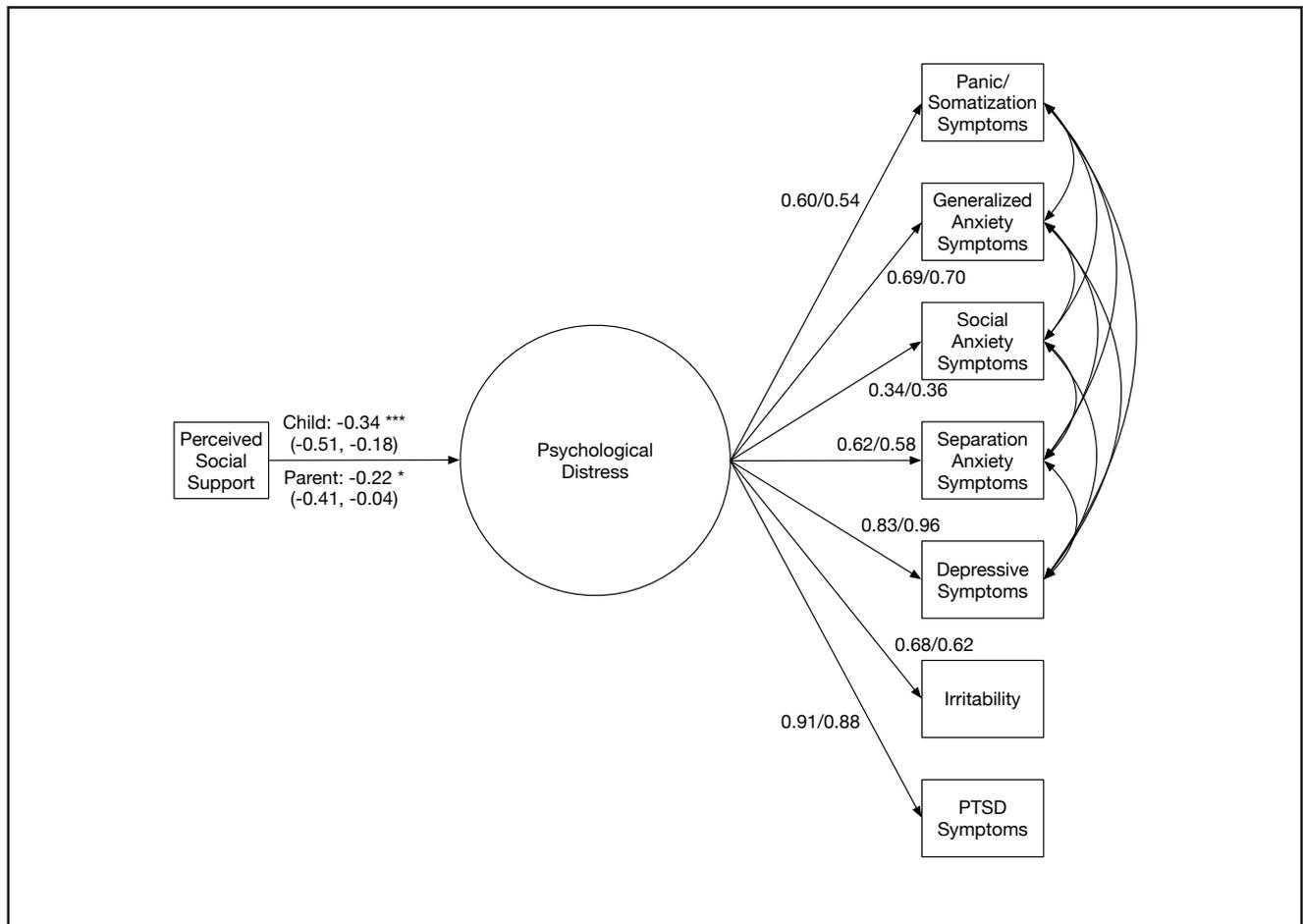
Note. All coefficients are standardized. All factor loadings are statistically significant (ps < 0.001). Factor loadings are presented as factor loadings from the model based on child report / factor loadings from the model based on parent report. Error variance for anxiety and depressive syndromes were a priori allowed to covary to account for the well-documented substantial covariance between anxiety and depressive syndromes (e.g., Clark & Watson, 1991). Covariances between anxiety and depressive syndromes are omitted for clarify but are available from the authors upon request as are confidence intervals for factor loadings.

tests, we used linear regression to separately regress current severity of PTSD and each internalizing syndrome on perceived social support to evaluate whether associations with perceived social support hold for each syndrome. As a note on multiplicity, despite considerable debate in the field (e.g., Blakesley et al., 2009), we follow recommendations to promote transparency and reduce type II error by presenting unadjusted p-values (Rothman, 1990; Streiner & Norman, 2011). We then consider multiplicity in the interpretation of test statistics via the Benjamini-Hochberg correction, which Blakesley and colleagues (2009) recommend in the case of moderately correlated outcomes.

Finally, moderation analyses used multilevel, mixed effects models to examine the difference between pre-pandemic distress and peri-pandemic distress. Specifically, models were specified for child- and parent-reported psychological distress separately including fixed and random effects for time to model interindividual (i.e., between-person) variation in the difference between pre- and peri-pandemic distress. Social support, grand mean centered, was then entered as a main effect and interaction to examine the hypothesis that higher perceived social support would be associated with a smaller difference from pre- to peri-pandemic distress (i.e., less increase in psychological distress). Structural equation modeling and multilevel modeling analyses used full information maximum likelihood estimation. Analyses used R version 4.0.2 (R Core Team, 2018) with the psych (Revelle, 2015), nlme (Pinheiro et al., 2016), lsr (Navarro, 2015), and ggplot2 packages (Wickham, 2009) and Mplus version 8.3 (Muthén & Muthén, 1998) for structural equation models.

Table 4. Linear regression of symptom severity on perceived social support – B [β] (95% CI)

	Generalized Anxiety	Separation Anxiety	Panic	Social Anxiety	Depressive	Irritability	PTSD
Child-Report							
Perceived Social Support	-0.41 [-0.23] ** (-0.68, -0.14)	-0.10 [-0.08] (-0.32, 0.11)	-0.27 [-0.16] * (-0.53, -0.01)	-0.21 [-0.13] (-0.47, 0.05)	-0.75 [-0.39] + (-1.04, -0.47)	-0.34 [-0.32] + (-0.5, -0.18)	-1.5 [-0.3] *** (-2.26, -0.75)
Child Age	0.26 [0.08] (-0.23, 0.76)	-0.54 [-0.21] ** (-0.94, -0.14)	0.01 [0] (-0.47, 0.5)	-0.08 [-0.03] (-0.56, 0.4)	0.04 [0.01] (-0.5, 0.57)	-0.15 [-0.07] (-0.44, 0.15)	-0.16 [-0.02] (-1.59, 1.27)
Sex	-1.73 [-0.18] * (-3.17, -0.3)	-0.94 [-0.13] (-2.09, 0.21)	-1.66 [-0.19] * (-3.06, -0.27)	-0.29 [-0.03] (-1.68, 1.1)	-1.35 [-0.13] (-2.89, 0.19)	-0.76 [-0.13] (-1.62, 0.09)	-4.13 [-0.15] * (-8.21, -0.04)
Parent-Report							
Perceived Social Support	-0.35 [-0.21] ** (-0.62, -0.09)	-0.13 [-0.1] (-0.34, 0.08)	-0.1 [-0.06] (-0.35, 0.16)	-0.02 [-0.01] (-0.26, 0.23)	-0.41 [-0.21] ** (-0.72, -0.10)	-0.13 [-0.11] (-0.32, 0.05)	-0.99 [-0.26] *** (-1.57, -0.41)
Child Age	-0.08 [-0.02] (-0.57, 0.42)	-0.55 [-0.21] ** (-0.94, -0.15)	-0.03 [-0.01] (-0.5, 0.45)	0.1 [0.04] (-0.36, 0.56)	-0.15 [-0.04] (-0.72, 0.43)	-0.11 [-0.05] (-0.45, 0.23)	-0.47 [-0.07] (-1.56, 0.62)
Sex	-0.68 [-0.07] (-2.12, 0.75)	-0.32 [-0.04] (-1.46, 0.82)	-0.93 [-0.11] (-2.31, 0.44)	-0.08 [-0.01] (-1.40, 1.24)	-0.97 [-0.09] (-2.64, 0.70)	-0.28 [-0.05] (-1.27, 0.71)	-1.17 [-0.06] (-4.32, 1.98)

Sex is coded such that female is the reference group. Panic refers to the panic/somatization subscale of the SCARED; all outcome variables (e.g., PTSD) refer to dimensional symptom severity.
* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$. + $p < 0.0001$.

Results

Descriptive Statistics

Families of children (N=190) aged 8 to 13 (M=10.83, SD=1.45) from grades 2 to 9 (M=5.57, SD=1.68) completed baseline assessment in June or July 2020 (see Table 3 for detailed demographic information). Per a post-hoc sensitivity analysis, this sample size provided 80% statistical power to identify a small-to-moderate difference between children's pre- and peri-pandemic well-being based on retrospective report at baseline assessment in a dependent means (i.e., matched-pairs) t-test where α=0.05 (d=0.204). Thirty-two children (16.84%) did not complete the child-report portion. Missing data was not associated with child age (p=0.47); sex (p=0.61); irritability (p=0.95); or symptoms of depression (p=0.45), PTSD (p=0.26), or any anxiety syndrome (ps>0.12) per parent report.

Descriptive statistics are presented in Tables 1 and 2. Per child and parent retrospective report, distress increased from the 3-month period prior to the pandemic to the baseline assessment in June-July 2020. As indicated by both child- and parent-report, all individual, item-level indices of child well-being on the CRISIS indicate greater psychological distress (see Table 2).

Associations of Internalizing Symptom Severity with Social Support

As omnibus tests of the association of perceived social support with internalizing symptom severity, two structural equation models were fit to regress, onto perceived social support, latent internalizing severity indexed by irritability, generalized anxiety, panic/somatization, depressive, and PTSD symptom severity (see Figure 1). Though not formally considered an internalizing disorder, PTSD was included as an indicator based on high intercorrelations with internalizing syndromes (see Supplemental Table S1). The models based on child self-report, $\chi^2(10)$=17.77, p=0.059, RMSEA=0.07, 95%CI (0, 0.12), CFI=0.98, and parent-report of symptom severity demonstrated good fit to the data, $\chi^2(10)$=16.74, p=0.080, RMSEA=0.07, 95%CI (0, 0.12), CFI=0.99. Both models indicated that higher perceived social support was associated with lower symptom severity.

In follow up analyses of individual symptom indices, higher child-perceived availability of social support from family and friends was associated with lower child-reported severity of irritability, generalized anxiety, depressive, and PTSD symptoms (see Table 4). Associations of social support with lower severity of PTSD symptoms were also evident when based on parent-report of children's distress. Perceived social support was also associated with attenuated increases in

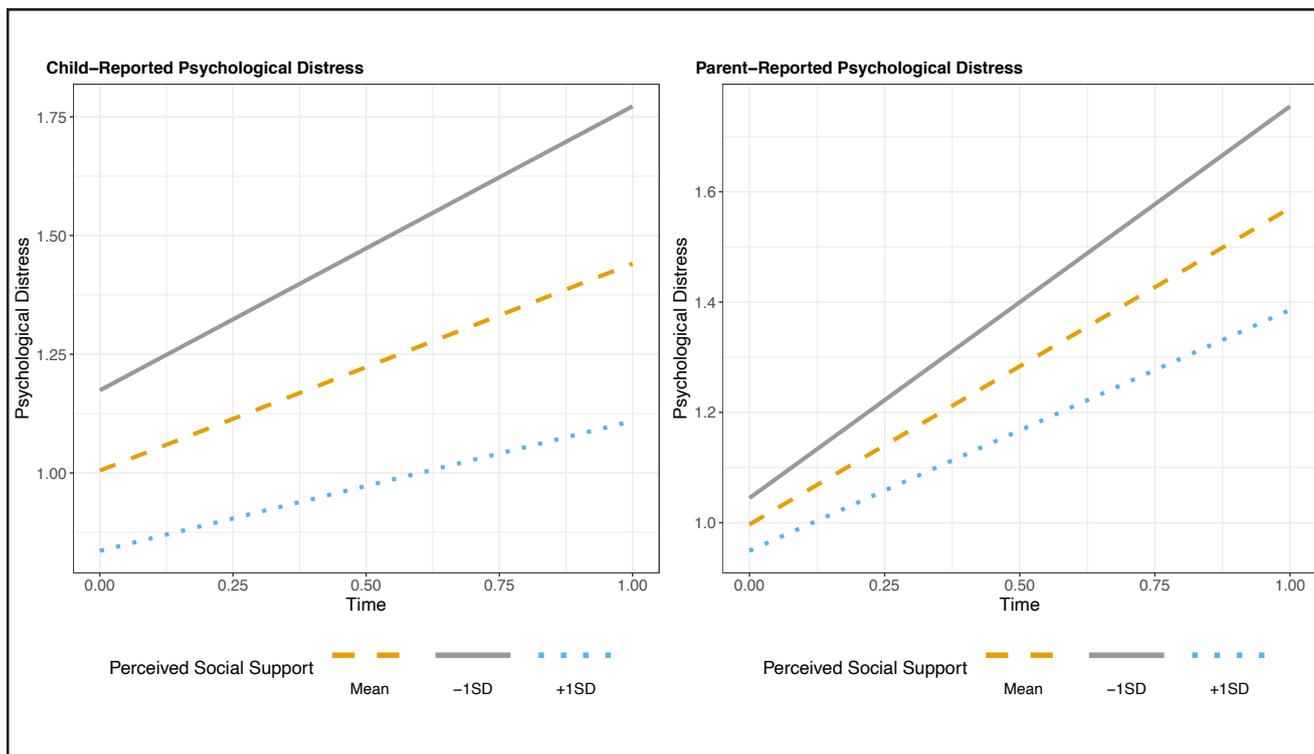**Figure 2. Change in well-being moderated by perceived social support**

Table 5. Multilevel, mixed effects regression of change in well-being as a function of current perceived social support – B (95% CI)

Fixed effects	Child-reported psychological distress	Parent-reported psychological distress
Support	-0.06 (-0.10, -0.03), p = 0.0005	-0.02 (-0.05, 0.02), p = 0.337
Time	0.44 (0.34, 0.53), p < 0.0001	0.57 (0.46, 0.69), p < 0.0001
Time*Support	-0.06 (-0.10, -0.02), p = 0.0011	-0.05 (-0.09, -0.009), p = 0.019
Random effects		
Intercept variance	0.54	0.56
Time variance	0.50	0.61
Correlation (intercept with time)	-0.13	-0.40
Residual variance	0.24	0.26
Support indicates perceived social support, which has been grand mean centered to make the main effect of time more readily interpretable.		

child- and parent-report of children's psychological distress (see Table 5 and Figure 2).

Discussion

Results suggest a broad impact of the pandemic on children's psychological distress, as assessed by both children and parents/guardians, including reduced well-being and higher irritability, anxiety, and depressive symptoms (e.g., Cao et al., 2020; Hawke et al., 2020). For example, paired *t*-tests indicate moderate to large increases in psychological

distress from retrospective reports of children's pre-pandemic well-being to their peri-pandemic well-being.

Moreover, as compared to a large-scale community study (Rhew et al., 2010), both children and parents reported depressive symptoms higher than children with no depressive diagnosis but lower than children with a depressive disorder. Similarly, the number of children above a putative threshold is higher than the period prevalence of depressive disorders in childhood (e.g., Costello et al., 2003) but does not suggest that most children reported a probable

depressive episode. Children reported higher symptoms of generalized anxiety and social anxiety, lower symptoms of separation anxiety, and similar symptoms of panic/somatization as a large Dutch community sample collected prior to the COVID-19 pandemic (Muris et al., 1999). Parents reported higher irritability though children reported irritability similar to a large sample of children collected prior to the pandemic in the United States of America (USA; Carney et al., 2016). Similarly, children reported less severe PTSD symptoms than a large community sample of children in the USA who had experienced a variety of different traumatic events (e.g., natural disasters, car accidents, sexual assault, physical assault; Foa et al., 2018). The elevated rates of symptomology in the present study (see Table 1) suggest that children may be especially vulnerable to the acute psychological impact of the pandemic. Finally, extant theory on stress and child psychopathology is consistent with a broad impact of the COVID-19 pandemic on children's mental health (e.g., Harkness & Hayden, 2020). For example, research implicates other forms of chronic stress or adverse childhood experiences in the etiology of myriad psychopathologies (Chapman et al., 2004; Cicchetti & Rogosch, 2002; Gottbrath Flaherty et al., 2009).

Regarding the second question, higher perceived social support availability from family and friends was associated with moderately lower severity of irritability, anxiety, depressive, and PTSD symptoms and attenuated increases in psychological distress. This is consistent with prior research, which documents an association of social support with well-being in children and adolescents (e.g., Chu et al., 2010; Flannery, 1990), and theory that implicates social support as a protective factor in child development (Thompson et al., 2006). For example, the buffering hypothesis suggests that social support mitigates psychological distress following myriad stressors (Cohen & Wills, 1985). The association of social support with children's mental health encourages creative approaches to facilitate safe social interaction of children with friends and family where possible. For example, ongoing research may clarify how technological developments can facilitate supportive interactions.

Limitations and future directions

results should be considered in light of several limitations, which suggest directions for future research. First, assessment used self- and parent/guardian-report rather than clinician-assessed diagnoses. However, child- and parent-report of symptoms facilitated dimensional assessment of psychological distress in a community sample, which may reflect dimensional risk for psychopathology, distress, or impairment associated with subthreshold symptoms (e.g.,

Kotov et al., 2017; Wakschlag et al., 2015). Future research is needed to investigate changes in the prevalence and incidence of psychiatric conditions in children following the COVID-19 pandemic.

Second, to limit participant burden, the present study was limited to investigating the impact of the pandemic on anxiety, depressive, PTSD, and irritability symptoms. Given the present indications of broad psychological sequelae of the COVID-19 pandemic, future research is needed to investigate the scope of psychological distress. For example, given increased child- and parent-reported irritability, future research is needed to evaluate the potential impact on the emergence of externalizing syndromes.

Third, due to the urgency to disseminate findings on the acute impact of the pandemic on children's mental health, the present study was limited to cross-sectional assessment at baseline. Prior research documents recall bias, particularly in internalizing disorders (e.g., Mogg et al., 1987), which may inflate the difference between pre- and peri-pandemic well-being described here. However, it is unclear how recall biases fully explain consistent evidence from child and parent reports of heightened symptom severity as compared against epidemiological samples collected prior to the COVID-19 pandemic or evidence that differences between pre- and peri-pandemic well-being are moderated by perceived social support. Previous research documented long-term impacts of other chronic childhood stressors on mental health into adolescence and adulthood (Chapman et al., 2004; Gottbrath Flaherty et al., 2009). Future longitudinal research is needed to clarify the long-term impact of the COVID-19 pandemic on the mental health of children and the psychosocial factors that contribute to the persistence of, or recovery from, psychological distress.

Finally, it is unclear whether the present sample fully reflects the demographics of Southwestern Ontario. For example, in the present study 47.89% of families reported receiving government benefits. According census data, 14% of families in region received government assistance in 2016 (e.g. employment insurance; Statistics Canada, 2016, 2017). The increased proportion who received assistance in the present study may be due to the broad definition of assistance on the CRISIS measure; some parents may report widespread assistance such as the Canada Child Benefit, which provides funds to all families to assist with the cost of raising children. However, while a larger sample is required to better approximate the population of Southwestern Ontario, the present results provide an important initial characterization of the type and magnitude of distress that children face in response to the COVID-19 pandemic.

Implications

The present study has implications for clinical assessment and for the development and deployment of psychosocial resources to support children's mental health. For example, resources to aid children's recovery from the pandemic may benefit from considering broad psychological sequelae beyond trauma or loss. The present results may also inform the provision of psychosocial resources by identifying particular vulnerability among children who report low social support. Finally, widespread elevated irritability, anxiety, and depressive symptoms highlight the need to consider the pandemic as psychosocial context in clinical assessment to avoid identifying pandemic-related symptoms as an unrelated psychiatric disorder. For example, present results suggest one consider adjustment disorders for internalizing symptoms that emerge during the COVID-19 pandemic.

Acknowledgements

Conflicts of interest

The authors declare that they have no conflict of interest. Data, materials, and code are available by request to the corresponding author.

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Supplemental Information

Supplemental Table S1. Correlation table of symptom severity										
Measure	Age	Sex	Total Anxiety[a]	Generalized Anxiety	Separation Anxiety	Panic	Social Anxiety	Depressive	Irritability	PTSD
Age	--	-0.04	-0.03	-0.02	**-0.19**	0.01	0.06	-0.06	-0.05	-0.05
Sex	-0.04	--	0	-0.01	-0.01	-0.03	0.04	-0.06	-0.05	-0.02
Total anxiety[a]	-0.02	-0.15	--	**0.86**	**0.81**	**0.81**	**0.73**	**0.61**	**0.30**	**0.61**
Generalized anxiety	0.09	**-0.17**	**0.88**	--	**0.62**	**0.61**	**0.48**	**0.64**	**0.35**	**0.60**
Separation anxiety	**-0.20**	-0.10	**0.79**	0.58	--	**0.56**	**0.47**	**0.48**	**0.25**	**0.54**
Panic	0.02	**-0.17**	**0.82**	0.68	0.56	--	**0.40**	**0.51**	**0.26**	**0.50**
Social anxiety	-0.03	-0.02	**0.75**	0.56	0.47	0.38	--	**0.29**	0.09	**0.31**
Depressive	0.01	-0.09	**0.62**	0.65	0.45	0.48	0.39	--	**0.59**	**0.80**
Irritability	-0.07	-0.10	**0.37**	0.41	0.36	0.33	0.11	0.56	--	**0.47**
PTSD	-0.01	-0.13	**0.66**	0.65	0.59	0.57	0.34	0.75	0.62	--

Correlations based on child-report are provided below the diagonal; correlations based on parent-report are provided above the diagonal. Bold indicates correlations that are statistically significant at $p \leq 0.01$. Sex is coded such that female is the reference group.

[a]Total Anxiety reflects the total of the four SCARED subscales included in the present study. Total Anxiety, Generalized Anxiety, Separation Anxiety, etc. refer to the dimensional severity of symptoms (see Measures for specific assessment measures used).