Are the kids really alright? Impact of COVID-19 on mental health in a majority Black American sample of schoolchildren

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ABSTRACT

Children from historically disadvantaged groups (racial minorities, lower socioeconomic status [SES]) may be particularly susceptible to mental health consequences during the COVID-19 pandemic. We examined the impact of the pandemic, including mental health symptoms and COVID-19-related fears and behaviors, in a sample of majority Black American (72%) children (*n*=64, ages 7–10, 24 female) from an urban area with high infection rates. Children completed a mental health screening form prior to the pandemic (October 2019) and at two time points during the pandemic (May, August 2020). We examined the impact of SES on mental health changes over time, COVID-19 fears and behaviors, and perceived impact of the pandemic. We also tested whether baseline mental health predicted the impact of COVID-19. Children's fears of illness increased over time, and these effects were independent of race and SES. However, lower SES children reported more fears about social distancing during the pandemic as compared to higher SES children. Lower SES children also reported more internalizing symptoms at baseline, which decreased in this group following stay-at-home orders. Results highlight the need to reduce the risk of persistent fear and mitigate the mental health consequences among vulnerable pediatric populations during and after the pandemic.

1. Introduction

Emerging data indicate that the 2019 novel coronavirus disease (COVID-19) pandemic is a threat to mental health worldwide, and mitigating these mental health consequences is a public health priority (Pfefferbaum and North, 2020). Indeed, recent systematic reviews have documented significant increases in anxiety, depression, and psychological distress among the general population, and a worsening of symptoms among patients with psychiatric disorders (Vindegaard and Benros, 2020; Xiong et al., 2020). Most of the scientific literature has focused on mental health consequences in *adults*, which may be due, in part, to the fact that children tend to experience milder physical symptoms when infected with COVID-19 (Ludvigsson, 2020). However, research on children's mental health following previous disasters, including pandemic disasters (e.g., H1N1), indicate that children are highly susceptible to the psychological effects of disasters (Abramson et al., 2010; Juth et al., 2015; Sprang and Silman, 2013).

Childhood is considered a sensitive period for brain systems that undergird socioemotional development, leaving the developing brain susceptible to excess worry and fear (Tottenham, 2017). Further, almost half of all mental disorders have their origins traced back to childhood or adolescence (Kessler et al., 2005), and the onset of new stressors during childhood may induce worry and fear in already vulnerable populations. A study of over 2,000 2nd–4th-grade students in China found that 62% were worried that they would get infected with COVID-19, and greater worry was associated with higher depressive symptoms (Xie et al., 2020). Fear of catching the virus, compounded with social stressors, such as school closures, lifestyle changes, social isolation, and caregiver stress, may adversely affect children's short- and long-term mental health. Emerging data are consistent with this notion and suggest an increased frequency of negative mood and increased intensity of depressive, anxiety, and behavioral health problems in youth following the onset of the COVID-19 pandemic (Gassman-Pines et al., 2020; Patrick et al., 2020; Racine et al., 2020). A recent study in the US reported

that, compared to adults, youth were more likely to report moderate to severe symptoms of anxiety and depression during the COVID-19 pandemic (Murata et al., 2020), underscoring children's vulnerability.

As compared to adolescents, younger children (ages <12), may be particularly susceptible to excessive and/or persistent worry during the COVID-19 pandemic because they may have less knowledge of the virus. Further, children often have fewer means to keep in touch with peers (e. g., less access to their own smartphone or internet), which can exacerbate social isolation and limit socioemotional development opportunities. A preliminary study from China found that younger youth (ages 3-6) were more likely to be afraid that family members would contract COVID-19 than older youth (ages 6+; Jiao et al., 2020). Therefore, more research is needed on the mental health impacts of COVID-19 in children.

Racial and ethnic minority groups, including Black Americans, have been disproportionately impacted by the COVID-19 pandemic and associated mental health consequences (Centers for Disease Control and Prevention, 2020a; Czeisler et al., 2020). Recent work by Sneed and colleagues (2020) highlights a variety of social and psychological consequences of the pandemic on Black American communities in the US, including pervasive fear of contracting the disease, fears of racial bias in testing and treatment, frequent grief and loss, and re-traumatization of already-traumatized communities. The pandemic's effects on children's mental health may also differ based on socioeconomic status (SES), with emerging research demonstrating that lower SES families are at heightened risk of adverse mental health outcomes during the COVID-19 pandemic (Marques de Miranda et al., 2020) and following other disasters (Mclaughlin et al., 2009), as compared to higher SES families. Together, the COVID-19 pandemic may disproportionately affect historically disadvantaged groups (i.e., Black Americans, lower SES) and further expose and exacerbate inequalities in the US (Perry et al., 2021). The limited research on minority youth samples in the US indicates that mental health impacts of the COVID-19 pandemic may differ based on sociodemographic and/or cultural factors (Penner et al., 2020). There are also few longitudinal studies that are capable of examining whether mental health problems evolve over time and whether pre-existing mental health problems predict the impact of COVID-19 on youth.

The present study will fill important gaps in our understanding of COVID-19 fears and behaviors, mental health, and perceived impact of the pandemic on a majority Black American youth sample. We leveraged a longitudinal study in schoolchildren that began in October 2019, before the pandemic's onset in the US. Children were from the Detroit area (Michigan, USA), a COVID-19 hotspot early on in the pandemic (e. g., April-May 2020; Centers for Disease Control and Prevention, 2020b). We examined mental health, including internalizing and externalizing symptoms, and the impact of the COVID-19 pandemic across multiple domains, including fears of illness, fears about social distancing, safety behaviors, and perceived impact. We aimed to (1) provide descriptive data on the impact of COVID-19 in a sample of majority Black American children in May 2020, two months following school shutdowns. We also examined (2) the effects of SES on the impact of COVID-19 on children during the pandemic, using a follow-up survey time point in August 2020 — five months following stay-at-home measures and just prior to the start of a new school year. To our knowledge, this is the first study in a majority Black American youth sample to track changes in mental health from baseline (pre-pandemic), and the first to examine longitudinal changes during the pandemic. Here, parent education was used as a proxy of SES. Prior studies link parent education to a variety of child outcomes, including brain size (Noble et al., 2015) and mental health problems (Sonego et al., 2013). Furthermore, research in the US during the COVID-19 pandemic has shown educational disparities in "pandemic precarity", or risk for material and financial insecurity (Perry et al., 2021). Leveraging survey data collected at baseline, we (3) tested for effects of SES and changes in mental health from before the pandemic to during the outbreak, and (4) whether mental health was associated with the COVID-19-related fears, behaviors, or impact. Finally, based on prior

research, we (5) explored several factors that may predict the impact of COVID-19 on children, including demographic characteristics (e.g., gender, race/ethnicity), exposure to the coronavirus, and parent marital and employment status.

2. Methods

2.1. Participants

Participants included 7–10-year-old children (grades 2–4) from three Detroit-area (Michigan, USA) schools (two public, one private). The schools were located in suburbs that closely neighbor the city of Detroit, and the schools' demographics reflect the surrounding neighborhoods (~57–69% Black American, ~23-37% Caucasian, median household income: ~$52,000; US Census Bureau, 2020). The schools were located within an 8-mile radius, and a mix of public and private schools were selected to capture varying within-household sociodemographic makeup (e.g., parent education).

During October 2019 (before the spread of COVID-19 in the US), children completed baseline assessments in the classroom using Qualtrics survey software as a part of a larger study. Parents were given an information sheet about the study that was approved by the local IRB. Following COVID-19-related school shutdowns on March 13, 2020, all students and their parents were invited electronically to complete follow-up surveys on mental health during the COVID-19 pandemic at two time points: May and August 2020. Students were included in the current report if they had complete survey data in May 2020 ($N = 64$, age $= 8.2 \pm .7$ years; 62.5% female, 37.5% male; 71.9% Black American; 25% Caucasian; 3.1% Other; see Table 1). This approach maximized the number of participants with complete data following the onset of the COVID-19 pandemic to assess changes over time. Overall, the sample of children was predominantly Black American, fitting with the participating schools' demographic composition and surrounding neighborhoods. Further, the sample, on average, resided in communities of moderate-to-high distress (Gellci et al., 2019; Marshall et al., 2018), estimated using the Distressed Communities Index (https://eig.org/dci). However, within-household markers of SES (i.e., parent education) ranged across the sample, with 41% of parents reporting some college or a high school diploma (see Table 1). Fifty-seven of the $N = 64$ had complete baseline survey data (October 2019), and $n = 53$ had complete data for August 2020. There were no significant differences in age or gender distribution in those who completed study assessments at baseline versus May or August (p's > 0.25). There was, however, a significant differences in race/ethnicity ($p = .01$), such that a higher percentage of Caucasian participants completed the follow-up surveys as compared to the baseline-only group. Children and parents provided informed consent or assent to participate in the study and received an e-gift card for their participation. Additionally, parents completed a brief survey that included demographic measures. The local IRB approved all study procedures.

2.2. Measures

2.2.1. Impact of the COVID-19 pandemic

The child surveys included an audio narration that accompanied the text. The child self-report version of the Fear of Illness and Virus Evaluation (FIVE) was used to assess children's COVID-19-related fears, behavioral changes, and impact in May and August (Ehrenreich-May, 2020). The surveys were modified in collaboration with a former elementary school teacher and with the developers of the FIVE measure (Ehrenreich-May and Sáez-Clarke, personal communication). In particular, we adapted the survey to be more appropriate for younger ages and clipart images were added throughout the surveys. All questionnaires were reviewed by the school administrators, and, upon the request of the schools, one item was removed regarding children's fear of dying from COVID-19. The modified FIVE consisted of 34 items (see Table S1). The

Table 1
Participant characteristics as reported in May 2020 ($N = 64$).

CHARACTERISTIC	M (SD)	RANGE
AGE	8.2 (.7)	7–10
MENTAL HEALTH		
INTERNALIZING SYMPTOMS	2.11 (1.2)	0–4
EXTERNALIZING SYMPTOMS	2.63 (2.1)	0–4
IMPACT OF COVID-19		
FEARS OF ILLNESS	19.11 (6.4)	8–29
FEARS ABOUT SOCIAL DISTANCING	15.34 (4.7)	10–37
BEHAVIORS	36.69 (6.1)	26–50
PERCEIVED IMPACT	3.92 (1.5)	1–8
	N (%)	
SEX		
MALE	24 (37.5%)	
FEMALE	40 (62.5%)	
GRADE		
SECOND	31 (48.4%)	
THIRD	30 (46.9%)	
FOURTH	3 (4.7%)	
RACE		
BLACK AMERICAN	46 (71.9%)	
CAUCASIAN	16 (25%)	
OTHER	2 (3.1%)	
PARENT HIGHEST EDUCATION		
HIGH SCHOOL OR EQUIVALENT	4 (6.3%)	
SOME COLLEGE	22 (34.4%)	
2-YEAR COLLEGE DEGREE	14 (21.9%)	
4-YEAR COLLEGE DEGREE	11 (17.2%)	
MASTER'S DEGREE	10 (15.6%)	
DOCTORATE	3 (4.7%)	
PARENT EMPLOYMENT STATUS		
FULL-TIME	38 (59.4%)	
PART-TIME	11 (17.2%)	
HOMEMAKER	5 (7.8%)	
RETIRED	1 (1.6%)	
LAID OFF/LOOKING FOR A JOB	2 (3.1%)	
OTHER	7 (10.9%)	
PARENT MARITAL STATUS		
MARRIED/PARTNERED	29 (45.3%)	
SINGLE	28 (43.8%)	
DIVORCED	6 (9.4%)	
WIDOWED	1 (1.6%)	

Demographics as reported in May 2020 ($n = 64$). Internalizing and externalizing reported using the PSC (internalizing subscale modified for this study). Impact of COVID-19 reported using the Fear of Illness and Virus Evaluation (FIVE, modified for this study).

FIVE has four subscales: (1) Fears about Contamination and Illness (8 items, hereafter 'Fears of Illness'), (2) Fears about Social Distancing (10 items), (3) Behaviors Related to Illness and Virus Fears ('Behaviors'; 14 items), and (4) Impact of Illness and Virus Fears ('Perceived Impact'; 2 items). The Fears of Illness and Fears about Social Distancing subscales are scored on a 4-point Likert scale ranging from 1 (1 = "I am NOT afraid of this at all") to 4 (4 = "I am afraid of this ALL of the time"). Example items are "I am afraid I will get a bad illness or virus" and "I am afraid I will be stuck at home," respectively. Behaviors were measured on a 4-point Likert scale ranging from 1 (1 = "I have NOT done this in the last week") to 4 (4 = "I did this ALL of the time last week"), and an example statement is: "I stay away from people outside of my family." The Perceived Impact subscale is scored on a 4-point Likert scale ranging from 1 (1 = "Not true for me at all") to 4 (4 = Definitely true), and an example statement is "The illness or virus has caused me to feel very strong emotions." We computed total scores on each subscale (Cronbach's alpha = .46–.865), with possible scores ranging from 8–32 for Fears of Illness; 10–40 for Fears about Social Distancing; 14–56 for Behaviors; and 4–8 for Perceived Impact. See Tables S1 for the full FIVE measure.

2.2.2. Mental health

An adapted self-report version of the widely used Pediatric Symptom Checklist (PSC) was used to measure children's internalizing (e.g.,

anxiety, depression) and externalizing (e.g., conduct disorder, oppositional defiant disorder) symptoms (Liu et al., 2020). The PSC version used here was similarly adapted to be more appropriate for younger ages, in collaboration with a former elementary school teacher. The PSC has been shown to have good internal reliability (Cronbach's α = .87; Murphy et al., 2016) and has been previously used in grades 3–8 (Pagano et al., 2000). Participants are asked to read a statement (e.g., "I feel sad or unhappy," "I fight with other children") and rate how each statement describes themselves on a 3-point Likert scale (0 = never, 1 = sometimes, 2 = often). Possible scores range from 0–8 for internalizing and 0–12 for externalizing symptoms.

2.2.3. SES

Parent-reported education (1–6 ordinal scale; 1 = high school diploma or equivalent, 6 = doctorate degree) was used as an SES index.

2.2.4. Demographic data

Parent-reported marital and employment status (e.g., full-time, laid off) was recorded during May and August (see Table 1).

2.2.5. Direct and indirect exposures to the coronavirus

Parents reported on children's exposures to the coronavirus during May and August by answering "yes" or "no" to 3 items, adapted from prior work (Carpenter et al., 2017). Direct exposure was measured with the following question "My child directly witnessed someone close to him/her getting sick from the virus." Indirect exposures were measured with the following items: "My child knows a person who has died from the virus" and "My child knows a person who has gotten sick from the virus but did not die."

2.3. Data analysis

First, we evaluated whether children's FIVE scores were associated with demographic data (i.e., child gender, race, parent marital status, parent employment status) and exposure to the coronavirus, using independent samples t-tests or Pearson r correlations. Variables that showed significant associations with FIVE or mental health scores were used as a covariate in subsequent models. Time (within-subjects factor: May 2020, August 2020) x SES (between-subjects factor: parent education level) repeated-measures ANOVAs were used for each of the four FIVE subscales. Pearson r correlations were used to test for associations among the FIVE subscales (e.g., between fears and behaviors). Similar time (within-subjects factor: October 2019, May 2020, August 2020) x SES (between-subjects factor: parent education level) repeated-measures ANOVAs were used to evaluate changes in mental health (i.e., internalizing, externalizing symptoms) over time. For results showing significant main effects or interactions with SES effects, we also performed follow-up analyses in the subsample of Black American children ($n = 46$). Pearson r correlations were used to test whether mental health symptoms were associated with FIVE scores at any time point. All analyses were performed in SPSS v.27 (IBM Corp.) software using a $p < .05$ threshold (two-tailed).

3. Results

3.1. Associations with demographic measures

3.1.1. Demographic data

Overall, children's FIVE scores did not differ by child gender, parent marital status (single vs. married/partnered), or parent employment status (full or part-time vs. other) in May or August (p's > .08). However, there were differences between Black American and non-Black American children, such that Black American children reported more Fears about Social Distancing during May and August 2020 compared to non-Black children ($p = .039$ and $p < .001$, respectively). These effects were no longer significant when controlling for SES (p's > .06).

3.1.2. Direct exposure to the coronavirus

According to parent reports, in May, 14.1% of children directly witnessed someone getting sick with the coronavirus. When controlling for SES, direct exposure was not associated with any FIVE subscale or with a change in any subscale over time (main effects and interactions, p's > .06).

3.1.3. Indirect exposures to the coronavirus

According to parent reports in May, 18.8% of children knew someone who died from the virus, and 45.3% knew someone who got sick but did not die. When controlling for SES, there was a main effect of indirect exposure on behaviors. Children who were indirectly exposed reported more protective behaviors than children with no exposure ($F(1,50) =$ 4.1, $p = 0.048$). This association was driven by knowing someone who died from the virus ($p < 0.05$; see Fig. 1) rather than knowing someone who got sick but did not die ($p > 0.05$). Indirect exposure was not associated with any other FIVE subscales.

3.2. Impact of COVID-19 on children, effects of SES, and changes from May to August 2020

3.2.1. Fears of illness

Overall, Fears of Illness significantly increased from May to August (main effect of time: $F(1,51) = 13.559$, $p < .001$, $\eta p^2 = .21$) (Fig. 2 and Table S2). There was no main effect of SES or time x SES interaction for Fears of Illness (p's > .09). The following four items drove the overall increase in Fears of Illness from May to August: fear of (1) getting the virus, (2) being hospitalized because of the virus, (3) being afraid that a friend or (4) people in the world would get the virus (p's < .05). See Table S1 for the full FIVE measure and change in item-level responses between May and August 2020.

3.2.2. Fears about social distancing

On average, Fears about Social Distancing were numerically higher in May than in August, although this difference did not reach significance (main effect of time, $F(1,51) = 3.799$, $p = .057$, $\eta p^2 = .069$; Fig. 2). There was, however, a significant main effect of SES on Fears about Social Distancing ($F(1,51) = 4.541$, $p = .038$, $\eta p^2 = .082$), which was driven by more Fears about Social Distancing in lower SES as compared to higher SES children. There was no time x SES interaction for Fears about Social Distancing ($p = 0.723$, $\eta p^2 = .002$).

3.2.3. Behaviors

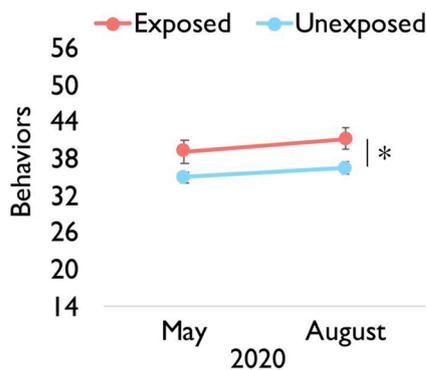There was no main effect of time, main effect of SES, nor time x SES

Fig. 1. Indirect exposure to the coronavirus is associated with greater protective behaviors during the pandemic. There was a significant main effect of indirect exposure (i.e., knowing someone who died from the coronavirus) on Behaviors (*$p < .05$, main effect of exposure). Behaviors reported using the Fear of Illness and Virus Evaluation (FIVE) questionnaire. Possible scores for the FIVE Behaviors subscale range from 14–50. SES was controlled for in statistical analyses. Error bars represent standard error.
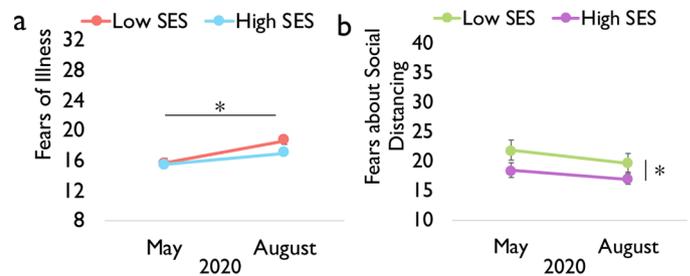
Fig. 2. Children's Fears of Illness (a) and Fears about Social Distancing (b) reported two- and five-months following COVID-19-related school shutdowns in the US. A: There was a significant main effect of time for Fears of Illness such that fears increased over time during the pandemic (*$p < .05$, main effect of time). B: For Fears about Social Distancing, there was a significant main effect of socioeconomic status (SES), such that lower SES youth reported greater fear than higher SES youth (*$p < .05$, main effect of SES). Fear reported using the Fear of Illness and Virus Evaluation (FIVE) questionnaire. Possible scores for the Fears of Illness and Fears about Social Distancing subscales range from 8–32 or 10–40, respectively. Parent education was used as the marker of SES. Analyses used SES coded on an ordinal scale; split by low (i.e., some college or below) vs. high SES groups (i.e., two-year college degree or above) for display purposes only. Error bars represent standard error.

interaction for Behaviors (p's > .1). However, when controlling for indirect exposure to the coronavirus, the main effect of time was significant ($F(1,50) = 5.94$, $p = .018$, $\eta p^2 = .106$), which was associated with an increase in Behaviors from May to August. Exploratory assessment of individual items showed a significant increase from May to August in handwashing, wearing a mask, using hand sanitizer, and avoiding touching things (p's < .05). The main effect of SES and time x SES interaction were not significant.

3.2.4. Impact

There was no main effect of time, main effect of SES, nor time x SES interaction for Perceived Impact (p's > .1).

3.2.5. Correlations between FIVE subscales

During both May and August, Fears of Illness, Fears about Social Distancing, and Perceived Impact were positively inter-related (r's > .3, p's < .05). Behaviors in May and August were positively inter-related (r(53) = .561, $p < .001$), but Behaviors were not associated with any other FIVE subscale (p's > .1).

3.3. Change in mental health over time and effects of SES

There was no main effect of time, main effect of SES, nor time x SES interaction for externalizing symptoms (p's > .2; see Fig. 3b). For internalizing symptoms, in contrast, there was a significant main effect of time ($F(2,82) = 6.72$, $p = .002$, $\eta p^2 = .141$) and a significant time x SES interaction ($F(2,82) = 5.33$, $p = .007$, $\eta p^2 = .115$). The main effect of SES was not significant for internalizing symptoms ($p = .3$). The main effect of time was driven by an overall *decrease* in internalizing symptoms from baseline to May 2020 ($t(53) = 2.45$, $p = .018$, $d = .57$; see Fig. 3a and Table S3), but no significant change from May to August 2020, or between baseline and August 2020 (p's > .3). The time x SES interaction was driven by a change in internalizing symptoms over time in the low ($F(2,28) = 4.1$, $p = .028$, $\eta p^2 = .325$) not high ($F(2,54) = .1$, $p = .9$, $\eta p^2 = .077$) SES group. *Post hoc* analyses indicated lower SES children initially had higher internalizing symptoms at baseline than higher SES children ($r(53) = -.31$, $p = .02$). SES was not associated with internalizing symptoms during the pandemic (p's > .3). Further, *post hoc* t-tests indicated that the main effect of time in the lower SES group was driven by a *decrease* in internalizing symptoms from baseline to May 2020 ($t(20) = 3.5$, $p = .002$, $d = .9$), but no difference between May and August 2020, or between baseline and August 2020 (p's > 0.1). We
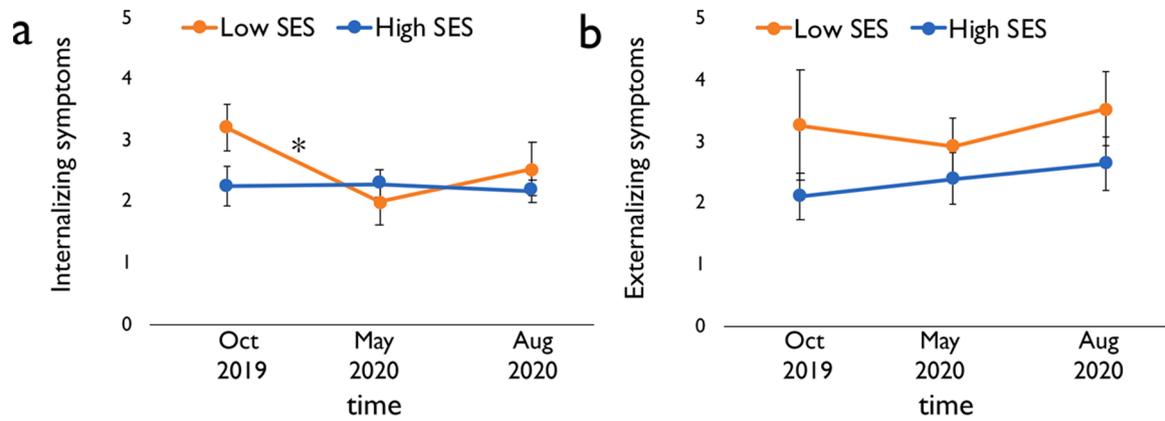
Fig. 3. Change in internalizing (a) and externalizing (b) symptoms over time, by socioeconomic status (SES). A: Overall, there was a significant main effect of time and a time x SES interaction for internalizing symptoms, which was driven by a *decrease* in internalizing symptoms between baseline and May, particularly in lower SES youth. B: There were no effects of time, SES, or time x SES interactions for externalizing symptoms (see text). Symptoms measured using the Pediatric Symptom Checklist (PSC). Parent education was used as the marker of SES. Analyses used SES coded on an ordinal scale; split by low (i.e., some college or below) vs. high SES groups (i.e., two-year college degree or above) for display purposes only. Error bars represent standard error.

repeated the analyses in the majority Black American subsample and found that the main effect of time on internalizing symptoms in the low SES group remained significant ($F(2,24) = 4.195$, $p = 0.027$). These results suggest that the effects of SES remain significant in the majority Black American subsample.

3.4. Associations between mental health symptoms and impact of COVID-19

Baseline internalizing and externalizing symptoms were not associated with FIVE scores during the pandemic (May or August 2020). However, during both May and August, higher current internalizing symptoms were associated with lower engagement in Behaviors ($r(64) = -.25$, $p = .043$ and $r(53) = -.384$, $p = .005$, respectively; Fig. 4a; Table S4) and higher Perceived Impact ($r(64) = .34$, $p = .006$ and $r(53) = .34$, $p = .012$, respectively; Fig. 4c). These associations were driven by less mask-wearing, less frequent use of hand sanitizer, and a greater interference with enjoying life in children with higher internalizing symptoms (p's < .05). During May, higher current externalizing symptoms were also associated with lower engagement in Behaviors ($r(64) = -.3$, $p = .017$; Fig. 4b), which was driven by less frequent mask-wearing and less frequent handwashing (p's < .05). There were no other significant correlations between mental health symptoms and FIVE scores (p's > .05).

4. Discussion

This study adds to the growing body of literature documenting children's mental health during the COVID-19 pandemic. By leveraging a longitudinal study of majority Black American schoolchildren that began *before* the onset of the pandemic in the US, the present study extends prior findings to younger children (ages 7–10) and to a racial minority group that is thought to be at heightened risk of COVID-19-related mental health consequences (Clark et al., 2020). To our knowledge, this is the first study to report on baseline (pre-pandemic) mental health, and the first to show longitudinal changes over the pandemic in primarily Black American youth. Overall, most children reported fears of illness and social distancing, and most children reported frequently engaging in protective behaviors (e.g., handwashing, mask-wearing). There was a significant increase in illness fears from May 2020 to August 2020, which may reflect additional stressors and uncertainty associated with the start of the new school year. The increase in fears of illness over time did not differ based on SES or race. Interestingly, rather than fear, children's exposure to the coronavirus was associated with increased safety behaviors. Overall, lower SES youth reported more fears about social distancing than higher SES youth, and this result remained significant in the Black American subsample. We were also uniquely positioned to evaluate whether mental health symptoms changed from baseline to after the onset of the pandemic. Although there were no changes in externalizing symptoms, surprisingly, we found that lower (but not higher) SES children reported *lower*
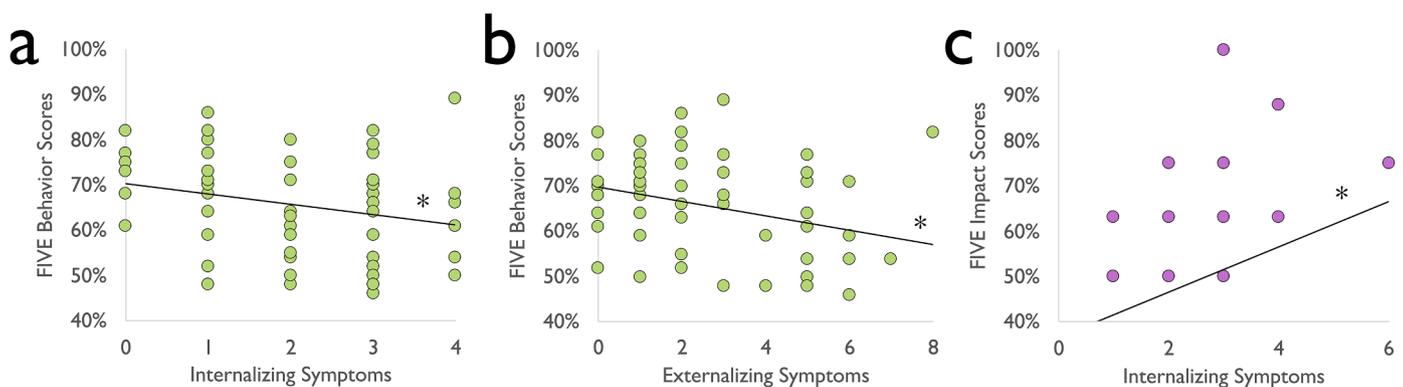

Fig. 4. Correlations between FIVE scores and internalizing and externalizing symptoms in children. COVID-19-Related Behaviors are negatively correlated with internalizing (Panel A) and externalizing symptoms (Panel B) during May 2020. Perceived Impact is positively correlated with internalizing symptoms during August 2020 (May 2020).*p < .05, Pearson bivariate correlation.

internalizing symptoms from baseline to May 2020 (but not from baseline to August 2020). However, lower SES children initially reported higher internalizing symptoms at baseline than their higher SES counterparts. Although baseline internalizing and externalizing symptoms did not predict the impact of COVID-19, higher concurrent internalizing symptoms were associated with less protective behaviors and a greater perceived impact during the outbreak. Higher concurrent externalizing symptoms were also associated with less engagement in COVID-19-related behaviors during May.

Overall, children's fears of illness increased during the study period, and this increase did not differ by SES or race. This increase may be related to the stress and uncertainty of the start of the new school year, including navigating the complexities of remote vs. in-person learning and the onset of academic, social, and family pressures. The increase in fear may relate to an increase in the personal relevance of the threat to oneself or loved ones due to the pandemic's worsening. For example, nearly half of children reported that they were afraid *most* or *all* of the time that people in the world might get sick and that they would not be able to see friends for a long time. In contrast, about half of children reported that they were afraid *some* of the time that they would get a bad illness, which increased to 60% in August. Children who reported having fears most or all of the time may be at risk of persistent fear and anxiety.

Interestingly, children's fears were not associated with their behaviors. This contrasts with recent studies in adults during the COVID-19 pandemic, suggesting that perceived threat and fear of contamination can trigger safety behaviors (e.g., hand-washing; Harper et al., 2020; Knowles and Olatunji, 2021). Instead, we found that children's exposure to the coronavirus was a significant predictor of children's safety behaviors during the pandemic. Similar findings were reported in a study of 5–15-year-old youth in Bangladesh. In that study, greater mental health disturbances were associated with having a relative or neighbor infected by COVID-19 (Yeasmin et al., 2020). Together, these data suggest that personal relevance may predict children's responses during the pandemic.

Overall, we found a significant *decrease* in children's internalizing symptoms from before the pandemic onset, which was driven by lower (but not higher) SES children. This was somewhat unexpected, given that, overall, the pandemic is thought to be associated with worsened mental health. However, lower SES children reported more internalizing symptoms before the pandemic relative to their higher SES counterparts. Thus, the decrease in internalizing symptoms in lower SES children made their levels comparable to that of higher SES children during the pandemic. These findings are similar to those reported in a study by Penner et al. (2020) in a sample of older (10–14 years), primarily Hispanic/Latinx 5th-8th grade students in the US. Penner and colleagues (2020) reported *reductions* in mental health problems among youth who had elevated levels before the onset of the pandemic. Taken together, these findings suggest that the mental health impacts of the COVID-19 pandemic may vary by SES and/or baseline symptoms. Penner et al. also pointed out that stay-at-home measures may lead to reduced peer stressors and academic pressures, which may improve mental health among some children (Penner et al., 2020). Stay-at-home measures may also reduce occupation-related stressors among lower SES parents with the aid of unemployment alongside the first pandemic relief payment in the US that was disbursed in April 2020, just prior to the May 2020 time point. Taken together, it will be important for researchers to identify risk or protective factors for mental health during COVID-19 among vulnerable groups, such as young children, those from lower SES households, and racial and ethnic minority groups.

There was also evidence that COVID-19 affects lower vs. higher SES households differently in our sample. Lower SES children reported more fears about social distancing than higher SES youth, and these effects were independent of race/ethnicity. These findings are consistent with reports that lower SES conditions may be a risk factor for poor children's mental health during the COVID-19 pandemic (Marques de Miranda et al., 2020) and following other disasters (Mclaughlin et al., 2009).

Families with fewer resources may live in shared communities and be less able to socially distance themselves from others, may have poorer access to healthcare or necessities, parents have lower ability to work from home, less access to the internet, poorer access to internal or other sources of social support networks. Lower SES families may have known that their communities were at higher risk early on or less able to socially distant than more affluent households, thereby increasing fear.

Several limitations warrant mention. First, due to in-person data collection constraints, this study relied on remote surveys, which may be associated with subjective reporting errors. Second, the sample size was relatively limited, and future studies with larger sample sizes are needed to validate these findings. We leveraged a longitudinal study that began in October 2019, before COVID-19-related school shutdowns, and thus the participation rate was limited by the unique challenges of studying families following the onset of a disaster (cf. Mclaughlin et al., 2009). The relatively limited sample size was somewhat tempered by the repeated-measures design and by the fact that the sample's socio-demographic composition included a large portion of minority youth, who are underrepresented in the literature on this topic, and who varied in SES. The limited sample size and the fact that the majority of the sample was Black American precludes our ability to assess whether effects are independent of race/ethnicity. However, results remained significant in the Black American subsample. Third, parent education is an imperfect proxy of SES and early experiences that are important for cognitive and emotional development. Future studies should examine other indicators (e.g., household income, occupation) and measure from more than one parent. Fourth, we focused on children's COVID-19-related fears and internalizing and externalizing symptoms, although there is evidence that children show a range of psychological responses to disasters. Future studies should examine other psychological markers, including children's depression and posttraumatic stress symptoms, as well as mental health of caregivers beyond reported fears.

5. Conclusion

Together, these data suggest that children's fears of illness increased over time, and these effects were independent of race and SES. An increase in fears over time has mental health implications, given that symptoms of fear-based disorders (e.g., anxiety, posttraumatic stress disorder) typically begin during the first two decades of life (Kessler et al., 2005). Lower SES children did, however, report more fears about social distancing during the pandemic as compared to their higher SES counterparts. Lower SES children also reported more internalizing symptoms prior to the onset of the pandemic, and internalizing symptoms decreased in this group following the stay-at-home orders. Finally, in contrast to what is reported in adults, children's fears did not drive their behaviors. Instead, exposure to the coronavirus was associated with children's safety behaviors during the pandemic. These findings underscore the need for research to identify the mental health impacts of COVID-19 on particularly vulnerable pediatric populations (e.g., younger, minority, lower SES). Future research should identify factors that can protect at-risk youth from adverse mental health consequences before and after the pandemic to prevent fear from persisting.

CRediT authorship contribution statement

Amanpreet Bhogal: Data curation, Conceptualization, Writing – original draft, Writing – review & editing. **Breanna Borg:** Conceptualization, Data curation, Project administration, Supervision, Writing – original draft, Writing – review & editing. **Tanja Jovanovic:** Conceptualization, Supervision, Writing – review & editing. **Hilary A. Marusak:** Conceptualization, Formal analysis, Funding acquisition, Project administration, Resources, Supervision, Visualization, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2021.114146.

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