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ADVERSITIES, AND TRAUMA SYMPTOMS IN CHILDREN**

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THE ASSOCIATION BETWEEN COVID-19 EXPOSURE, SECONDARY
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A thesis submitted in partial fulfillment
of the requirements for the degree of

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ABSTRACT

THE ASSOCIATION BETWEEN COVID-19 EXPOSURE, SECONDARY ADVERSITIES, AND TRAUMA SYMPTOMS IN CHILDREN

Maddi Gervasio

Natural disasters include direct exposure and secondary adversities (Chrisman & Dougherty, 2014). For youth, severity of disaster exposure and number of secondary adversities have been found to be positively associated with the severity of trauma-related psychopathology, including posttraumatic stress disorder (PTSD) and depression (Giannopoulou et al., 2006). Preliminary studies suggest an interaction between trauma exposure severity and number of secondary adversities in the prediction of psychopathology. Notably, youth who experienced secondary adversities without directly experiencing the trauma exhibited heightened psychopathology (Kar, 2019), yet these children tend to be excluded from studies and missed when identifying children in need of services.

Emerging research suggests that COVID exposure and COVID-related secondary adversities are positively associated with youths' PTSD and depression severity (Benke et al., 2020; Murata et al., 2021). Neither the predictive role of secondary adversities nor the interaction between disaster exposure and secondary adversities in the prediction of PTSD and depression severity have been examined in the context of the pandemic.

This study aims to examine the impact of the interaction between COVID exposure and number of COVID-related secondary adversities on youths' mental health in a diverse sample of children ($N=501$). Data are drawn from self-report measures administered via Qualtrics. COVID-19 Exposure and COVID-related secondary

adversities were assessed using the CHP Scale on Child Exposure to COVID-19 (Brown and Goodman, 2020). Child PTSD and depression symptoms were assessed using the Child PTSD Symptom Scale 5th edition (CPSS; Foa et al., 2018) and the Mood and Feelings Questionnaire (MFQ; Angold et al., 1995).

Hierarchical linear regressions were run with child age and family income as covariates, COVID-19 exposure (yes/no), number of COVID-related secondary adversities, and the interaction of COVID-19 exposure and secondary adversities as predictors, and CPSS and MFQ as the criterion variables. The overall model for PTSD predicted 16.7% of the variance, $F(5, 483) = 19.208, p < .001$. The overall model for depression predicted 13.3% of the variance, $F(5, 481) = 14.665, p < .001$. R^2 -change for the COVID Exposure-by-COVID-Related Secondary Adversities interaction term was 1.9% ($p < .001$) for PTSD and 1.4% ($p = .006$) for depression.

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Introduction

In the United States, 14% of children experience a natural disaster before the age of 18 (Becker-Blease et al., 2010; SAMSHA, 2018). Natural disasters include both direct exposure to harm or threat of harm and secondary adversities (Chrisman & Dougherty, 2014). Secondary adversities are stressors that occur as consequences of the trauma and can be specific to the trauma type; for example, after a hurricane, some families experience dislocation and lose their community. Secondary adversities can be experienced without having direct exposure to the natural disaster; for example, a child may lose their school in an earthquake they did not experience because their home is outside the impacted area (Pfefferbaum et al., 2015).

For youth, severity of disaster exposure and number of secondary adversities have been found to be positively associated with the severity of trauma-related psychopathology, including posttraumatic stress disorder (PTSD) and depression (Giannopoulou et al., 2006; Pfefferbaum et al., 2015). Preliminary studies suggest an interaction between trauma exposure severity and number of secondary adversities in the prediction of trauma-related psychopathology. Specifically, youth who experienced more secondary adversities had a larger association between trauma severity and PTSD symptom severity compared to those with fewer secondary adversities (La Greca et al., 2010). Notably, youth who experienced secondary adversities without directly experiencing the trauma exhibited heightened psychopathology (Kar, 2019), yet these children tend to be excluded from studies and missed when identifying children in need of services.

The COVID pandemic is a disaster with a range of exposure types and secondary adversities. COVID exposure is defined as illness or death in self, family, or close friends and COVID-related secondary adversities are defined as consequences to the virus including social distancing, disruption in family routine, employment/economic loss, and loss of school, community, home, and social support (Benke et al., 2020; Murata et al., 2021). Emerging research suggests that COVID exposure and COVID-related secondary adversities are positively associated with youths' PTSD and depression symptom severity (Benke et al., 2020; Murata et al., 2021). Neither the predictive role of secondary adversities nor the interaction between disaster exposure and secondary adversities in the prediction of PTSD and depression severity have been examined in the context of the pandemic. The goal of this study is to examine the impact of the interaction between COVID exposure and number of COVID-related secondary adversities on youths' mental health in a diverse sample of children living in New York City (NYC). This will help providers understand what combination of pandemic experiences puts youth at higher risk for PTSD and depression.

Disaster Exposure and Trauma-Related Psychopathology

Natural disasters (e.g., earthquakes, hurricanes, floods, pandemics) have a devastating impact on individuals and the community at large. Notably, 10% of youth who experience a natural disaster and 16% of youth who experienced a pandemic or epidemic develop PTSD (e.g., Brown et al., 2020; Yang et al., 2022). Additionally, children who experience a trauma are 2.6 times more likely to have clinically significant symptoms of depression (Vibhakar et al., 2019). In a comparison of disaster-affected youth versus

controls, 31% versus 17% met criteria for depression and 17% versus 9% met criteria for moderate to severe depression (Kar, 2019).

Post-Disaster Secondary Adversities and Trauma-Related Psychopathology

Secondary adversities, defined as post-trauma stressors that are consequences of the impact of the trauma on the individual and/or community, negatively impact youths' mental health (Pfefferbaum et al., 2015). Secondary adversities include loss/damages to property, relocation/dislocation, disruption to family routines, economic loss, loss of community, and decreases in social support (Chrisman & Dougherty, 2014; Pfefferbaum et al., 2015). After the Athens 1999 earthquake, one study found that 20% of youth who were not directly exposed to the earthquake but experienced a range of secondary adversities met criteria for PTSD (Giannopoulou et al., 2006). During pandemics, 30% of youth who experienced quarantine and isolation met criteria for PTSD (Sprang & Silman, 2013). Henssler and colleagues (2021) conducted a meta-analysis examining the impact of social isolation and quarantine during pandemics on mental health in youth and adults. They found that those experiencing isolation or quarantine for one week or longer were at an increased risk for adverse mental health outcomes compared to controls. Additionally, number of post-disaster secondary adversities has been found to be predictive of depression and PTSD symptom severity in youth, with those who experience more secondary adversities exhibiting higher symptom severity than those with fewer (Giannopoulou et al., 2006; Pfefferbaum et al., 2015).

Relation Between Disaster Exposure and Secondary Adversities on Trauma-Related Psychopathology

Secondary adversities decrease protective factors and impact children regardless of direct disaster exposure, thus impacting the relation between disaster exposure and trauma-related symptom severity. La Greca et al. (2010) conducted a 2-wave prospective study examining the impact of hurricane exposure severity, secondary adversities, and social support on children's PTSD symptoms. In this study, secondary adversities are conceptualized as ongoing loss/disruption (e.g., housing stability, material objects, peer support, family separation, financial resources), major life events directly and indirectly related to the hurricane, and disruption of social support. Participants were in the 2nd-4th grades in four elementary schools, one of which was destroyed in the Hurricane. They completed two assessments, nine months post-disaster (i.e., Time 1) and 21 months post-disaster (i.e., Time 2). La Greca et al. (2010) found that, at Time 2, number of secondary adversities (i.e., loss/disruption and major life events) were positively associated with PTSD symptom severity. Additionally, ongoing loss/disruption to social support moderated the relation between disaster exposure, defined by perception of life threat, and PTSD symptom severity. For youth with more loss/disruption and lower social support, more severe disaster exposure was associated with higher PTSD symptoms compared to those with less loss/disruption and higher social support (La Greca et al., 2010). This highlights that for hurricane exposed youth, the number of secondary adversities, especially those that reduce social support, moderate the relation between trauma exposure severity and PTSD symptoms in youth. Notably, this study only included youth with direct exposure to the hurricane, therefore excluding those without

direct exposure but with secondary adversities. Since secondary adversities without direct disaster exposure have been associated with symptom severity in youth, future studies need to include children without direct exposure to fully understand the impact of secondary adversities and ensure all affected children who need services are identified. Additionally, the sample only included children in the 2nd - 4th grade and 84% of the participants were Caucasian. Future studies need to include a more diverse sample and include children in middle and high school to better understand how children across all ages and races/ethnicities are impacted.

The number of secondary adversities experienced has a significant impact on depression symptom severity for youth with and without direct disaster exposure. Giannopoulou and colleagues (2006) conducted a cross-sectional study examining the impact of secondary adversities after the 1999 Athens earthquake on PTSD and depression symptom severity in children, ages 9-17. In the sample of 2036 children attending school in a suburb of Athens 10km from the epicenter, 1752 were directly exposed to the earthquake and 284 were not directly exposed. Participating children self-reported the number of secondary adversity types they experienced, ranging from 0-9 (Giannopoulou et al., 2006), using the post-earthquake adversity index of the Earthquake Trauma Questionnaire. There was no significant difference in number of adversity types between the two groups. The researchers found a significant interaction between direct exposure (yes/no) and gender for the prediction of PTSD, with females with direct exposure experiencing an increase in PTSD symptoms, disproportionate to males, compared to those without direct exposure. The researchers found a significant main effect for number of post-earthquake adversities for the prediction of PTSD. Participating

children with direct exposure and post-earthquake adversities had higher PTSD symptom severity than those with no direct exposure and no secondary adversities. Number of post-earthquake adversities was the strongest predictor of PTSD symptom severity for children with no direct exposure (14% of variance) and for depression symptom severity for all children (9% of variance for those with direct exposure and 8% of variance for those without direct exposure) above and beyond demographic variables, perceived threat, subjective distress, and objective exposure. Within this sample, 36% of the directly exposed children and 20% of the children without direct exposure met criteria for PTSD. In this current sample, previous trauma history is unknown, which has been found to impact the severity of trauma-related psychopathology. Due to this, it is unclear if previous traumas may impact the prediction of PTSD and depression. Additionally, the researchers only examined the interaction between direct exposure (yes/no) and demographic variables. Future research should evaluate if number of secondary adversities moderates the relation between trauma exposure and symptom severity after accounting for previous trauma history.

Emerging Research on COVID-19 Exposure and Secondary Adversities

Since the start of the pandemic, youth mental health concerns have increased. A meta-analysis including 29 studies evaluated the prevalence of depression symptoms in youth, 4-17 years old, during the pandemic across East Asia, Europe, and North America and found that within the first year of the pandemic 1 in 4 youth globally were experiencing elevated depressive symptoms which is double the pre-pandemic estimates (Racine et al., 2021). The COVID pandemic, including COVID illness and death exposure and COVID-related secondary adversities, is impacting the prevalence of

depression symptoms in youth. However, the role of COVID exposure and COVID-related secondary adversities on symptom severity is unclear.

Prime and colleagues (2020) proposed that youth with pre-existing vulnerabilities, such as trauma histories, and COVID-related secondary adversities are at exacerbated risk for developing psychopathology during the pandemic. Murata and colleagues (2021) conducted a cross-sectional study in the United States with adolescents, ranging from 13 to 17 years old, and adults to examine the impact of COVID exposure (i.e., suspected exposure to the virus, quarantining, sickness, and/or death of a loved one) on PTSD and depression symptom severity. Within this study, specific types of COVID-related secondary adversities were examined. These variables included quarantine, perceived loneliness, perceived stress, and exposure to media about COVID-19. They found that COVID exposure was positively associated with PTSD and depression symptoms in adolescents and adults. In a comparison between the adolescents and adults, the investigators found that adolescents were more likely to report higher PTSD and depression symptom severity compared to adults. Additionally, they found that number of secondary adversities (i.e., loneliness, amount of perceived stress, and number of hours of exposure to media coverage of COVID-19) were positively predictive of depression symptoms and severity of suicidal ideation and behavior in adolescents. Loneliness, lower household income, and amount of health worries related to COVID-19 were predictive of PTSD symptom severity in adolescents. This study does not include youth under the age of thirteen. More information is needed on how COVID exposure and secondary adversities are impacting children of all ages. Additionally, the distinction between COVID-19 illness and death exposure and COVID-related secondary adversities

is not clear. In this study, COVID-related secondary adversities were included in the coding of COVID-19 exposure. Future research is needed that distinguishes between COVID-19 illness and death exposure and COVID-related secondary adversities to better understand how each is impacting youths' mental health.

Few studies have specifically examined the impact of COVID secondary adversities on youth mental health. Panda et al. (2020) conducted a meta-analysis including fifteen studies examining the impact of the COVID-19 lockdown and quarantine measures on youth, ages 3-18, and caregiver mental health living in Asia and Europe. The fifteen studies were cross-sectional and included data from December 2019 to August 2020. They found that COVID lockdown and quarantine (yes/no) was associated with a negative impact on youth mental health. Overall, 42% of the youth reported elevated depression symptoms. This study included both children and adults and the authors do not examine if differences exist between the two groups. Additionally, the number of secondary adversities experienced, which has been found to be a predictor of symptom severity, was not included. Without number of secondary adversities included, the full impact of COVID-related secondary adversities on youth symptom severity cannot be known. Future research is needed to examine to role of number of secondary adversities on youth symptom severity.

Overall, this body of literature is limited and little is known about additional risk factors, such as previous trauma history, in the context of the pandemic. Guo et al. (2020) compared the differential impact of pre-pandemic maltreatment and COVID exposure on PTSD in youth, ages 11 to 18, living in rural China. Guo et al. (2020) found that both pre-pandemic maltreatment and COVID exposure contributed to the variance in PTSD.

However, pre-pandemic maltreatment accounted for more variance than COVID exposure. Because the authors only included maltreatment, all previous trauma types were not captured in this study. Further research is needed to understand the impact of the COVID-19 illness and death exposure, COVID-related secondary adversities, and their interaction on those most vulnerable to psychopathology, such as those exposed to interpersonal trauma. A comprehensive understanding of each of these components of the COVID pandemic is essential for practitioners to understand what to assess for and how to treat youth impacted by the pandemic.

Current Study

To understand the relevance of secondary adversities for mental health interventions following disasters, additional research is needed that distinguishes between trauma exposure (i.e., exposure to illness and death) and number of secondary adversities. In addition, selection of the participating sample needs to include children with and without direct trauma exposure and a range of number of secondary adversities. From a research design standpoint, we need to examine whether COVID-19 secondary adversities moderate the established relation between COVID-19 exposure and PTSD and depression.

In the current study, I estimated the unique variance accounted for by COVID-19 exposure and COVID-related secondary adversities on youth PTSD and depression symptom severity as well as the effect of the interaction between COVID-19 Exposure and COVID-19 related secondary adversities on the same outcomes. Participants included a sample of culturally- and economically-diverse youth living in NYC between August 2020 and January 2021. I hypothesized that COVID-related secondary

adversities would moderate the relation between COVID-19 exposure and PTSD and depression symptom severity. Youth with fewer secondary adversities will have a smaller association between PTSD severity and COVID exposure as well as depression severity and COVID exposure compared to those with more secondary adversities.

Methods

Participants

Participants were drawn from a NYC Needs Assessment Study (Brown, 2020), designed to evaluate the impact of COVID-19 on NYC children and their caregivers and identify needed resources for the community. Within the larger study, children and caregivers reported on mental health symptoms and COVID exposure. Eligible youth included 501 children between the ages of nine and seventeen and their caregivers who reported on exposure to COVID-19 illness and death exposure, COVID-19-related secondary adversities, and mental health symptoms. Children were included if both the child and caregiver data were complete, they were in the 4th to 12th grade, living in a NYC zip code, and answered all validation questions correctly. All participant responses were examined to identify invalid and fraudulent data using best practices for data screening which included checking validation questions, IP addresses, and examination of response patterns (Chandler et al., 2020; DeSimone et al., 2015). Data was collected from 1,749 participants and 1,248 were excluded when their responses were identified as invalid, questionable, or fraudulent. Of the potential participants, the final sample included 501 children, with 414 children who did not experience COVID illness nor death and 87 who did. Demographic information is presented in Table 1.

Measures

Demographic Information. Caregivers provided demographic information on themselves, their children, and family. This information included NYC zip code, family annual household income, child's age, race, ethnicity, and gender.

COVID-19 Exposure. To assess for COVID-19 illness and death exposure and amount of COVID-19-related secondary adversities, children completed the Child HELP Partnership Scale of Child Exposure to COVID-19 (Brown & Goodman, 2020). This is a self-report measure that assessed for COVID Exposure defined as illness or death in self, family, or close friends. The endorsements of COVID-19 Exposure contribute to the total, ranging from 0 (no exposure) to 28 (high exposure). Due to the skewed distribution of total score for COVID Exposure (see Table 2), COVID Exposure was dichotomized to reflect no exposure or some exposure. In addition to COVID Exposure, this measure also captures COVID-19 related secondary adversities. Children were asked if specific situations happened to them because of the coronavirus. The COVID-Related Secondary Adversities scale captured social isolation, loss of social support, loss/displacement of home, and family economic loss (see Appendix). The endorsements of COVID-19 related secondary adversities contributed to the total score, ranging from 0 (no secondary adversities) to 14 (high secondary adversities). The COVID-Related Secondary Adversities scale has adequate internal consistency (McDonald's $\omega = .740$).

PTSD symptom severity. Children's PTSD symptom severity was assessed using the Child PTSD Symptom Scale for DSM-5 (CPSS-5; Foa et al., 2018). This is a self-report measure that includes 20 items assessing DSM-5 PTSD symptom frequency and severity on a 5-point scale with *not at all*, *once a week or less/a little*, *two to three times a week/somewhat*, *four to five times a week/a lot*, or *six or more times a week/almost always*. Total PTSD Symptom Severity is then calculated and ranges from 0-80. Foa and colleagues (2018) established excellent internal consistency for the total symptom severity (Cronbach's $\alpha = .924$), good test-retest reliability ($r = .800$), and good

validity for the CPSS-5 self-report. The internal consistency for this sample was excellent (McDonald's omega = .939).

Depression symptom severity. Children's depression symptoms severity was assessed using the Mood and Feelings Questionnaire, short version (MFQ; Angold et al., 1995). This is a self-report measure consisting of thirteen items that describe feelings or behaviors that may manifest as depressive symptoms. Item responses are rated on a 3-point likert scale with *not at all*, *sometimes*, and *most of the time*. These endorsements are then summed together to for the total score, ranging from 0-26. The use of the MFQ short version has been validated for children between the ages of 8-18 (Cronbach's alpha = .88-.89) (Thabrew et al., 2018; Turner et al., 2014). The internal consistency for this study's sample was good (McDonald's omega = .867).

Procedures

All procedures were approved by St. John's University's Institutional Review Board. Data were drawn from a NYC Needs Assessment Study (Brown, 2020), designed to evaluate the impact of COVID-19 on NYC children and their caregivers and identify needed resources for the community. Data for this study were obtained from a cross-sectional survey design with active data collection between August 2020 and January 2021. Participants were recruited through community partners throughout NYC, such as the Borough Presidents, City Council offices, mental health agencies, educators, and clergy who helped distribute the study links. They survey was uploaded to Qualtrics, an online data collection system, and began with caregivers providing consent for themselves and their children to participate. After completing consent, the self-report and caregiver-report measures were accessed. Caregivers then provided the link to the assent

and child self-report measures to their children. After completion, caregivers were provided with a list of resources on trauma and bereavement and both caregivers and children were compensated with \$10 e-gift cards.

Statistical Analysis

Preliminary Analyses. Prior to running analyses, all scales were examined for normality. Normality of predictor variables were assessed by examination of histograms and descriptive statistics (mean, standard deviation, skewness, and kurtosis). The COVID-19 Exposure variable was highly positively skewed (skewness = 6.807) with 414 participants reporting no covid exposure (kurtosis = 61.257). Due to this, the COVID-19 Exposure variable was dichotomized (no exposure $n = 414$; some exposure $n = 87$). Correlation coefficients for potential covariates, identified from existing literature, were evaluated for inclusion. In this study, child age and family income were included as covariates. Even though previous trauma history is an important covariate, this was not included in the analysis due to its strong correlation with COVID exposure. To aid with interpretation, the continuous predictor variable (COVID-19 related secondary adversities) was mean-centered and the dichotomous predictor variable (COVID-19 Exposure) was dummy coded with no exposure as the reference group.

Outcome Analysis. Hierarchical linear regressions were conducted to assess the relative unique variance accounted for by child's age, family income, COVID-19 Exposure, and COVID-19 related secondary adversities on criterion variables of PTSD and depression, as well as the effect of the interaction between COVID-19 Exposure and COVID-19 related secondary adversities on the same outcomes. Two hierarchical linear regressions were run with child age and family income in Block 1 as covariates, COVID-

19 illness/death exposure (yes/no) in Block 2, number of COVID-related secondary adversities in Block 3, and the interaction of COVID-19 illness/death exposure and secondary adversities in Block 4 as predictors, and CPSS and MFQ as the criterion variables.

Results

To examine whether secondary adversities moderated the relation between COVID Exposure and PTSD, a hierarchical linear regression was conducted with Child Age and Family Income in Block 1, COVID Exposure (yes/no) in Block 2, number of COVID-Related Secondary Adversities in Block 3, and the interaction of COVID Exposure and secondary adversities in Block 4. Findings are presented in Table 3. The overall model predicted 16.7% of the variance, $F(5, 483) = 19.208, p < .001$. R^2 -change for the COVID Exposure-by-COVID-Related Secondary Adversities interaction term was 1.9% ($p < .001$). Examination of the interaction (COVID Exposure (yes/no) x Number of COVID Secondary Adversities (high, low)) plot (Figure 1) revealed that youth with COVID exposure and high amounts of secondary adversities were the most likely to endorse higher levels of PTSD compared to those with COVID exposure and low secondary adversities and those with no COVID exposure. Youth with COVID exposure and low amounts of secondary adversities had similar levels of PTSD compared to those with no COVID exposure. For youth with no COVID exposure, high amounts of secondary adversities was associated with slightly higher PTSD symptoms than those with low secondary adversities. Table 4 shows the standardized regression coefficients for all variables entered in Block 5. Follow-up analyses were conducted to evaluate the simple slopes for the COVID exposure ($t = 4.784, p < .001$) and no COVID exposure group ($t = 2.660, p = .008$) which found both slopes were significant.

To examine whether secondary adversities moderated the relation between COVID Exposure and depression, a hierarchical linear regression was conducted with Child Age and Family Income in Block 1, COVID Exposure (yes/no) in Block 2, number

of COVID-Related Secondary Adversities in Block 3, and the interaction of COVID Exposure and secondary adversities in Block 4. Findings are presented in Table 5. The overall model accounted for 13.3% of the variance, $F(5, 481) = 14.665, p < .001$. R^2 -change for the COVID Exposure-by-COVID-Related Secondary Adversities interaction term was 1.4% ($p = .006$). Examination of the interaction (COVID Exposure (yes/no) x Number of COVID Secondary Adversities (high, low)) plot (Figure 2) revealed that youth with COVID exposure and high amounts of secondary adversities were more likely to endorse higher levels of depression symptoms compared to those with COVID exposure and low secondary adversities and those with no COVID exposure. For youth with no COVID exposure, high amounts of secondary adversities was associated with slightly higher depression symptoms than those with low secondary adversities. Table 6 shows the standardized regression coefficients for all variables entered in Block 5. Follow-up analyses were conducted to evaluate the simple slopes for the COVID exposure ($t = 4.101, p < .001$) and no COVID exposure group ($t = 2.672, p = .008$) which found both slopes were significant.

Due to the large difference in group sizes, we then ran the analyses using a 2:1 case-control matching with IBM SPSS Statistics was performed (Rose & Van der Laan, 2009). For the subsample of children who did not experience COVID exposure, a 2:1 age matched no COVID exposure control group was obtained (No COVID Exposure $n = 174$, COVID Exposure $n = 87$). The results pattern was unchanged.

Discussion

In the current study, I aimed to examine if COVID-related secondary adversities moderated the relation of COVID-19 exposure with PTSD and depression symptom severity in youth. This study extends the limited literature on the impact of COVID-19 on the mental health of youth by examining the frequency (versus type) of secondary adversities on a pandemic (versus natural disasters). I found that number of COVID-related secondary adversities was a significant moderator for PTSD and depression. For youth with COVID exposure, those with high amounts of secondary adversities are associated with higher PTSD and depression symptom severity than those with low amounts of secondary adversities. For youth with no COVID exposure, those with high amounts of secondary adversities are associated with slightly higher PTSD and depression symptoms severity than those with low amounts of secondary adversities. Youth with COVID exposure and high COVID-related secondary adversities had the highest PTSD and depression symptom severity. Youth with COVID exposure and low secondary adversities had similar levels of PTSD and depression symptom severity as those with no COVID exposure. Although the COVID exposure-by-secondary adversities interaction term only accounted for 1% of the variance in PTSD and depression, the combination of the significant interaction and the main effect of secondary adversities highlight the need to attend to children who experience secondary adversities without direct exposure to the trauma.

These findings are consistent with previous literature that found that disaster secondary adversities (e.g., lack of financial stability, access to resources, and social support) are risk factors and impact the relation between disaster exposure and trauma-

related symptom severity in youth (Giannopoulou et al., 2006; Jensen et al., 2009; La Greca et al., 2010; Pfefferbaum et al., 2015). It highlights that more secondary adversities negatively impact PTSD and depression symptom severity in youth with and without direct exposure to COVID. Children without direct disaster exposure and with secondary adversities tend to be excluded from studies and missed when identifying children in need of services. Based on these findings, these children are at the same level of need or even higher need for services than those with direct disaster exposure, depending on the amount of secondary adversities. Providers, school personnel, and communities at large should adjust their understanding of disaster trauma and begin to assess for secondary adversities which may not be as obvious as disaster exposure.

The significance of the main effects are also consistent with previous studies of COVID-19 exposure and secondary adversities in youth (Guo et al., 2020; Murata et al., 2021; Panda et al., 2020). Consistent with previous literature COVID-related secondary adversities added unique variance to the prediction of PTSD and depression above and beyond interpersonal trauma exposure. This study adds support to Prime and colleagues (2020) model that COVID-related secondary adversities serve as a risk factor for psychopathology in youth during the pandemic.

Clinical and Public Health Implications

The findings from the current study have several implications for clinical and public health following a pandemic. Given the risk to those with direct exposure and those with indirect exposure with secondary adversities, all children living in the disaster-impacted area should be screened for services regardless of direct disaster exposure. Children should be screened for trauma exposure, exposure to illness and death, and

frequency of secondary adversities using standardized measurement tools. First, existing measurement tools (e.g., Earthquake Trauma Questionnaire, Child HELP Partnership Scale of Child Exposure to COVID-19) should be studied for reliability and validity. Once measurement development has been completed, the standardized and psychometrically robust measures should be accessible and used in a range of settings (e.g., schools, community centers, providers offices). Screening for secondary adversities should be conducted regardless of direct exposure to capture children who are typically unidentified. Once screened, providers should help connect families with the needed services. Secondary adversities, such as lack of financial stability and resources, may be a proxy for other risk factors (e.g., parental stress, negative life events related to poverty) for the development of PTSD and depression after a trauma and highlights the importance of connecting families with services. This is an essential step as Giannopoulou et al. (2006) found that post disaster, only 7% of the children who met criteria for PTSD sought mental health services following the earthquake when services were not discussed with families after they were assessed. Families may not understand how specific symptoms relate to the disaster or what treatments are available and effective.

Post-disaster interventions that address secondary adversities for youth and caregivers have been developed and evaluated after natural disasters. One evidence-informed intervention that has been implemented and evaluated for assisting people in the hours, days, and weeks following a disaster is called Psychological First Aid (PFA; Brymer et al., 2006). PFA is a modular approach to help youth and adults manage secondary adversities (e.g., school and home instability) through case management by

assessing for and problem-solving access to concrete needs. PFA targets short term and long-term functioning to reduce the initial distress caused by the trauma (Brymer et al., 2006). By assessing all children for secondary adversities in the disaster impacted area more families in need of PFA would be identified and connected with services. Typically, PFA is implemented by paraprofessionals hired to go to community centers or walk door-to-door and offer this service to everyone in the impacted community. If communities do not currently have this service available, schools or community advocacy programs can become trained in PFA. Youth and their caregivers with ongoing COVID-related secondary adversities would benefit from receiving PFA.

In addition to PFA, youth in disaster impacted areas can benefit from Skills for Psychological Recovery (SPR), an evidence-informed preventive intervention. SPR is a modular approach developed to help teach trauma survivors strength-based coping skills to promote recovery, protect survivors' mental health, and prevent maladaptive behaviors (Wade et al., 2014). Sheerin et al. (2021) examined the effectiveness of SPR at reducing mental health symptoms and overall distress, preventing long-term mental health problems, and facilitating safety during the COVID-19 pandemic. They conducted a outcomes study with 26 adults and 10 youth receiving five or six individual SPR sessions via telehealth services. They found that their participants reported slight reductions in depression and anxiety symptoms from pre- to post-treatment assessment. Notably, PTSD symptoms were not assessed. SPR also has been shown to be effective for children with secondary adversities in child welfare placements.

Limitations and Future Directions

The current study is unique in its evaluation of the impact of the COVID-19 on youth with and without direct COVID exposure living in NYC at the height of the pandemic. Despite the importance of the inclusion of youth without COVID exposure and with secondary adversities, the study has a number of methodological limitations that may affect generalizability of the results. As part of the inclusion criteria, the sample consisted of only NYC children. NYC was an early epicenter of the pandemic with approximately 203,000 confirmed cases within the first three months of the pandemic (Thompson et al., 2020). The impact of COVID exposure and COVID-related secondary adversities may be different for NYC children because children living in NYC experience higher rates of child abuse/neglect than other parts of the United States (NYS Kids' Well-being Indicators Clearinghouse, 2020; Children's Bureau, Child Welfare Information Gateway, 2021). During the lockdown, these children were confined to their apartments and disconnected from their community and social supports. Social support from peers, family, school, and community was directly impacted by COVID-related secondary adversities in the form of social distancing, remote learning, and cancelled community activities (e.g., prom, graduation, sports, theater, art, or music).

Additionally, this study has measurement limitations. Specifically, COVID exposure and secondary adversities were collected using one measure from one informant. Best practices for assessment include multi-measure and multi-informant assessments. Due to this, future studies should include both the child and parent report of disaster exposure, secondary adversities, and psychopathology. Parents may report more secondary adversities than the child depending on the child's age.

Lastly, the research design was a limitation. The current study used a cross-sectional design and was conducted from August 2020 to January 2021 when NYC was shut down. During this time, some secondary adversities, such as quarantine, were universal experiences. It is unknown if secondary adversities that are universal experiences have a different impact on psychopathology. Without longitudinal studies, we are unable to examine whether the outcomes of this study remain consistent after the distribution of the COVID-19 vaccine, removal of the stay-at-home orders, and reduction of social distancing.

More needs to be known about the role of secondary adversities on the relation between disaster exposure and symptom severity. Future studies should include comprehensive assessment of children's trauma exposure secondary adversities, and mental health problems using longitudinal designs. Additionally, future research is needed to implement and evaluate the effectiveness of interventions developed for natural disaster secondary adversities to understand how to best treat youth impacted by COVID-related secondary adversities. These studies can help to inform practitioners, parents, and teachers and prepare communities for future pandemics or epidemics.

Table 1

Sample Demographics

Variable	<i>M (SD)</i>	<i>Frequency</i> (%)
Age	13.87 (1.79)	
Gender		
Male		283 (56.5)
Female		217 (43.3)
Race & Ethnicity		
Hispanic		76 (15.2)
Black & Non-Hispanic/Latino		82 (16.4)
Asian		16 (3.2)
Native American/Pacific		15 (3.0)
Islander		
Caucasian		296 (59.1)
Multiracial		12 (2.4)
Other		4 (0.8)

Table 2

Frequency Statistics for COVID Exposure

# COVID Exposure Items Endorsed	Frequency of Endorsement	% Sample Endorsement
0	414	82.6%
1	12	2.4%
2	18	3.6%
3	27	5.4%
4	7	1.4%
5	5	1.0%
6	8	1.6%
7	3	0.6%
8	3	0.6%
14	1	0.2%
21	1	0.2%
25	1	0.2%
28	1	0.2%
Sample Total	501	100%

Table 3

Regression Results: Change Values on PTSD

Step	Variables Added	R^2	F	p	$R^2 \Delta$	$F\Delta$	p
1	Child's Age, Family Annual Income	.068	17.448	<.001	.068	17.448	<.001
2	COVID Exposure	.116	20.903	<.001	.048	25.999	<.001
3	COVID-related Secondary Adversities	.148	20.833	<.001	.033	18.357	<.001
4	COVID Exposure x COVID-Related Secondary Adversities	.167	19.208	<.001	.019	10.972	<.001

Table 4

Regression Results on Outcome: PTSD

Variable	B	SE	<i>t</i>	<i>p</i>
(Intercept)	21.381	5.924	3.609**	<.001
Age	.843	.316	2.666*	.008
Family Annual Income	-2.263	.593	-3.817**	<.001
COVID Exposure	2.218	1.874	1.184	.237
COVID-related Secondary Adversities	.731	.275	2.660*	.008
COVID Exposure x COVID-Related Secondary Adversities	2.242	.677	3.312**	<.001

Note. ** $p < 0.001$, * $p < 0.05$

Figure 1

Moderation of COVID-Related Secondary Adversities on the Relation Between COVID Illness and Death Exposure and PTSD Symptom Severity

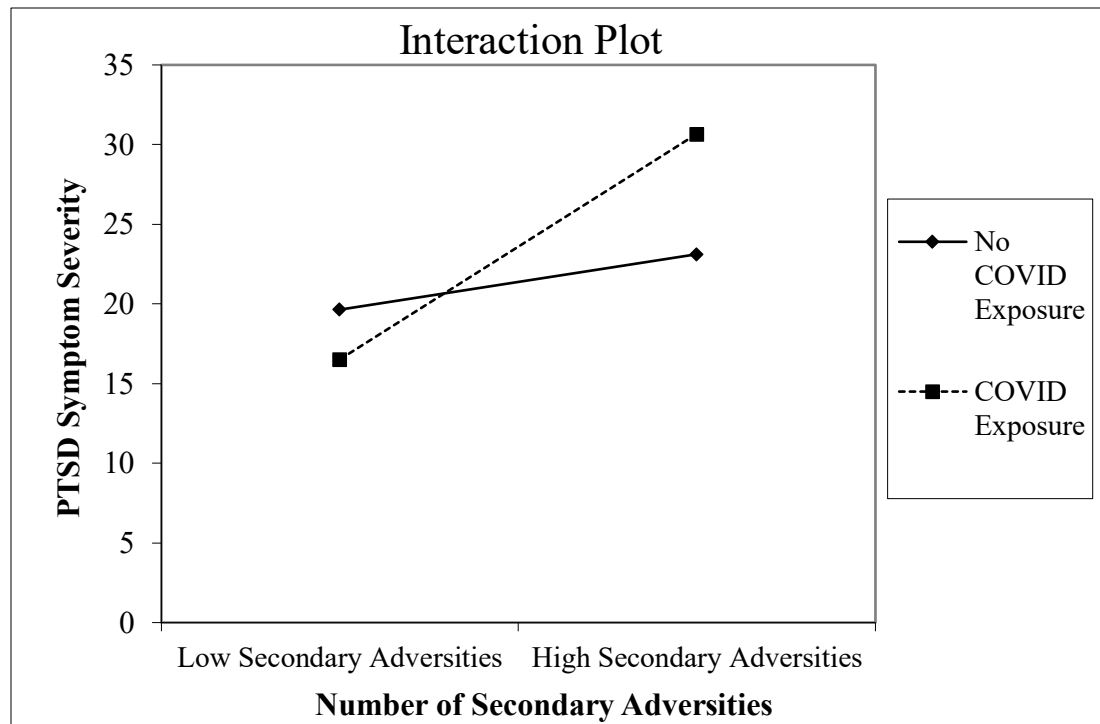


Table 5

Regression Results: Change Values on Depression

Step	Variables Added	R^2	F	p	$R^2 \Delta$	$F\Delta$	p
1	Child's Age, Family Annual Income	.034	8.542	<.001	.034	8.542	<.001
2	COVID Exposure	.090	15.832	<.001	.056	29.399	<.001
3	COVID-related Secondary Adversities	.120	16.210	<.001	.029	15.869	<.001
4	COVID Exposure x COVID- Related Secondary Adversities	.133	14.665	<.001	.014	7.588	.006

Table 6

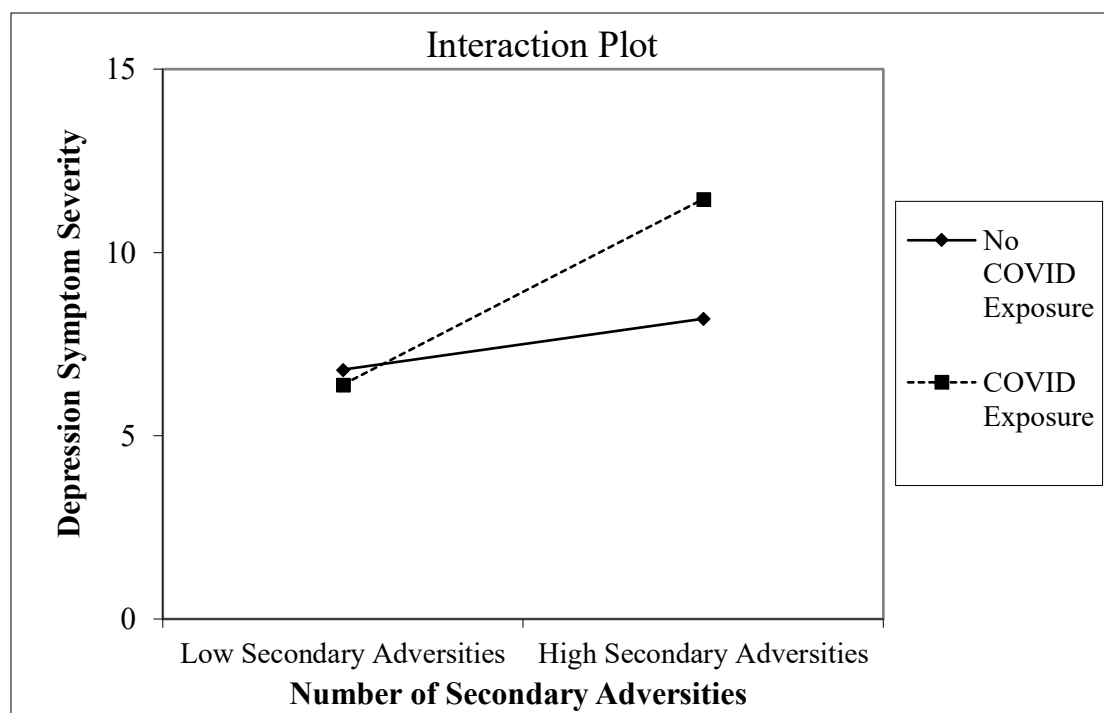
Regression Results on Outcome: Depression

Variable	B	SE	<i>t</i>	<i>p</i>
(Intercept)	7.498	2.361	3.176*	.002
Age	.215	.126	1.710	.088
Family Annual Income	-.544	.237	-2.292*	.022
COVID Exposure	1.427	.746	1.912	.056
COVID-related Secondary Adversities	.292	.109	2.671*	.008
COVID Exposure x COVID-related Secondary Adversities	.771	.280	2.755*	.006

Note. ** $p < 0.001$, * $p < 0.05$

Figure 2

Moderation of COVID-Related Secondary Adversities on the Relation Between COVID Illness and Death Exposure and Depression Symptom Severity



Appendix A

CHP Scale on Child Exposure to COVID-19

Please read each item and circle yes or no as to whether this happened to you because of the coronavirus.

1. I stayed distant from people outside my home	Yes	No
2. I couldn't play or hang out in person with my friends	Yes	No
3. I couldn't hang out in person with the members of my family who don't live with me	Yes	No
4. My school was closed	Yes	No
5. I had to do school from home	Yes	No
6. I had the technology I needed (computer/tablet and internet) to do school from home	Yes	No
7. I couldn't attend in person my school activities (e.g., graduation, prom)	Yes	No
8. I couldn't attend in person my afterschool activities (e.g., sports, theater, art, music)	Yes	No
9. I had no place to live	Yes	No
10. I had to move homes	Yes	No
11. I did not have enough to eat	Yes	No
12. My parent/caregiver was doing her/his/their job at home	Yes	No
13. My parent/caregiver was working in healthcare or other essential business outside my home (specify: _____)	Yes	No
14. My parent/caregiver was let go from her/his/their job	Yes	No

15. The adults taking care of me were worried about money	Yes	No
16. I was sick but not tested for coronavirus	Yes	No
17. I was tested for coronavirus	Yes	No
a. I had coronavirus	Yes	No
b. I was quarantined for coronavirus	Yes	No
c. I was in the hospital for coronavirus	Yes	No
d. My life was in danger	Yes	No
18. My parent/caregiver was tested for coronavirus (specify all: _____)	Yes	No
a. My parent/caregiver had coronavirus	Yes	No
b. My parent/caregiver was quarantined for coronavirus	Yes	No
c. My parent/caregiver was in the hospital for coronavirus	Yes	No
d. My parent/caregiver died	Yes	No
If yes, please specify cause of death: coronavirus other don't know		
e. I was there when my parent/caregiver died	Yes	No
f. I was part of a funeral or memorial for my parent/caregiver	Yes	No
19. Someone else I lived with was tested for coronavirus (specify all: _____)	Yes	No
a. Someone else I lived with had coronavirus	Yes	No
b. Someone else I lived with was quarantined for coronavirus	Yes	No
c. Someone else I lived with was in the hospital for coronavirus	Yes	No

d. Someone else I lived with died	Yes	No
If yes, please specify cause of death:		
coronavirus other don't know		
e. I was there when someone else I lived with died	Yes	No
f. I was part of a funeral or memorial for someone else I lived with	Yes	No
20. Other family members who didn't live with me were tested for coronavirus (specify all: _____)	Yes	No
a. Other family members who didn't live with me had coronavirus	Yes	No
b. Other family members who didn't live with me were quarantined for coronavirus	Yes	No
c. Other family members who didn't live with me were in the hospital for coronavirus	Yes	No
d. Other family members who didn't live with me died	Yes	No
If yes, please specify cause of death:		
coronavirus other don't know		
e. I was there when other family members who didn't live with me died	Yes	No
f. I was part of a funeral or memorial for other family members who didn't live with me	Yes	No
21. I have a friend(s) who was tested for coronavirus	Yes	No
a. My friend(s) had coronavirus	Yes	No

b. My friend(s) was quarantined for coronavirus	Yes	No
c. My friend(s) was in the hospital for coronavirus	Yes	No
d. My friend(s) died	Yes	No
If yes, please specify cause of death:		
coronavirus	other	don't know
e. I was there when my friend(s) died	Yes	No
f. I was part of a funeral or memorial for my friend(s)	Yes	No

22. How many of your loved ones have died since coronavirus started (March, 2020)?

Please read each item and circle yes or no as to whether this happened to you before the coronavirus.

1. Before coronavirus, I had such bad depression that it caused problems at home, with school, or with my friends	Yes	No
2. Before coronavirus, I had such bad fears and worry that they caused problems at home, with school, or with my friends	Yes	No
3. Before coronavirus, I had such bad anger or misbehavior that it caused problems at home, with school, or with my friends	Yes	No
4. Before coronavirus, I had such bad attention that it caused problems at home, with school, or with my friends	Yes	No
5. Before coronavirus, I had scary times when I was in danger of being hurt or dying	Yes	No
6. Before coronavirus, I had scary times when someone I loved was in danger of being hurt or dying	Yes	No

Please rate how often you did each one during the past week.

1. I did active things or moved my body	Rarely/ Never	Once in a while	Weekly	Everyday
2. I changed my upsetting thoughts	Rarely/ Never	Once in a while	Weekly	Everyday
3. I went to someone for help when I was upset	Rarely/ Never	Once in a while	Weekly	Everyday
4. I used relaxation, deep breathing, yoga, or meditation	Rarely/ Never	Once in a while	Weekly	Everyday
5. I played sports, rode my bike, or other aerobic exercise	Rarely/ Never	Once in a while	Weekly	Everyday
6. I drew, painted, wrote (stories, poems, journal), or composed music	Rarely/ Never	Once in a while	Weekly	Everyday
7. I read books, magazines, etc.	Rarely/ Never	Once in a while	Weekly	Everyday
8. I prayed	Rarely/ Never	Once in a while	Weekly	Everyday
9. I told myself "I can handle it" or "Things will get better"	Rarely/ Never	Once in a while	Weekly	Everyday
10. I talked to a relative or friend	Rarely/ Never	Once in a while	Weekly	Everyday

11. I talked to a counselor, spiritual leader, or therapist	Rarely/ Never	Once in a while	Weekly	Everyday
12. I blamed myself for the bad things that are happening	Rarely/ Never	Once in a while	Weekly	Everyday
13. I thought about the world being a dangerous place	Rarely/ Never	Once in a while	Weekly	Everyday
14. I got into yelling fights with my family	Rarely/ Never	Once in a while	Weekly	Everyday
15. I got into physical fights with my family	Rarely/ Never	Once in a while	Weekly	Everyday
16. I cried or screamed	Rarely/ Never	Once in a while	Weekly	Everyday
17. I avoided people	Rarely/ Never	Once in a while	Weekly	Everyday
18. I drank alcohol	Rarely/ Never	Once in a while	Weekly	Everyday
19. I used marijuana	Rarely/ Never	Once in a while	Weekly	Everyday
20. I used other drugs (e.g., cocaine)	Rarely/ Never	Once in a while	Weekly	Everyday
21. I hurt myself on purpose	Rarely/ Never	Once in a while	Weekly	Everyday

22. I saw or heard news about coronavirus on television and other screens	Rarely/ Never	Once in a while	Weekly	Everyday
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23. I did something to help other people	Rarely/ Never	Once in a while	Weekly	Everyday
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24. I volunteered my time, raised money, or donated supplies	Rarely/ Never	Once in a while	Weekly	Everyday
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Appendix B

COVID Secondary Adversities Scale

I stayed distant from people outside my home

I couldn't play or hang out in person with my friends

I couldn't hang out in person with the members of my family who don't live with me

My school was closed

I had to do school from home

I had the technology I needed (computer/tablet and internet) to do school from home
(*reverse scored*)

I couldn't attend in person my school activities (e.g., graduation, prom)

I couldn't attend in person my afterschool activities (e.g., sports, theater, art, music)

I had no place to live

I had to move homes

I did not have enough to eat

My parent/caregiver was working in healthcare or other essential business outside my home

My parent/caregiver was let go from her/his/their job

The adults taking care of me were worried about money

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