

# Prospective Examination of Psychological Trauma Among Adolescents During the COVID-19 Pandemic

Jasmine Lewis<sup>1</sup>, Srinidhi Jayakumar<sup>1</sup>, Rosanna Breaux<sup>1</sup>, Melissa R. Dvorsky<sup>2, 3</sup>, Joshua M. Langberg<sup>4</sup>, and Stephen P. Becker<sup>5, 6</sup>

<sup>1</sup> Department of Psychology, Virginia Polytechnic Institute and State University

<sup>2</sup> Department of Psychiatry and Behavioral Sciences, and Department of Pediatrics, The George Washington University School of Medicine and Health Sciences

<sup>3</sup> Division of Psychology and Behavioral Health, Children's National Hospital, Washington, District of Columbia, United States

<sup>4</sup> Department of Psychology, Virginia Commonwealth University

<sup>5</sup> Division of Behavioral Medicine and Clinical Psychology, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio, United States

<sup>6</sup> Department of Pediatrics, University of Cincinnati College of Medicine

**Objective:** This longitudinal study investigated the predictors of and changes in psychological trauma during the COVID-19 pandemic. **Method:** Participants included 236 adolescents (130 males;  $M_{\text{age}} = 16.74$  years in spring 2020; 49.6% diagnosed with attention-deficit hyperactivity disorder; 16.1% diagnosed with an anxiety or depressive disorder) in the United States who completed online questionnaires at four timepoints (spring 2020, summer 2020, fall 2020, spring 2021). **Results:** Repeated measures ANOVA showed that psychological trauma was highest during stay-at-home orders in spring 2020, and decreased for a majority of adolescents by the summer of 2020. However, ~20% of adolescents exhibited moderate-to-clinical levels of psychological trauma at each timepoint. Four groups were identified based on the presence of psychological trauma symptoms: (a) *resilient group* (normal range across all timepoints; 60.6%); (b) *moderate fluctuating group* (moderate range at 1 or more timepoints; 18.2%); (c) *severe fluctuating group* (clinical range at 1 or more timepoints; 14.0%); and (d) *chronic psychological trauma group* (moderate or clinical range across all timepoints; 7.2%). Females, adolescents with preexisting internalizing disorders, and participants whose families were most impacted by the pandemic were more susceptible to experiencing psychological trauma symptoms. **Conclusions:** Findings highlight at-risk populations and suggest that the COVID-19 pandemic resulted in psychological trauma symptoms for approximately 20% of adolescents at some point during the first year of the pandemic. There is critical need to provide mental health services to adolescents, such as through school-based services, to reduce the negative long-term psychological impact of the pandemic.

### Clinical Impact Statement

Female adolescents, those with preexisting internalizing disorders, and those whose families were most impacted by the pandemic are most vulnerable for displaying psychological trauma symptoms during the COVID-19 pandemic. Despite decreases in symptoms on average from spring 2020 to spring 2021, approximately 20% of adolescents experienced moderate-to-clinical psychological trauma symptoms at some point in 2020–2021. Addressing this substantial mental health need during the ongoing pandemic, such as through school-based services, is critical.

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Jasmine Lewis  <https://orcid.org/0000-0002-5913-6848>

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Correspondence concerning this article should be addressed to Rosanna Breaux, 460 Turner Street NW, Suite 207, Blacksburg, VA 24061, United States. Email: [rbreaux@vt.edu](mailto:rbreaux@vt.edu)

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The COVID-19 pandemic caused a major shift in every facet of life for adolescents across the world. In-person interactions with teachers/peers and extracurricular activities were paused for students in the United States beginning in March 2020 (Moreland et al., 2020). Many students continued to experience remote learning and/or multiple changes in learning format during the 2020–2021 school year (Becker et al., 2020; Lischer et al., 2021). Along with these disruptions, the pandemic has the clear potential to be a chronic stressor for many adolescents given the ongoing threat of COVID-19 exposure for themselves or loved ones, and the numerous emotional, mental, and financial stressors brought on by the pandemic. Chronic stress or trauma early in life has been linked to psychiatric morbidity such as posttraumatic stress disorder (PTSD) and depression over the life span (Heim et al., 2008; Pervanidou et al., 2020). Adolescents are especially vulnerable to chronic stressors because the brain structures that mediate the stress response (e.g., pituitary gland, hippocampus, amygdala, prefrontal cortex) are still maturing during this developmental period (Romeo, 2013). Additionally, the adolescent brain is more sensitive to glucocorticoids (e.g., cortisol), and the duration and amount of glucocorticoids released during times of stress for adolescents is increased (Romeo, 2013). There is currently a gap in the literature on the long-term psychological traumatic impact that a continuous stressor like the COVID-19 pandemic could have on adolescents, especially those with preexisting psychiatric disorders. As such, the present study sought to examine changes in psychological trauma symptoms in adolescents in the United States during the COVID-19 pandemic across four timepoints: spring 2020, summer 2020, fall 2020, and spring 2021. Additionally, it examined factors (pre-COVID-19 mental health diagnoses, biological sex, and COVID-19 impact) that may predict higher levels of psychological trauma symptoms.

### Psychological Trauma Following Chronic Stress

Trauma exposure (i.e., a Criterion A event that involves actual or threatened death, serious injury, or sexual violence) is a required risk factor for the diagnosis of PTSD, but it is not sufficient because not all who are exposed to trauma develop PTSD. In addition, even individuals that may not meet the diagnostic criteria according to the *Diagnostic and Statistical Manual, Fifth Edition (DSM-5; American Psychiatric Association, 2013)*, may still be suffering from chronic traumatic stress and significant life impairment (Williamson et al., 2015). Due to the nature of the pandemic, many individuals might experience significant distress characteristic of psychological trauma yet not fit PTSD diagnostic criteria. For example, diagnostic criteria for PTSD excludes trauma exposure through social media, TV, or movies, and the diagnosis focuses on the stress reactions from past, not future events. However, studies have shown that the daily reminders of the infection and death rate through media outlets was stressful for some adolescents and adults. For example, Bridgland et al. (2021) found

that adults exhibited “PTSD-like symptoms” for events they anticipated would happen, regardless of if they were directly exposed to COVID-19 or indirectly exposed through the media.

Prior research during other traumatic events and chronic stressors have shown the short- and long-term impact of natural disasters (e.g., hurricane, earthquake, wild fire; Cénat & Derivois, 2015; Jin et al., 2019; Orengo-Aguayo et al., 2019), school shootings (e.g., Miron et al., 2014; Travers et al., 2018), and other disasters (e.g., Yule et al., 2000) on the mental health of adolescents. Specifically, some psychological trauma symptoms may not appear immediately but appear sometime after traumatic exposure. For example, among adolescent survivors of the Wenchuan earthquake in China, it was discovered that the prevalence rate for PTSD (23.3%) was the highest 1 year after the traumatic event, although there were five distinct patterns of change in PTSD symptoms following the earthquake (Fan et al., 2015). These findings highlight the need to examine the various patterns of psychological trauma symptoms that adolescents could experience after a traumatic event or chronic stressor. We might expect for there to be similar differential patterns of change in psychological trauma symptoms during the COVID-19 pandemic, as some might have been initially impacted by stay-at-home orders and the initial shock of the pandemic, but then improved as summer and the return to school in fall 2020 occurred, whereas others might have a more latent reaction as the pandemic continues. Others might show early symptoms that remain high throughout the chronic stressor; and still others might experience low levels of symptoms throughout. Such patterns of response for psychological trauma have yet to be explored during the COVID-19 pandemic.

### Potential Predictors for Risk of Psychological Trauma

Many individual factors, including demographic factors (e.g., biological sex), clinical factors such as the presence of an internalizing disorder (e.g., anxiety, depression) or attention-deficit/hyperactivity disorder (ADHD), and the impact of the trauma (e.g., duration, proximity, severity) have been previously identified as predictors of psychological trauma development following traumatic events. Regarding sex, females develop PTSD at a higher rate than males even when trauma type is controlled for (e.g., Garza & Jovanovic, 2017; Tolin & Foa, 2006) and score higher on reexperiencing, avoidance, and arousal subscales of PTSD (Ditlevsen & Elklit, 2010). Internalizing disorders contribute to the pre-traumatic risk for PTSD in females, since these disorders are more prevalent in females than males postpuberty (e.g., Christiansen & Hansen, 2015). Regarding clinical diagnoses, numerous studies have shown that internalizing symptoms is a predictor of increased risk for the development of PTSD after traumatic exposure (e.g., Perkonig et al., 2000; Storr et al., 2007). For example, a retrospective study investigating PTSD in young adults found that those with preexisting major depression had a threefold increased risk of developing PTSD after trauma exposure (Breslau et al.,

2000). Similarly, in a longitudinal study with 166 trauma-exposed adolescents, Haller and Chassin (2012) found higher levels of internalizing symptoms predicted development of PTSD, especially if coupled with family adversity. Externalizing disorders such as ADHD have also been linked to increased risk for PTSD. Specifically, individuals with ADHD (a neurodevelopmental disorder characterized by high rates of inattention, impulsivity, and/or hyperactivity) are at higher risk for exposure to psychological trauma (Ford & Connor, 2009). Additionally, childhood ADHD has been found to significantly increase risk for PTSD in adulthood (e.g., Adler et al., 2004; Biederman et al., 2014). Importantly, this elevated risk for PTSD among individuals with ADHD does not appear to merely be individuals with PTSD being mislabeled as having externalizing problems (e.g., Szymanski et al., 2011). Finally, proximity to a traumatic event or chronic stressor is a risk factor for developing PTSD. Direct exposure is strongly associated with PTSD (e.g., Elklit & Petersen, 2008; May & Wisco, 2016). Indirect exposure such as learning about an unexpected death of a close family member or friend can also cause psychological trauma symptoms. For example, a study examining posttraumatic stress in students after the Virginia Tech campus shooting in 2007 found that uncertainty about the safety of a close friend/acquaintance was associated with one of the highest levels of posttraumatic stress symptoms (Hughes et al., 2011). This highlights that psychological trauma symptoms can occur through both direct and indirect exposure to a traumatic event.

### COVID-19 and Psychological Trauma Symptoms

Little is known about the short- and long-term effects of a chronic stressor, such as the COVID-19 pandemic, with only one study to date examining such impacts prior to COVID-19. Specifically, Sprang and Silman (2013) examined the effect of isolation and quarantine on the mental health of children and their parents from previous pandemics such as the influenza A (H1N1) and the severe acute respiratory syndrome (SARS). They found that parents and children that had to either isolate or quarantine during these pandemics were at increased risk to either screen as at risk for PTSD or to meet the diagnostic criteria for PTSD (Sprang & Silman, 2013). Specifically, 28% of parents that experienced isolation or quarantine met the diagnostic criteria for PTSD compared to 5.8% of parents who did not experience social distancing. Furthermore, 30% of the children who had experienced isolation or quarantine met the diagnostic criteria for PTSD, compared to 1.1% of children who were not isolated/quarantined (Sprang & Silman, 2013).

Early research on the psychological impact of the COVID-19 pandemic has shown that adolescents are experiencing higher levels of psychological distress than pre-COVID (Qiu et al., 2020). For example, a survey given to 8,079 Chinese adolescents found that 43% experienced symptoms of depression and 37% experienced anxiety symptoms (Zhou et al., 2020). However, when examining psychological trauma symptoms specifically, research during COVID-19 has almost exclusively focused on adults, particularly healthcare workers (e.g., Blekas et al., 2020; Johnson et al., 2020). To date, only a handful of cross-sectional studies have examined psychological trauma symptoms during the COVID-19 pandemic among adolescents (Hu et al., 2021; Li et al., 2020; Liang et al., 2020; Murata et al., 2021; Yue et al.,

2020). In the studies conducted in China in January–March 2020, rates of severe psychological trauma symptoms or meeting criteria for PTSD ranged considerably (3.5–12.1%). Murata and colleagues (2021) found that adolescents in the United States were significantly more likely to display moderate to severe psychological trauma symptoms (45%) relative to adults (33%) during spring/summer 2020. There has been limited research examining predictors of trauma-related distress during the pandemic; however, one study suggests that positive coping is a protective factor and negative coping is a risk factor for trauma-related distress in adolescents (Zhang et al., 2020). Despite this solid foundation of evidence for the significant impact COVID-19 has had on adolescent psychological trauma symptoms, we are unaware of any study that has used a prospective longitudinal design to examine psychological trauma symptoms at multiple timepoints during the pandemic in the United States.

Given this backdrop, this study sought to fill this gap in the literature by examining the psychological trauma symptoms of adolescents in the United States, and factors that contributed to such symptoms throughout a year of the COVID-19 pandemic (i.e., from stay-at-home orders in spring 2020 to spring 2021 once widespread vaccination had begun). Our sample is uniquely suited to examine risk for psychological trauma symptoms, as the sample was recruited pre-COVID-19 with approximately half of the adolescents being comprehensively diagnosed with mental health disorders. Unlike many other traumas the onset of psychological trauma for COVID-19 is unclear and may affect individuals differently at different times. This article represents a unique and important study assessing change in and predictors of psychological trauma symptoms over four COVID-19 timepoints. Based on prior longitudinal COVID-19 mental health research (e.g., Breaux et al., 2021), it was hypothesized that rates of psychological trauma symptoms would be highest during spring 2020 stay-at-home orders, with decreases observed on average from spring 2020 to spring 2021. It was further hypothesized that a small but meaningful proportion of adolescents would continue to display moderate or severe psychological trauma symptoms during summer 2020 through spring 2021. Finally, it was predicted that females, adolescents with ADHD or an internalizing disorder, and adolescents whose families were most impacted by the pandemic, would display the highest rates of psychological trauma symptoms throughout the COVID-19 pandemic.

## Method

### Participants and Procedure

Participants were 236 adolescents (130 males; 15–17 years,  $M = 16.74$ ,  $SD = .60$  in spring 2020) who were initially recruited from local middle schools around two sites in the Southeastern and Midwestern United States (a university and an academic medical center). Approximately half of the sample ( $n = 117$ ) was specifically recruited to represent adolescents diagnosed prior to COVID-19 with ADHD. Almost a third of adolescents (30.2%; 8.4% of adolescents without ADHD; 52.6% of adolescents with ADHD) were receiving school-based services through an Individualized Education Program or 504 Plan prior to COVID-19. Additionally, 38 participants were comprehensively diagnosed with an

anxiety or depressive disorder prior to COVID-19. Adolescents identified as predominantly White (80.5%), with 9.7% identifying as biracial/multiracial, 5.5% identifying as Black, 4.2% Asian; 5.5% of the sample identified as Hispanic/Latinx. Participants came from a range of socioeconomic backgrounds ( $M$  family income = \$95,000,  $SD$  = \$33,766), with 23% of families falling below the 2019 median household income (\$68,703; Semega et al., 2020). Participants who provided consent to be contacted in the future (visits between September 2018–February 2020;  $N$  = 262) were invited to participate in the current study, with COVID-19 data being collected over four timepoints: spring 2020 (May–June, 2020; 3.8% missing adolescent data), summer 2020 (July–August, 2020; .8% missing adolescent data), fall 2020 (October–November, 2020; 11.4% missing adolescent data), and spring 2021 (March–May, 2021; 22.0% missing adolescent data). Details of the larger study’s diagnostic and study procedures can be found elsewhere (Becker et al., 2019) and in the [online supplemental materials](#). Study procedures were approved by the Virginia Commonwealth University and Cincinnati Children’s Hospital Medical Center Institutional Review Boards.

## Measures

### *Child and Adolescent Trauma Screen*

The Child and Adolescent Trauma Screen (CATS; Sachser et al., 2017) is a 20-item self-report questionnaire on a 4-point scale (0 = *never* to 3 = *almost always*) that screens for psychological trauma symptoms in youth ages 7–17 years. The questionnaire assesses each of the five DSM–5 PTSD symptom clusters: reexperiencing, avoidance, negative mood/cognition, arousal, and functional impairment. The CATS used in this study was modified to assess posttraumatic stress symptoms specifically resulting from the COVID-19 pandemic (e.g., “Upsetting thoughts or pictures about the COVID-19 pandemic that pop into your head.”) for nine of the items; the remaining 11 items were general psychological trauma symptoms (e.g., “Trouble falling or staying asleep.”). The CATS has been shown to have good reliability  $\alpha$ s = .88 to .94, and strong convergent validity ( $r$ s = .62–.82; Sachser et al., 2017). Reliability was very good across all four time points in the present dataset:  $\alpha$ s = .92–.93. The total symptom score was calculated by summing up the 20 items (range = 0–60). A cut-off  $\geq 21$  is indicative of a clinically relevant level of psychological trauma symptoms, whereas values between 15 and 20 are considered moderate psychological trauma symptoms, and values  $< 15$  are not clinically elevated.

### *Pre-COVID Mental Health Diagnoses*

The ADHD group consisted of any adolescents who met DSM–5 criteria for ADHD combined or predominantly inattentive presentation pre-COVID-19. The Internalizing Disorder group consisted of any adolescents who met criteria for any anxiety or depressive disorder (e.g., generalized anxiety, major depression, persistent depressive disorder) pre-COVID-19 based on parent or adolescent report on the Children’s Interview for Psychiatric Syndromes (ChIPS; Weller et al., 2000). The ChIPS is a highly structured interview designed for use by trained lay interviewers, which was validated in inpatient, outpatient, and community-based samples (Weller et al., 2000). Diagnoses were provided first by the

study staff (e.g., doctoral student, postdoctoral fellow) administering the ChIPS, and then discussed with a PhD-level clinician prior to determining final diagnoses.

### *Epidemic-Pandemic Impacts Inventory*

The Epidemic-Pandemic Impacts Inventory (EPII; Grasso et al., 2020) consists of 92 parent-report yes/no items that assess the impact of COVID-19 on members of a family’s personal, professional, and social life. The measure asks questions about changes in employment, education, home life, health, and social activities since the pandemic (e.g., “Laid off from job or had to close own business,” “Had a child home who could not go to school,” “Separated from family and close friends”). Items 1–49 of the questionnaire were used to calculate the total impact score for this study, which covered topics on education, home life, work, employment, social activities, economics, emotional health, and well-being. Of note, two items were not endorsed by any participants (i.e., 21. Became homeless, 38. Unable to access clean water), as such this variable includes 47 items. Reliability as measured by Kuder–Richardson-20 (KR-20 = .86) value was acceptable for this measure in the current study.

## Analytic Plan

Descriptive statistics and bivariate correlations were first examined. A repeated measures ANOVA with follow-up comparison tests was run to examine linear and quadratic change in psychological trauma symptoms from spring 2020 to spring 2021. Next, we examined the percentage of adolescents who fell into the moderate and clinical psychological trauma ranges at each timepoint. Finally, subgroups were created to reflect patterns of change in psychological trauma symptoms throughout the pandemic. Chi-square tests were then run to examine whether biological sex, ADHD diagnostic status, and internalizing disorder diagnostic status differed across the identified subgroups, and a one-way ANOVA was run to examine whether COVID-19 impact differed across the identified groups. All analyses were run in SPSS Version 26.

## Results

Descriptive statistics and correlations for study variables are presented in [Table 1](#). Females were less likely to be diagnosed with ADHD but had higher levels of internalizing disorders and psychological trauma. Adolescents with internalizing disorders had higher levels of psychological trauma symptoms during the summer and fall 2020 timepoints. Parents of adolescents with ADHD reported being more impacted by COVID-19. Furthermore, parents reporting higher levels of COVID-19 impact had adolescents with greater psychological trauma at two timepoints (spring and fall 2020). Finally, strong correlations were found between psychological trauma symptoms at all four timepoints.

### **Change in Psychological Trauma from Spring 2020 to Spring 2021**

The repeated measure ANOVA revealed that on average, psychological trauma symptoms displayed significant linear and quadratic change from spring 2020 to spring 2021;  $F$  = 6.11 and 14.48,

**Table 1**  
Descriptive Statistics and Correlations Between Study Variables

Variable	M(SD) or %	1	2	3	4	5	6	7	8
1. Biological sex	44.9%	—							
2. ADHD status	49.6%	-.20**	—						
3. Anx/Dep status	16.1%	.14*	.07	—					
4. COVID-19 family impact	23.4 (10.3)	.01	.16*	.03	—				
5. Spring 2020 Trauma Sx	9.9 (9.7)	.28***	-.09	.13	.21**	—			
6. Summer 2020 Trauma Sx	7.9 (8.4)	.24***	-.01	.19**	.12	.72***	—		
7. Fall 2020 Trauma Sx	7.7 (8.4)	.24**	.01	.16*	.15*	.66***	.74***	—	
8. Spring 2021 Trauma Sx	7.5 (8.6)	.22**	-.02	.09	.07	.52***	.59***	.75***	—

Note. Biological sex is presented as % female (0 = male, 1 = female), ADHD Status is presented as % diagnosed with ADHD (0 = no ADHD diagnosis, 1 = ADHD diagnosis), and Anx/Dep Status is presented as % diagnosed with an anxiety or depressive disorder (0 = no anxiety or depressive disorder diagnosis, 1 = anxiety or depressive disorder diagnosis). ADHD = attention-deficit/hyperactivity disorder; Anx = anxiety; Dep = depression; COVID-19 = Coronavirus Disease 2019; Trauma Sx = psychological trauma symptoms as measured by the Child and Adolescent Trauma Screen.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

$p = .014$  and  $p < .001$ , respectively<sup>1</sup>. Specifically, psychological trauma symptoms were significantly higher in spring 2020 than summer 2020;  $t = 4.12$ ,  $p < .001$ , fall 2020;  $t = 4.18$ ,  $p < .001$ , and spring 2021;  $t = 2.69$ ,  $p = .008$  (see Figure 1a). In contrast, symptoms in summer 2020; fall 2020; and spring 2021 did not significantly differ,  $t_s = -.35 - .40$ ,  $p_s > .688$ . Examination of rates of moderate and clinical levels of psychological trauma symptoms revealed a slightly different pattern than the continuous repeated measures ANOVA analysis (see Table 2). Specifically, 25.1% of adolescents displayed moderate to clinical psychological trauma symptoms during spring 2020. There were significant drops in rates of clinical psychological trauma from spring to summer 2020 (13.2 to 8.5%),  $p = .050$  (resulting in 17% in the moderate to clinical range). Although rates of clinical psychological trauma continued to drop in fall 2020 (7.2%) and spring 2021 (7.0%) this was not a significant change ( $p_s > .197$ ). Rates of moderate psychological trauma symptoms displayed a nonsignificant increase from summer to fall 2020 (8.5% to 11.5%), and again from fall 2020 to spring 2021 (11.5% to 12.4%),  $p_s > .224$ . As such, approximately 20% of adolescents remained in the moderate to clinical psychological trauma range during the 2020–2021 school year.

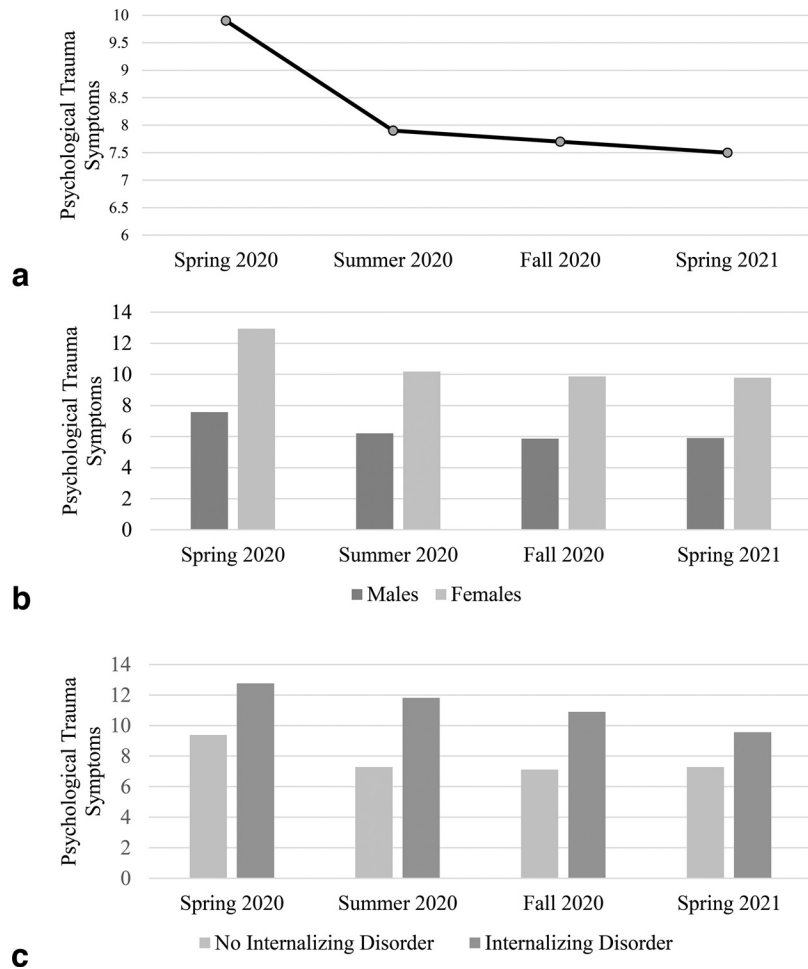
To better understand individual variation in psychological trauma symptoms, five groups were created based on patterns of change observed in these categorical classifications across the four timepoints in this sample and prior chronic stress research (Fan et al., 2015): (a) a *resilient group* who remained in the normal range across all timepoints ( $n = 143$ ); (b) a *moderate fluctuating group* who were in the moderate range at one or more timepoints but the normal range for all other timepoints ( $n = 43$ ); (c) an *early psychological trauma recovery group* who met for clinical psychological trauma in spring and/or summer 2020; but not fall 2020 or spring 2021 ( $n = 25$ ); (d) a *delayed psychological trauma group* who met for clinical psychological trauma in fall 2020 or spring 2021; but not spring or summer 2020 ( $n = 8$ ); and (e) a *chronic psychological trauma group* who remained in the moderate or clinical psychological trauma range across all timepoints ( $n = 17$ ). Because the third and fourth groups, particularly the delayed PTSD group, had small sample sizes, these were collapsed into a single *severe fluctuating group* who were in the clinical psychological trauma range at one or more timepoints but the moderate and normal range for the other timepoints ( $n = 33$ ).

### Predictors of Psychological Trauma Symptoms During the COVID-19 Pandemic

Results for the chi-square and ANOVA analyses comparing the four psychological trauma groups are presented in Table 3. Biological sex significantly differed across the four psychological trauma groups,  $\chi^2 = 13.59$ ,  $p = .004$  (see Figure 1b for mean psychological trauma symptoms for males vs. females at each timepoint). Specifically, females were significantly more likely than males to be in the severe fluctuating group ( $p < .024$ ) and significantly less likely than males to be in the resilient group ( $p < .001$ ). Females and males did not significantly differ in their likelihood to be in the moderate fluctuating or chronic psychological trauma groups,  $p_s > .102$ . ADHD diagnostic status did not significantly differ across the four identified psychological trauma groups,  $\chi^2 = 2.03$ ,  $p = .567$ . Internalizing disorders diagnostic status marginally differed across the four identified psychological trauma groups,  $\chi^2 = 6.60$ ,  $p = .086$  (see Figure 1c for mean psychological trauma symptoms for adolescents with vs. without an internalizing disorder at each timepoint). Post hoc comparisons found that adolescents with preexisting anxiety or depressive diagnoses were significantly more likely to be in the chronic psychological trauma group relative to adolescents without preexisting internalizing disorders ( $p = .025$ ). Adolescents with and without an internalizing diagnosis did not differ significantly in their likelihood to be in the resilient, moderate fluctuating, or severe fluctuating groups,  $p_s > .146$ . Finally, COVID-19 impact significantly differed across the four identified psychological trauma groups,  $F = 2.65$ ,  $p = .050$ . The

<sup>1</sup> Given that participants with an ADHD ( $\chi^2 = 8.26$ ,  $p = .004$ ) or internalizing ( $\chi^2 = 5.50$ ,  $p = .019$ ) disorder were less likely to have CATS data at all four time points and that repeated measures ANOVA uses listwise deletion, these analyses were rerun using multiple imputation with 10 imputed datasets. Participants with versus without complete CATS data did not differ on demographic factors (sex, family income, race/ethnicity). Similar pooled means across the 10 datasets relative to the original dataset (see Table 1) were observed at each of the four timepoints (spring 2020: 10.01, summer 2020: 7.62, fall 2020: 7.66, spring 2021: 7.82). The same pattern of significant linear and quadratic change was observed across all 10 estimated datasets, all  $p_s < .004$ , with spring 2020 having significantly higher psychological trauma symptoms than the other three timepoints  $p_s < .002$ , and the summer 2020, fall 2020, and spring 2021 timepoints not significantly differing from each other,  $p = .712-.914$ .

**Figure 1**  
*Psychological Trauma Symptoms During the First Year of the COVID-19 Pandemic for (a) Entire Sample, (b) Males vs/Females, and (c) Adolescents With vs. Without an Internalizing Disorder Pre-COVID-19*



chronic psychological trauma group had significantly higher COVID-19 impact than the moderate fluctuating group,  $p = .039$ , and marginally higher COVID-19 impact than the resilient group,  $p = .073$ . However, the chronic psychological trauma group did not significantly differ from the severe fluctuating group,  $p = .396$ , and the resilient group did not significantly differ from the moderate fluctuating group,  $p = .840$ .

**Table 2**  
*Frequency of Moderate and Clinical Psychological Trauma Symptoms Across COVID-19 Timepoints*

Timepoint	Not clinically elevated %	Moderate psychological trauma symptoms %	Clinical psychological trauma symptoms %
Spring 2020	74.9%	11.9%	13.2%
Summer 2020	82.9%	8.5%	8.5%
Fall 2020	81.3%	11.5%	7.2%
Spring 2021	80.5%	12.4%	7.0%

**Discussion**

This study sought to extend the limited research on psychological trauma among adolescents during the COVID-19 pandemic. Our study was uniquely suited to assess differences over time and predictors of psychological trauma symptoms over time, with four COVID-19 timepoints spanning a year of the pandemic. We found that the highest rate of moderate or clinical psychological trauma symptoms (25%) was during stay-at-home orders in spring 2020. Despite rates dropping in summer 2020, ~20% of adolescents still displayed elevated psychological trauma symptoms in spring 2021. Notably, 60% of adolescents in our study demonstrated resilience throughout the first year of the pandemic, with no elevations in psychological trauma symptoms at any timepoint. However, 14% displayed clinical psychological trauma symptoms at one timepoint or more and 7% displayed chronic psychological trauma across all timepoints. Females and adolescents with pre-existing internalizing disorders reported higher levels of psychological trauma symptoms during the pandemic, and were more likely to be in the severe fluctuating or chronic psychological trauma

**Table 3**  
*Chi-Square and ANOVA Analyses Comparing Psychological Trauma Groups*

Variable	Resilient group % or <i>M(SD)</i>	Moderate fluctuating group % or <i>M(SD)</i>	Severe fluctuating group % or <i>M(SD)</i>	Chronic psychological trauma group % or <i>M(SD)</i>	$\chi^2$ or <i>F</i>
Biological sex					13.59**
Males	70.8%	15.4%	9.2%	4.6%	
Females	48.1%	21.7%	19.8%	10.4%	
ADHD diagnostic status					2.03
Comparison	58.0%	20.2%	16.0%	5.9%	
ADHD Dx	63.2%	16.2%	12.0%	8.5%	
Internalizing disorder diagnostic status					6.60 <sup>†</sup>
Comparison	62.6%	17.2%	14.6%	5.8%	
Internalizing Dx	50.0%	23.7%	10.5%	15.8%	
COVID-19 impact	23.01 (10.27)	21.53 (8.92)	24.61 (9.49)	29.41 (10.34)	2.65*

Note. Dx = diagnosis.

<sup>†</sup>  $p < .10$ . \*  $p < .05$ . \*\*  $p < .01$ .

groups, respectively. Adolescents who reported higher COVID-19 impact displayed chronic psychological trauma symptoms during the first year of the COVID-19 pandemic. These results, consideration of the COVID-19 pandemic within *DSM-5* nosology, and possible interventions to help adolescents that have psychological trauma symptoms are discussed next.

The highest level of psychological trauma was observed early in the pandemic, during the stay-at-home orders of spring 2020; with large decreases in psychological trauma by summer 2020 that remained low, on average, from summer 2020 to spring 2021. This finding suggests that the sudden increase in COVID-19 infections, frequent media stories, and rapid transition to stay-at-home orders resulted in high rates of posttraumatic stress during spring 2020; however, once stay-at-home orders had lifted in summer 2020 and many individuals returned to some pre-COVID-19 normality (e.g., in-person interactions) these symptoms significantly decreased and remained low for most adolescents. Similarly, the proportion of adolescents in our sample who displayed clinical psychological trauma symptoms dropped from 13.2% in spring 2020 to 8.5% in summer 2020. However, the proportion of adolescents who displayed moderate or clinical psychological trauma symptoms remained substantial in fall 2020 and spring 2021 (18.7% and 19.4%, respectively). This is consistent with previous literature examining the prevalence of posttraumatic stress symptoms after a chronic stressor, with some studies showing that symptoms can develop a while after the onset of the stressor and persist several years after the initial event (e.g., Jin et al., 2019). Alternatively, it is possible that the summer 2020 timepoint had a drop in psychological trauma symptoms given that adolescents were not in school and exposed to the stressful school-related challenges (e.g., shifting from remote to in-person schooling) that were present during the academic year. Further, we identified four groups representing patterns of change in psychological trauma: a resilient group (normal range at all four timepoints; 60.1%), a moderate fluctuating group (moderate range at  $\geq 1$  timepoint; 18.1%), a severe fluctuating group (clinical psychological trauma symptoms range at  $\geq 1$  timepoint; 13.9%), and a chronic psychological trauma group (moderate or clinical psychological trauma symptoms at all timepoints; 7.1%). Although it is encouraging that 60% of adolescents remained resilient throughout the first year of the COVID-19 pandemic, it is concerning that 40% of adolescents

displayed moderate or clinical psychological trauma symptoms at least once during this time. Given this high proportion, it is critical to examine potential predictors of such elevations in psychological trauma.

We examined biological sex, pre-COVID-19 mental health diagnoses, and COVID-19 impact as predictors of psychological trauma. Females were more likely than males to be in the severe fluctuating group and significantly less likely than males to be in the resilient group. The fact that females reported higher psychological trauma symptoms and were more likely than males to display clinical psychological trauma at some point in our study aligns with previous literature on traumatic events in youth (e.g., Garza & Jovanovic, 2017; Guessoum et al., 2020). Similarly, and consistent with prior research (e.g., Schwartz et al., 2017), we found that adolescents with preexisting anxiety or depressive diagnoses were significantly more likely to be in the chronic psychological trauma group relative to adolescents without preexisting internalizing disorders. Given our sample size and analyses, we were not able to simultaneously examine the impact of biological sex and internalizing disorders. However, the fact that differences were found for different groups across these two predictors (i.e., severe fluctuating and resilient for sex and chronic severe for internalizing disorders), suggests that we are not merely identifying the same at-risk subpopulation with these two predictors. Based on research with other traumatic events and chronic stressors (e.g., McFarlane, 1987), we expected that adolescents whose families were more impacted by the pandemic early on would have more severe and longer duration of psychological trauma. Consistent with our hypothesis, the chronic psychological trauma group had higher family COVID-19 impact than the moderate fluctuating group and the resilient group.

In contrast, and inconsistent with prior literature (e.g., Swansburg et al., 2021; Uçar et al., 2022), ADHD diagnostic status did not significantly differ across the four identified psychological trauma groups, despite adolescents with ADHD having parents who reported higher family COVID-19 impact at the bivariate level. It is possible that the unique circumstances brought on by the COVID-19 pandemic (e.g., less social interactions, more flexibility in learning) may have actually resulted in some positive outcomes for adolescents with ADHD (e.g., less bullying, less demand on sitting and attending for extended periods of time;

Chawla et al., 2021; McFayden et al., 2021) and thus somewhat less psychological stress for these adolescents. Another potential explanation for why adolescents with ADHD are not displaying higher psychological trauma symptoms during the pandemic is that there they are worrying less about the pandemic than adolescents without ADHD (i.e., are less likely to experience worries about themselves, family, or friends being infected or about their physical or mental/emotional health being negatively impacted by COVID-19; Dvorsky et al., 2022).

The *DSM-5* nosology for PTSD and Acute Stress Disorder largely focuses on traumatic events that (a) are related to actual or threatened death, serious injury, or sexual violence; (b) happen in the past; and (c) have a clear start and end (APA, 2013). However, these criteria do not fully capture the chronic traumatic stress brought on from the COVID-19 pandemic, which includes the fear of future trauma (e.g., COVID-19 exposure, death of family or friends, negative impact of the pandemic on the adolescent's future); prolonged social isolation; and significant occupational, academic, and financial stressors (Bridgland et al., 2021). Prior research found that individuals exhibited "PTSD-like symptoms" for events that had not yet happened, whether they had been indirectly or directly exposed to COVID-19, and that this anticipatory fear about future trauma was the best predictor of PTSD-like symptoms (Bridgland et al., 2021). This finding is also consistent with prior research that has shown that thinking about future trauma can lead to PTSD symptoms outside of the COVID-19 pandemic (e.g., Goutaudier et al., 2019). Additionally, unlike many traumas, the onset and end of the traumatic event for COVID-19 is unclear and may affect individuals differently at different times, with some adolescents perhaps not experiencing elevated symptomatology for months or even years after the end of the stressor. This possibility is highlighted from the results in the current study, with a small portion (3.4%) of adolescents who did not display elevated psychological trauma symptoms until fall 2020 or spring 2021 and ~20% adolescents who remained in the moderate to clinical psychological trauma range in spring 2021. In addressing this critical psychological need, it seems prudent to not wait until after the chronic stressor (i.e., COVID-19 pandemic) is over, nor to rely on a formal *DSM-5* diagnosis such as PTSD or Acute Stress Disorder, to intervene.

Given the unique circumstances of everyone being affected by the COVID-19 pandemic, school-based mental health services may be an ideal way to intervene and reduce the psychological impact of the pandemic for adolescents. School-based mental health services provide crucial services to adolescents that otherwise may not receive any assistance; for example, 35% of adolescents who receive services in a school setting have not received any mental health services elsewhere (Lipari et al., 2016). Our study suggests that approximately 20% of adolescents are still displaying moderate to severe psychological trauma symptoms as of spring 2021; with females, adolescents with preexisting internalizing disorders, and adolescents whose families were most impacted by the pandemic (e.g., family members infected or hospitalized, financial/employment impacts) being the most vulnerable. Prior evidence suggests that early school-based intervention is most effective in helping students after a traumatic event (Yule, 1992); as such, we believe that school-wide intervention is critically needed during the 2021–2022 school year. One school-based intervention that has shown efficacy in decreasing psychological trauma symptoms in youth is Cognitive Behavioral Intervention for Trauma in Schools (CBITS). CBITS uses cognitive-behavioral

approaches (e.g., psychoeducation, relaxation, social problem solving, cognitive restructuring, exposure) to lessen symptoms of PTSD, depression, and behavioral issues, and to enhance functioning, grades and attendance, peer and parent support, and coping skills in students from late elementary through high school (Jaycox et al., 2012). Importantly, CBITS can be delivered by anyone who provides mental health services in the school setting (e.g., school counselors) and has a free 5-hour web-based training course available and a publicly available manual ([https://www.rand.org/content/dam/rand/pubs/tools/TL200/TL272/RAND\\_TL272.pdf](https://www.rand.org/content/dam/rand/pubs/tools/TL200/TL272/RAND_TL272.pdf)). This ensures feasibility for broad dissemination and implementation of CBITS by school mental health professionals. A few studies (e.g., Allison & Ferreira, 2017; Morsette et al., 2009; Wolmer et al., 2011) have shown that students experienced significant decline in PTSD, stress, and depression symptoms after treatment, including among students who did not meet criteria for PTSD. This suggests that school-based mental health programs can assist in reducing psychological trauma symptoms as well as other psychological concerns in the aftermath of the COVID-19 pandemic, which is crucial.

These findings need to be considered within the context of several limitations. First, our sample was predominately White and from middle to upper socioeconomic backgrounds. Given the disproportionate impact of the pandemic on Black and Latinx Americans and families from lower socioeconomic statuses, it is possible that our observed rates of psychological trauma may be an underestimate. Relatedly, it is possible that families who continued to participate in our study were less impacted early on by the COVID-19 pandemic and/or the civil unrest in the United States during this time, and thus are experiencing less psychological stress. Similarly, it is important to note that we did not administer the CATS pre-COVID-19, as this measure was modified to be specific to the pandemic. However, only three participants met diagnostic criteria for PTSD pre-COVID-19 based on parent and self-report on a diagnostic interview, suggesting that the observed rates of psychological trauma likely do not result from other traumatic exposure. Additionally, although our prospective examination of change in psychological trauma symptoms is a strength, ideally more sophisticated analyses such as latent trajectory analysis could be used to identify subgroups and patterns of change in symptoms over time. Unfortunately, our sample was underpowered for such analyses; this is an important area for future research. Finally, half the sample was specifically recruited for ADHD and common psychological comorbidities pre-COVID-19; ADHD diagnosis is overrepresented. Despite these limitations, our study showed that females, those with a preexisting internalizing disorder, and adolescents whose families were most impacted by COVID-19 were more susceptible to experiencing psychological trauma symptoms during the pandemic. In addition, we found that although psychological trauma symptoms decreased for most adolescents after stay-at-home orders, 20% remained in the moderate to severe range through spring 2021. Helping address these widespread psychological trauma symptoms among adolescents is critical.

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