



## Linking trauma to mental health in the statewide Texas Youth Depression and Suicide Research Network (TX-YDSRN)

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### ABSTRACT

Rates of youth depression and suicide are rising worldwide and represent public health crises. The present study examined the relationship between trauma history and symptoms of depression, suicidal ideation, and anxiety among suicidal and depressed youth. A diverse group of 1000 8–20-year-olds enrolled in the statewide Texas Youth Depression and Suicide Research Network (TX-YDSRN) reported their trauma history (Traumatic Events Screening Inventory for Children) and symptoms of depression (Patient Health Questionnaire for adolescents; PHQ-A), anxiety (Generalized Anxiety Disorder scale; GAD-7), and suicidality (Concise Health Risk Tracking scale; CHRT-SR). Nearly half of the sample reported exposure to multiple categories of traumatic experiences. Number of trauma exposure categories significantly predicted PHQ-A and GAD-7 scores. Exposure to interpersonal trauma and to sexual trauma were significantly associated with PHQ-A, GAD-7, and CHRT-SR scores. The number of trauma exposure categories was associated with increased levels of anxiety and depression; however, only exposure to interpersonal or sexual trauma was associated with more suicidality. Clinicians should assess trauma exposure in patients seeking psychiatric care, especially for interpersonal and sexual trauma, which may be predictive of increased risk for suicidality in depressed youth. Future work should disentangle the effects of specific trauma types from multiple trauma exposure.

### 1. Introduction

Rates of youth depression and suicide are rising worldwide and present a critical public health problem. Between 2007 and 2018, rates of suicide among U.S. youth and young adults increased 57.4 % (Curtin, 2020), and suicide is the second leading cause of death for Americans between the ages of 10 and 34 (Curtin, 2022). Similarly, between 2009

and 2019, rates of past year major depressive episodes of adolescents in the U.S. increased from 8.1 % to 15.8 % (Daly, 2022). As youth depression tends to persist and has been related with poorer functioning in adulthood (Copeland et al., 2021), there is a need to better understand the characteristics of and precursors for adolescent depression and suicidality.

Adverse Childhood Experiences (ACEs) have been clearly linked to

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negative physical and mental health outcomes in adulthood (Anda et al., 2006; Felitti et al., 1998; Mandelli et al., 2015; Mersky and Topitzes, 2010; Wright et al., 2009). Youth in the US experience trauma at high rates, and many youths report experiencing more than one type of ACE before they turn 18 (Finkelhor et al., 2015). These multiple traumatic and ACEs have been found to have a graded, dose-dependent relation to adverse outcomes; risk of depression, suicidality, and anxiety, increase as the number of traumatic and ACEs increase (Anda et al., 2006; Felitti et al., 1998; Fox et al., 2019). Overall, these findings indicate the importance of considering the cumulative effects of trauma on youth to understand the common experience of multiple traumas more clearly.

Previous literature has also explored the psychological impacts of specific trauma categories and specific types of ACEs. One such category is interpersonal trauma (i.e., victimization); this category includes child maltreatment, physical and sexual assault, and the witnessing of violence. In studies of adolescents, interpersonal trauma experiences have been related to higher rates of depressive symptoms (Turner et al., 2010), suicidal ideation (Turner et al., 2012), and anxiety (Cyr et al., 2014). Further, many researchers have examined the specific impacts of sexual assault on the development of depressive symptoms, revealing that sexual abuse experiences are a consistent predictor of adolescent and adult depression (Hickman et al., 2013; Radell et al., 2021; Weiss et al., 1999). Of note, while exposure to specific types of trauma, such as sexual abuse, or trauma categories, such as interpersonal trauma, appear to be particularly impactful on mental health outcomes, several studies have found multiple trauma exposure as the strongest predictive factor for these outcomes (Cyr et al., 2014; Finkelhor et al., 2007; Hickman et al., 2013; Negele et al., 2015).

Although prior research has established the relationship between trauma and mental health outcomes, these studies have predominantly relied on community-based (Anda et al., 2006; Felitti et al., 1998; Finkelhor et al., 2015) or targeted, trauma-exposed samples (Hickman et al., 2013). Few studies have specifically examined the impact of childhood trauma on clinical samples with depression and suicidality (Fisher et al., 2013; Giampetruzzi et al., 2023; Miller et al., 2009; Negele et al., 2015; Young et al., 1997), and even fewer have studied adolescents with depression and suicidality. In an inpatient sample of adolescents, Stewart and colleagues found a complex relationship between specific types of peer victimization experiences and symptoms of suicidality, depression, and anxiety (Stewart et al., 2018). The limited work using adolescent outpatient clinical samples has found similar associations between trauma exposure and depressive symptoms but has not considered suicidal ideation or anxiety (Connell et al., 2018; Peh et al., 2017). Overall, further work is required to determine the impacts of childhood exposure to trauma on the mental health of depressed and suicidal youth.

### 1.1. Present study

Funded by the Texas State Legislature as part of the Texas Child Mental Health Care Consortium (TCMHCC), the Texas Youth Depression and Suicide Research Network (TX-YDSRN; <https://tx-ydsrn.swmed.org/>) is an ongoing multisite prospective observational study aimed at understanding the mental health needs of depressed and suicidal youth across Texas. The current analyses examine the frequency of traumatic experiences reported at baseline among the first 1000 youth enrollees and aim to characterize the relationship between exposure to trauma and symptoms of depression, anxiety, and suicidality. Based on the extant literature, we hypothesized that youth with more types of traumatic experience categories would report higher levels of depression, anxiety, and suicidality. Given past findings that interpersonal trauma and sexual abuse may be particularly impactful on mental health outcomes, we expected that youth who experienced interpersonal and/or sexual trauma would display higher rates of depression, anxiety, and suicidality than youth who only experienced other types of traumas.

## 2. Methods

### 2.1. Study procedures

The TX-YDSRN comprises 12 academic medical centers and their corresponding clinical sub-sites (see Trivedi et al. 2023 for further detail). This state-wide depression registry includes youth between the ages of 8–20 years who screen positive for depression and/or suicidality or were receiving care for depression. For minors, assent and parental consent were obtained, while adult participants provided consent. The University of Texas Southwestern Medical Center Institutional Review Board (IRB) acted as a single IRB of record for all Nodes; node IRBs also reviewed the study protocol. Participants completed a series of self-report and assessor administered measures during the baseline visit. Participants then completed self-report and assessor administered measures regularly for 24 months. The present manuscript considers baseline data only.

### 2.2. Participants

Participants were 1000 youth whose age ranged from 8 to 20 years old ( $M = 15.5$ ,  $SD = 2.6$ ). Most participants (61.4 %) identified their gender as cis-gender female, 25.7 % identified their gender as cis-gender male, and 12.9 % reported identifying as trans, non-binary, or questioning their gender identity. Most youth identified their race as White (66.0 %), followed by More Than One Race (11.1 %), Black or African American (10.6 %), Another Race Not listed (8 %), Asian (1.8 %), Unknown (1.8 %), and American Indian/Alaskan (1.4 %) and Native Hawaiian (0.2 %); 44.2 % of the sample identified their ethnicity as Hispanic.

### 2.3. Measures

The Traumatic Events Screening Inventory for Children (TESI-C) (Ford, 1997) is an 18-item, semi-structured interview conducted with the youth that assesses for lifetime exposure to potentially traumatic events. For the present study two items were added to capture bullying and cyberbullying and one item that captures emotional abuse and neglect (for a total of 21 items, see Supplementary Table 1 for each type of traumatic event category captured in this study). The TESI-C has demonstrated adequate psychometric properties (Daviss et al., 2000; Ford, 1997; Ford et al., 1999).

For the first analysis, four groups were created based on the number of trauma exposure categories reported: none, 1, 2-3,  $\geq 4$ , allowing for the examination of dose response relationships as proposed by Bethell et al. (2017). Each TESI-C item endorsed was counted as one trauma exposure category (possible range 0–21). For the second analysis, participants were categorized as having experienced interpersonal trauma or not; exposure to the following trauma categories was used for interpersonal trauma classification: been attacked or punished severely, stealing from you/mugging you, kidnapped or family/friend kidnapped, family fighting/attacking each other, family yelling/screaming a lot, family prison/police involved with family, people outside home fighting/attacking, people outside home yelling a lot, exposure to war/terrorism on tv, sexual abuse, bullying, or cyberbullying. The participants without an interpersonal trauma were further separated into the non-interpersonal trauma group (for those exposed to any other type of trauma) and the no trauma group. Similarly, for the third analysis participants were categorized as having experienced sexual abuse, another non-sexual trauma (inclusive of other non-sexual interpersonal traumas and non-interpersonal traumas), or no trauma. It is worth noting that interpersonal trauma is inclusive of sexual abuse in our definition; the third analysis focuses on the impact of sexual abuse alone.

The Patient Health Questionnaire (PHQ-9) (Spitzer et al., 1999) modified for adolescents (PHQ-A) (Johnson et al., 2002; Kroenke et al., 2001) is a 9-item self-report scale that measures the severity of

depression symptoms over the past two weeks. Each item was rated on a 4-point Likert-type scale ranging from 0 (Not at all) to 3 (Nearly every day). Responses were then summed into a total score. The PHQ-A has demonstrated good psychometric properties (Johnson et al., 2002). The internal consistency for the scale in the current sample was good ( $\alpha = .85$ ).

The Generalized Anxiety Disorder-7 (GAD-7) (Spitzer et al., 2006) is a 7-item self-report scale that measures the severity of generalized anxiety symptoms over the past two weeks. Youth rated each item on a 4-point Likert-type scale that ranged from 0 (Not at all) to 3 (Nearly every day). Responses were then summed into a total score. The GAD-7 has demonstrated good psychometric properties when used with youth (Hughes et al., 2021). The internal consistency for the scale in the current sample was good ( $\alpha = .88$ ).

The Concise Health Risk Tracking Self-Report (CHRT-SR) (Mayes et al., 2018; Trivedi et al., 2011) is a 16-item self-report measure that examines the severity of suicidal thoughts and associated risk factors for suicide during the past week. Items were rated on a 5-point Likert-type scale ranging from 0 (Strongly Disagree) to 4 (Strongly Agree). The Total Score was used for these analyses. The CHRT-SR has demonstrated good psychometric properties and has been validated for adolescents (Mayes et al., 2018). The internal consistency for the scale in the current sample was excellent ( $\alpha = .91$ ).

### 2.4. Statistical analyses

We assessed the assumption of normality for residuals using normal quantile plots; no major violations of the normality assumption were noted. Continuous data were summarized as mean and standard deviations while categorical data were reported as frequency and percentages. Groups were compared using chi-square tests or analysis of variance F tests. Analysis of covariance (ANCOVA) models were used to compare mean levels of continuous outcomes across trauma groups adjusted for age (continuous), gender identity (cis-female, cis-male, or trans/non-binary), and race (White or BIPOC). If there was a significant main effect of trauma (exposure category, interpersonal trauma exposure, or sexual trauma exposure) on the outcome variable, post-hoc pairwise t-tests were used to compare the least squares (LS) means. Exploratory, unplanned gender by trauma group interactions were also conducted in separate ANCOVA models with the same model constituents as detailed above. Post-hoc pairwise t-tests were used to compare gender LS means when interactions were found to be significant. The analyses were conducted using SAS 9.4 (SAS Inc, Cary, NC). P-values < 0.05 were considered statistically significant.

## 3. Results

### 3.1. Descriptive statistics

Descriptive data is detailed in Table 1. The sample ( $n = 1000$ ) was found to have moderate severity of depression and anxiety, and trauma exposure was common; 34.3 % participants reported no lifetime trauma exposure, 17.5 % reported 1 lifetime trauma exposure category, 27.8 % reported 2-3 lifetime trauma exposure categories, and 20.4 % reported 4+ lifetime trauma exposure categories. Exposure to any interpersonal trauma was endorsed by 48.7 % of participants, while exposure to specifically sexual trauma was endorsed by 24.0 %. In Supplementary Table 1, we report the frequencies for each type of trauma exposure. Supplementary Tables 2–4 detail the demographic and clinical variables of the sample by each type of trauma exposure group.

### 3.2. Association of number of trauma categories with mental health symptoms

Tables 2a and 2b detail the results of our first analysis. There were main effects of trauma exposure and gender on PHQ-A score and GAD-7

**Table 1**  
Demographic and self-report measure data for the baseline TX-YDSRN sample.

Variable	Total Sample	
	n = 1000	
Age in Years, mean (sd)	15.5	2.6
Age Group, n (%)		
8 < age < 12	67	6.7
12 ≤ age < 18	687	68.7
18 ≤ age ≤ 20	246	24.6
Sex Assigned at Birth, n (%)		
Female	734	73.4
Male	266	26.6
Gender, n (%)		
Cis-female	614	61.4
Cis-male	257	25.7
Trans/Non-binary	129	12.9
Race, n (%)		
White	660	66.0
BIPOC	340	34.0
Ethnicity, n (%)		
Hispanic	442	44.2
Not Hispanic	542	54.2
Unknown	16	1.6
Depression Severity, n (%)		
PHQ-A 0-5	106	10.6
PHQ-A 6-9	217	21.7
PHQ-A 10-14	267	26.7
PHQ-A 15-19	244	24.4
PHQ-A 20+	166	16.6
Anxiety Severity, n (%)		
GAD-7 0-4	141	14.1
GAD-7 5-9	265	26.5
GAD-7 10-14	266	26.6
GAD-7 15+	328	32.8
PHQ-A Total Score, mean (sd)	12.9	6.4
GAD-7 Total Score, mean (sd)	11.3	5.9
CHRT-SR Total, mean (sd)	28.4	13.1
Trauma Exposure Category, n (%)		
0 ACEs	343	34.3
1 ACE	175	17.5
2-3 ACEs	278	27.8
≥4 ACEs	204	20.4
Interpersonal Trauma	487	48.7
Sexual Trauma	240	24.0

PHQ-A = 9-item Patient Health Questionnaire for adolescents; GAD-7 = 7-item Generalized Anxiety Disorder scale; CHRT-SR = Concise Health Risk Tracking Scale – Self Report; ACE = Adverse Childhood Experience.

**Table 2a**  
ANCOVA main effects from analysis one (traumatic event categories).

Source	DF	F	p
<b>PHQ-A</b>			
Trauma Exposure (0, 1, 2-3, ≥4 trauma categories)	3	4.02	<b>0.0074</b>
Age at Consent	1	1.77	0.1842
Gender	2	23.76	<b>&lt;0.0001</b>
Race	1	0.04	0.8511
<b>GAD-7</b>			
Trauma Exposure (0, 1, 2-3, ≥4 trauma categories)	3	6.76	<b>0.0002</b>
Age at Consent	1	2.43	0.1197
Gender	2	20.6	<b>&lt;0.0001</b>
Race	1	0.69	0.4068
<b>CHRT-SR – Total</b>			
Trauma Exposure (0, 1, 2-3, ≥4 trauma categories)	3	2.28	0.0781
Age at Consent	1	13.11	<b>0.0003</b>
Gender	2	19	<b>&lt;0.0001</b>
Race	1	1.59	0.2073

score. Post-hoc tests found a significantly lower mean PHQ-A score in the No Trauma group than in the 2-3 Trauma Exposure Category and the ≥4 Trauma Exposure Category groups. A significantly lower mean GAD-7 score was found between the No Trauma group and each of the three other groups, and a lower score found in the 2-3 Trauma Exposure

**Table 2b**  
Post-hoc comparisons from analysis one (traumatic event categories).

	No Traumatic Event	1 Traumatic Event Category	2-3 Traumatic Event Categories	≥4 Traumatic Event Categories
<b>PHQ-A</b>				
LS Mean	12.33	13.31	13.72	14.06
No Traumatic Event (p)	-	0.0877	<b>0.0061</b>	<b>0.0021</b>
1 Traumatic Event (p)	-	-	0.4968	0.2476
2-3 Traumatic Events (p)	-	-	-	0.5553
<b>GAD-7</b>				
LS Mean	10.4	11.8	11.5	12.6
No Traumatic Event (p)	-	<b>0.0094</b>	<b>0.0122</b>	<b>&lt;0.0001</b>
1 Traumatic Event (p)	-	-	0.7049	0.1473
2-3 Traumatic Events (p)	-	-	-	<b>0.043</b>
<b>CHRT-SR – Total</b>				
LS Mean	27.8	29.3	29.6	30.7
No Traumatic Event (p)	-	0.2139	0.0888	0.0121
1 Traumatic Event (p)	-	-	0.8065	0.2827
2-3 Traumatic Events (p)	-	-	-	0.3413

PHQ-A = 9-item Patient Health Questionnaire for adolescents; GAD-7 = 7-item Generalized Anxiety Disorder scale; CHRT-SR = Concise Health Risk Tracking Scale – Self Report.

Category group compared to the ≥4 group. Main effects of age and gender were found for CHRT-SR total score. No significant interactions were found between gender and trauma exposure category for any of the outcomes.

**3.3. Association of interpersonal traumatic events with mental health symptoms**

Tables 3a and 3b show the main effects and post-hoc comparisons for our second analysis. There were main effects of interpersonal trauma category and gender on PHQ-A, GAD-7, and CHRT-SR scores; there was

**Table 3a**  
ANCOVA main effects from analysis two (interpersonal traumatic event).

Source	DF	F	p
<b>PHQ-A</b>			
Trauma Category (None, Interpersonal, Non-interpersonal)	2	7.27	<b>0.0007</b>
Age at Consent	1	1.89	0.1695
Gender	2	22.15	<b>&lt;0.0001</b>
Race	1	0.10	0.7510
<b>GAD-7</b>			
Trauma Category (None, Interpersonal, Non-interpersonal)	2	8.21	<b>0.0003</b>
Age at Consent	1	2.08	0.1494
Gender	2	20.47	<b>&lt;0.0001</b>
Race	1	0.68	0.4086
<b>CHRT-SR – Total</b>			
Trauma Category (None, Interpersonal, Non-interpersonal)	2	3.99	<b>0.0187</b>
Age at Consent	1	12.94	<b>0.0003</b>
Gender	2	17.86	<b>&lt;0.0001</b>
Race	1	1.37	0.2424

**Table 3b**  
Post-hoc comparisons from analysis two (interpersonal traumatic event).

	No Trauma Events	Interpersonal Trauma Events	No Interpersonal Trauma Events
<b>PHQ-A</b>			
LS Mean	12.3	14.0	12.9
No Traumatic Events (p)	-	<b>0.0002</b>	0.3151
Interpersonal Events (p)	-	-	0.0525
<b>GAD-7</b>			
LS Mean	10.4	12.0	11.7
No Traumatic Events (p)	-	<b>&lt;0.0001</b>	<b>0.0183</b>
Interpersonal Events (p)	-	-	0.4712
<b>CHRT-SR – Total</b>			
LS Mean	27.8	30.4	28.5
No Traumatic Events (p)	-	<b>0.0062</b>	0.5625
Interpersonal Events (p)	-	-	0.1137

PHQ-A = 9-item Patient Health Questionnaire for adolescents; GAD-7 = 7-item Generalized Anxiety Disorder scale; CHRT-SR = Concise Health Risk Tracking Scale – Self Report.

also a main effect of age on CHRT-SR score. Post-hoc tests showed a significantly lower mean PHQ-A score in the No Traumatic Events group compared to the Interpersonal Trauma group, and a significantly lower mean GAD-7 score in the No Traumatic Events group compared to the other groups. The Interpersonal Trauma group had a higher mean CHRT-SR score than the other two groups. The Interpersonal Trauma and Non-Interpersonal Trauma groups were not significantly different on any outcomes.

Exploratory analyses utilizing a separate ANCOVA model revealed a significant gender by interpersonal trauma group interaction on PHQ-9 score. Post-hoc pairwise t-tests (see Supplemental Fig. 1) show that in the No Trauma group cis-males had significantly lower PHQ-9 scores than cis-female and trans/non-binary youth; cis-females also had significantly lower PHQ-9 scores than trans/non-binary youth. Within the Interpersonal Trauma group, cis-males had significantly lower PHQ-9 scores than trans/non-binary youth. In the Non-Interpersonal group, trans/non-binary youth had significantly higher PHQ-9 scores than cis-males. The interaction of interpersonal trauma group and gender on CHRT-SR total score was significant. Post-hoc pairwise t-tests (see Supplemental Fig. 2) revealed a pattern of significant differences that mirror those found above for PHQ-9, with the addition that in the Non-Interpersonal Trauma group, cis-females had significantly lower CHRT-SR scores than trans/non-binary youth.

**3.4. Association of sexual abuse and mental health symptoms**

Tables 4a and 4b show the main effects and post-hoc comparisons of our final ANCOVA models. There were main effects of sexual trauma group and gender on PHQ-A, GAD-7, and CHRT-SR scores; there was also a main effect of age on CHRT-SR score. Post-hoc tests showed significantly lower mean PHQ-9 and GAD-7 scores in the No Trauma group than in the other two groups. Mean CHRT-SR score was significantly higher in the Sexual Trauma group compared to the No Trauma group. There were no significant differences between the Sexual Trauma group and the Non-Sexual Trauma group on PHQ-9, GAD-7, or CHRT-SR.

Exploratory analyses utilizing a separate ANCOVA model revealed a significant gender by sexual trauma group interaction on PHQ-9 score. Post-hoc pairwise t-tests (see Supplemental Fig. 3) show significant differences between the three gender groups with trans/non-binary being the highest and cis-male being the lowest. No significant differences between genders for PHQ-9 score were found in the Sexual



**Table 4a**  
ANCOVA main effects from analysis three (sexual abuse trauma).

Source	DF	F	p
<b>PHQ-A</b>			
Trauma Category (None, Sexual, Non-sexual)	2	6.48	<b>0.0016</b>
Age at Consent	1	2.21	0.1371
Gender	2	21.01	<b>&lt;0.0001</b>
Race	1	0.05	0.8199
<b>GAD-7</b>			
Trauma Category (None, Sexual, Non-sexual)	2	9.06	<b>0.0001</b>
Age at Consent	1	2.60	0.1071
Gender	2	18.24	<b>&lt;0.0001</b>
Race	1	0.68	0.4111
<b>CHRT-SR – Total</b>			
Trauma Category (None, Sexual, Non-sexual)	2	3.42	<b>0.0329</b>
Age at Consent	1	13.38	<b>0.0003</b>
Gender	2	17.01	<b>&lt;0.0001</b>
Race	1	1.55	0.2131

**Table 4b**  
Post-hoc comparisons from analysis three (sexual abuse trauma).

	No Traumatic Events	Sexual Trauma Events	Non-Sexual Trauma Events
<b>PHQ-A</b>			
LS Mean	12.3	14.2	13.4
No Traumatic Events (p)	-	<b>0.0005</b>	<b>0.0137</b>
Sexual Trauma Events (p)	-	-	0.137
<b>GAD-7</b>			
LS Mean	10.4	12.4	11.7
No Traumatic Events (p)	-	<b>&lt;0.0001</b>	<b>0.0018</b>
Sexual Events (p)	-	-	0.1404
<b>CHRT-SR – Total</b>			
LS Mean	27.8	30.7	29.4
No Traumatic Events (p)	-	<b>0.011</b>	0.0858
Sexual Events (p)	-	-	0.2409

PHQ-A = 9-item Patient Health Questionnaire for adolescents; GAD-7 = 7-item Generalized Anxiety Disorder scale; CHRT-SR = Concise Health Risk Tracking Scale – Self Report.

Trauma group. In the Non-Sexual Trauma group trans/non-binary individuals had significantly higher PHQ-9 scores than cis-males and cis-females. A significant interaction was also found for gender and sexual trauma group on CHRT-SR total score. Post-hoc pairwise t-tests (see Supplemental Fig. 4) reveal gender differences in CHRT-SR score that mirror those found above for PHQ-9 score.

#### 4. Discussion

This statewide, multisite, observational study examined the impact of traumatic experiences on mental health symptoms of youth with depression and/or suicidality. Participants in this sample reported high rates of trauma exposure with two-thirds of participants (65.7 %) reporting at least one lifetime trauma exposure, and nearly half (48.2 %) reporting multiple trauma exposure categories. These rates are consistent with research of childhood trauma exposure in the U.S. (Finkelhor et al., 2015). Notably, 24 % of this sample reported experiencing sexual abuse in their lifetime which is significantly higher than rates of sexual abuse reported in community samples in the U.S. (8.4 %) (Finkelhor et al., 2015) and Texas (9.8 %) (Fox et al., 2019). However, previous research has suggested rates of sexual abuse are higher in samples of female-identifying people (26.6 %) (Finkelhor et al., 2014), people who identify as Latina (35 %) (Ulbarri et al., 2009), and adults with depression (Fisher et al., 2013). As our sample comprises high rates of cis-female, Hispanic, and depressed youth, this may account for the high rate of sexual abuse that was found.

In our first analysis, we examined the impact of multiple trauma exposure categories on symptoms of anxiety, depression, and suicidality. These findings were only partially consistent with our initial hypothesis and the extant literature. While we did find a graded, dose-dependent relation between trauma and anxiety, the relation between trauma and depression symptoms was only found after reaching a threshold of trauma exposure (at least 2-3 trauma exposure categories), with no differences found once the threshold was reached. This contrasts much of the extant literature that used non-clinical samples (Anda et al., 2006; Felitti et al., 1998; Fox et al., 2019); however, a recent study of depressed adults also found that higher thresholds of ACEs (3+) were needed to impact symptom levels (Giampetruzzi et al., 2023).

Our second and third analyses examined the impact of trauma type (i.e., interpersonal trauma or sexual abuse only) on symptoms of depression, suicidality, and anxiety. As hypothesized, youth who experienced the specific type of trauma reported higher levels of depression, anxiety, and suicidality than youth who did not experience any trauma. Notably, throughout our analyses only specific trauma type was significantly different from the no trauma group for symptoms of suicidality, suggesting that exposure to these trauma types may be a unique signal of suicidal risk. This is particularly interesting given findings showing that among depressed adults, trauma types of sexual abuse and violence predicted suicidality, while other non-interpersonal trauma types did not (Giampetruzzi et al., 2023). However, throughout the interpersonal and sexual trauma analyses, outcomes in the interpersonal and sexual trauma exposure groups were never significantly different than those in the non-specific trauma groups, making it difficult to suggest that these individual trauma types lead to worse outcomes than exposure to trauma generally. In several analyses, those in the sexual or interpersonal trauma groups had significantly different outcomes than those in the no trauma groups, while those in the non-sexual or non-interpersonal trauma groups did not. In these cases, it is possible that those in sexual or interpersonal trauma groups had more total lifetime trauma exposures than those in the non-sexual or non-interpersonal groups, and that the amount of trauma exposure could be leading to the worsened outcomes. However, due to the nature of these analyses, it was not possible to control for the amount of trauma exposure in the interpersonal and sexual trauma models, making it difficult to disentangle these effects. Future work should aim to disambiguate the impact of exposure to specific types of trauma from that of exposure to multiple non-specific traumatic events.

It is worth noting that exposure to traumatic experiences, although statistically significant, accounts for relatively small amounts of the variance seen in the mental health outcomes in our sample, illustrating the complex nature of factors that impact mental health. Comparatively, gender stands out as a strong predictor of anxiety, depression, and suicidal behavior in each of the major analyses. To further tease out the impact of gender, exploratory analyses were conducted to assess the interaction between gender and trauma exposure. Overall, cis-males had the lowest symptom scores and trans/non-binary individuals the highest. However, among the trans/non-binary individuals there were no statistically significant differences between the trauma groups for symptom scores. These findings suggest that a potential third variable not captured by the TESI-C, such as other experiences of adversity including discrimination, may account for the high symptom levels of trans/non-binary youth. Experiences of discrimination may be one such variable; in sexual minority individuals these experiences are known to be associated with worsened mental health outcomes, and some evidence suggests that this effect may be the strongest in trans/non-binary youth relative to cis-gender males (Black et al., 2023). Accordingly, mental health and primary care providers may want to assess their trans/non-binary patients for experiences of gender/identity-based discrimination as these experiences could result in worsened health outcomes; validated measurement scales, such as the Trans Discrimination Scale (Watson et al., 2019), have been developed. Interestingly, within the group exposed to sexual trauma, all gender differences

disappear, indicating that all individuals who reported experiencing sexual trauma report similarly high levels of depression and suicidality.

A major strength of the study is our patient registry which consists of diverse “real-world” youth who are seeking treatment for depression and suicidality, allowing our results to generalize more broadly than those of traditionally recruited samples (Trivedi et al., 2023). However, this study has limitations. The current analyses used cross-sectional, self-report, retrospective data, which makes it impossible to adjust for levels of each outcome variable prior to the participant’s exposure to trauma and introduces self-reporting bias. Use of longitudinal data may provide useful insight into the trajectory of mental health symptoms amongst depressed and suicidal youth relative to their trauma histories. TX-YDSRN is continuing to longitudinally assess these youth, which will allow for further understanding of the role of trauma history in symptom trajectories, as well as an examination of risk and protective factors. Additionally, as with many measures of trauma, some events may have been captured in the TESI-C that do not rise to the level of a DSM-5 Criterion A trauma (a requirement for an accurate assessment of trauma on the TESI-C) which may slightly affect the base rates of trauma. Similarly, as the TESI-C is clinician-administered, it is possible that some youth underreported their trauma exposure due to demand characteristics. As the gender by trauma interactions were unplanned exploratory analyses, the sample for this study was not constructed for the purpose of completing these analyses; thus, it is likely underpowered (see Supplemental Tables 2–4). Because of this, and the number of tests in the supplementary materials (which were not corrected for multiple comparisons), the interaction results should be seen as strictly exploratory and should be interpreted with caution. Of the 129 trans/non-binary participants in our study 120 reported a birth sex of female, thus our gender specific results may not generalize to trans/non-binary individuals who were male at birth. More data from this population would be needed to truly assess the gender specific effects of trauma.

Overall, these findings suggest that depressed and/or suicidal youth have experienced high rates of trauma, including high rates of sexual abuse. Symptom severity of depression and anxiety may be higher for youth who have a history of multiple types of trauma exposure; while symptoms of suicidality may be higher in those exposed to interpersonal trauma and sexual assault. Therefore, universal trauma screening in mental health clinics is critical as it may provide guidance for ongoing symptom monitoring and determination of level of care for depressed and/or suicidal youth. The American Academy of Pediatrics also recommends screening for Adverse Childhood Experiences in primary care visits (American Academy of Pediatrics, 2014); this will become increasingly important as the push continues for youth depression and mental health concerns to be treated in primary care settings (Dubowitz et al., 2022; U.S. Preventative Services Task Force, 2022). Specifically, clinicians should look to multiple trauma experiences to inform symptom severity for depression and anxiety, and sexual and interpersonal trauma to identify increased risk of suicidality as these patients may warrant more robust intervention and monitoring. Additionally, research suggests that people who present to clinics with depression and traumatic experiences, may benefit from trauma treatment (e.g., Eye Movement Desensitization and Reprocessing, Trauma-focused Cognitive Behavior Therapy, Cognitive Behavioral Intervention for Trauma in Schools) to improve their depression symptoms (de Arellano et al., 2014; Dominguez et al., 2021). Therefore, assessing for trauma as well as depression symptoms may dictate the best treatment course.

#### CRediT authorship contribution statement

**Lynnel C. Goodman:** Conceptualization, Methodology, Validation, Writing – original draft. **Joshua S. Elmore:** Conceptualization, Methodology, Writing – original draft, Visualization. **Taryn L. Mayes:** Conceptualization, Writing – review & editing, Supervision, Project administration. **Abu Minhajuddin:** Methodology, Validation, Formal

analysis, Data curation, Writing – review & editing. **Holli Slater:** Validation, Writing – original draft, Supervision, Project administration. **Joseph C. Blader:** Methodology, Investigation, Writing – review & editing. **Israel Liberzon:** Investigation, Writing – review & editing. **Regina B. Baronia:** Investigation, Writing – review & editing. **Emily J. Bivins:** Investigation, Writing – review & editing. **Jacquelyn M. LaGrone:** Investigation, Writing – review & editing. **Sierra Jackson:** Investigation, Writing – review & editing. **Sarah L. Martin:** Investigation, Writing – review & editing. **Ryan Brown:** Investigation, Writing – review & editing. **Jair C. Soares:** Investigation, Writing – review & editing. **Sarah M. Wakefield:** Supervision, Project administration, Writing – review & editing. **Madhukar H. Trivedi:** Conceptualization, Resources, Writing – review & editing, Supervision, Project administration, Funding acquisition.

#### Declaration of Competing Interest

Dr. Blader reports having received consultant and speakers’ honoraria from Supernus Pharmaceuticals. Dr. Brown has received consulting fees from Sage and Biogen Pharmaceuticals. Dr. Soares has served as an advisor or consultant for Asofarma, Boehringer Ingelheim, Johnson & Johnson, Livanova, Pfizer, Pulvinar Neuro LLC, Relmada, Sanofi, and Sunovion. He has received research grants from Alkermes, Allergan, and Compass and holds less than U.S. \$5,000 in Atai Life Sciences stock. Dr. Wakefield serves as an Executive Committee Member of the Texas Child Mental Health Care Consortium. Dr. Trivedi has received research funding from NIMH, NIDA, NCATS, the American Foundation for Suicide Prevention, the Patient-Centered Outcomes Research Institute, and the Blue Cross Blue Shield of Texas. He has served as a consultant or advisor for ACADIA Pharmaceuticals, Alkermes Inc., Alto Neuroscience Inc, Applied Clinical Intelligence, LLC, Axsome Therapeutics, Biogen MA Inc, Boehringer Ingelheim, Cerebral Inc., Circular Genomics Inc., Compass Pathfinder Limited, Daiichi Sankyo Inc, GH Research, GreenLight VitalSign6 Inc, Heading Health, Health Care 16 Global Village, Janssen Pharmaceutical, Legion Health, Lundbeck Research USA, Merck Sharp & Dohme Corp., Mind Medicine Inc., Myriad Neuroscience, Naki Health Ltd, Navitor, Neurocrine Biosciences Inc., Noema Pharma AG, Orexo US Inc., Otsuka America Pharmaceutical Inc, Perception Neuroscience Holdings, Pharmerit International, Policy Analysis Inc., Praxis Precision Medicines Inc, Relmada Therapeutics Inc., Rexahn Pharmaceuticals, Inc., SAGE Therapeutics, Signant Health, Sparian Biosciences, Titan Pharmaceuticals, Takeda Pharmaceuticals Inc, WebMD. He has received grant/research funding from NIMH, NIDA, NCATS, American Foundation for Suicide Prevention, Patient-Centered Outcomes Research Institute (PCORI), and Blue Cross Blue Shield of Texas. Additionally, he has received editorial compensation from Engage Health Media, and Oxford University Press. Dr. Goodman, Mr. Elmore, Ms. Mayes, Dr. Minhajuddin, Dr. Slater, Dr. Liberzon, Dr. Baronia, Ms. Bivins, Dr. LaGrone, Ms. Jackson, and Dr. Martin have no disclosures to report.

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## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.psychres.2023.115620](https://doi.org/10.1016/j.psychres.2023.115620).

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