THE UNIVERSITY OF CHICAGO

A Medical Chart Review of Trauma Exposure and Internalizing Problems in Pediatric Patients Seen by Consultation-Liaison Service

By:

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Abstract:

Trauma exposure has significant impacts on children and adolescents' mental health and well-being, and the impact can vary depending on genetic, socio-economic, and environmental factors. The frequent exposure to traumatic events, such as community violence, among youth that live in socially and economically disadvantaged communities, is an important issue since these children could be more vulnerable in situations and generate more negative outcomes. This study examined youth exposure to trauma and the impacts of trauma by reviewing medical charts of 79 pediatric patients from 3 to 18 years old who were consulted on the University of Chicago Pediatric Consultation-Liaison (C/L) service from January 2017 to January 2022. This study aims to better understand how traumatic exposures, such as community violence, contribute to internalizing problems, such as depression and anxiety, in young children and adolescents that live in urban areas.

Introduction:

Exposure to traumatic events, usually described as deeply disturbing experiences that cause a lot of stress, often occurs more frequently in areas with lower income levels due to factors such as disparities in living conditions, unstable political situations, ongoing conflicts, and lower levels of control over daily life (Do et al., 2019). Evidence suggests that cumulative exposure to traumatic events is associated with a progressively increasing risk of psychiatric symptoms including psychological distress, depression, and anxiety (Do et al., 2019). One type of traumatic exposure that severely impacts people who live in economically disadvantaged areas is the exposure to community violence, defined as the witnessing and experiencing intentional acts of violence between individuals who may or may not know each other committed in public

(Centers for Disease Control and Prevention, 2021). These acts of interpersonal violence include gunshots in the neighborhood, being a victim in a shooting, losing a friend or family related to gun-related injuries, and witnessing a homicide. Community violence in the U.S., especially in the South Side of Chicago has been an extremely concerning problem; in 2022, 31,001 cases of violent crimes have already been reported to the Chicago Police Department compared to 22,968 cases in 2021 (Chicago Police Department, 2022). Undoubtedly, these crimes have significant impacts on one of the most racially and economically segregated areas in the U.S., such as South Chicago, in which the population is predominantly Black, consisting of 78.5% of the population (Statistical Atlas, 2018). Community violence that involves firearms is one of the most serious and impactful violence (Alpers, 2013), and living in a neighborhood that frequently exposes children and adolescents to these traumatic experiences can lead to both physical injuries and mental health conditions, such as internalizing problems. In the DSM-5, internalizing disorders include major depressive disorder, anxiety disorders, dysthymia, and somatic disorders (American Psychiatric Association, 2013). The two most common types of internalizing problems are depression and anxieties, in which patients suffer emotionally and experience sadness and worry (Wilkinson, 2009). We know that exposure to traumatic events, such as community violence, can contribute to higher risks of internalizing disorders (Grasso & Briggs-Gowan, 2013), but the relationship between each type of traumatic event and internalizing disorders is still under question. This thesis will examine medical record data of pediatric patients consulted on the University of Chicago Pediatric Consultation-Liaison (C/L) service to understand how traumatic exposures, such as community violence, contribute to internalizing problems, such as depression and anxiety, in young children and adolescents that live in urban areas.

1.1 Gun Violence among Urban Youth

Community violence, including shootings, and the number of people surviving gunshot wounds have increased dramatically over the years (Center for Violence Prevention, n.d.). According to a study, gun injuries are the second-leading cause of death among U.S. children and teens, and in 2019, 4,483 youth ages 10-24 years old were victims of homicide (Center for Violence Prevention, n.d.). In 2020, 79% of homicides in the U.S. involved a firearm (Gramlich, 2022). In the South side of Chicago, one of the most economically segregated areas, there is a 55% increase in homicides in 2020 compared to 2019 (Chicago Police Department, 2020). Community violence involving firearms undoubtedly has a significant impact on people's lives, especially children and adolescents. The Centers for Disease Control and Prevention's (CDC) updated data showed 45,222 people killed by firearms in the United States in 2020 - a new peak (Centers for Disease Control and Prevention, 2021). Furthermore, structural violence, defined as social forces that harm certain groups of people, disproportionately impacts poor, urban communities, such as South Chicago. It also contributes to the development of health and social problems across the lifespan. Research has found that violence exposure is more prevalent in urban areas than that in non-urban areas, and youth living in urban communities are more likely to be exposed to violence involving firearms, which is associated with more anxiety symptoms (Borg et al., 2021). Therefore, it is important to look at the effects of trauma exposure in these young children living in urban areas.

1.2 Internalizing Problems and Externalizing Problems

Internalizing problems are different from externalizing problems in a way that internalizing problems are described as inner-directed and generating distress in the individual (Forns, 2011) and are characterized by anxious and depressive symptoms, social withdrawal, and somatic complaints while externalizing problems are defined as aggressive, oppositional, and delinquent behavior (Göbel et al., 2016). Among children and adolescents, internalizing problems, with a prevalence rate of 10%, and externalizing problems, with a prevalence rate of 14%, are the most common mental health problems (Ihle and Esser, 2002; Hölling et al., 2007). Gender differences in prevalence rates are present throughout children's development. Externalizing symptoms are more common among boys and have an earlier onset in childhood (Plück et al., 2000). However, boys show higher rates of internalizing symptoms during childhood, while there are higher rates of internalizing symptoms in teenage girls and young women with greater long-term stability (Ihle et al., 2000; Hölling et al., 2007). Exposure to traumatic events has the potential to contribute to the development of traumatic stress leading to several psychosocial challenges including internalizing problems. Depressive disorders could lead to impaired social functioning and anxiety disorders could affect people's normal function and lead to avoidance of situations completely (American Psychiatric Association, 2013). Although many researchers have looked at the influence of trauma exposure on people's mental health, there is minimal research on the link between exposure to traumatic events and the development of internalizing problems among youth in urban settings.

1.3 The impact of gun-related violence on pediatric patients

The impact of exposure to gun violence on children and adolescents' development and mental health is significant. Recent research has shown that approximately 8% of youth in the

U.S. have been exposed to gun violence within the past year, and the exposure includes knowing a friend and/or family member who had been shot with a firearm (Turner et al., 2018). One study has found that childhood violence victimization is significantly associated with risk for multiple psychiatric disorders such as mood disorders and anxiety disorders, comorbidity, and unfavorable illness (Moffitt, T. E., & Klaus-Grawe 2012 Think Tank, 2013). Another research demonstrated that exposure to violence involving a gun is associated with posttraumatic stress (Thompson & Massat, 2005), and youth who are exposed to this type of violence by witnessing a friend and/or family being injured or shot by a firearm within the past 2 years are more likely to experience severe symptoms of trauma (Turner et al., 2018). Researchers have also found that youth who had been exposed to violence experienced more depressive symptoms (Eisman, 2015). Therefore, exposure to traumatic events such as experiencing gun-related violence has a significant impact on children and adolescents' mental health.

1.4 Structural Racism

Not only is community violence a major problem in the United States, it is especially a primary concern for Black communities. Reflecting the demographics of the south side of Chicago, one of the most racially and economically segregated cities in the United States (Glaeser & Vigdor, 2012; Logan et al., 2001; Stuart, 2002), there is ample evidence that low-income, urban, Black or African American children, in the Chicago area and throughout the United States, are at very high risk for exposure to potentially traumatic events such as violent crime and traumatic loss, defined as the loss of loved ones due to potential traumatizing circumstances (Bell and Jenkins, 1993; Smith, 2015). According to a 2020 report, Chicago has a 20.6% poverty rate, meaning one out of every 4.8 residents of Chicago lives in poverty, and

550,432 of 2,666,702 Chicago residents reported an income below the poverty line in 2019. (Diegues, 2020). In Chicago, Blacks or African Americans are disproportionately affected by violent crime, often at rates even greater than those reported nationally. According to the Chicago Police Department's Annual Report 2010 Year in Review (2011), Black individuals, who make up 35% of the population in Chicago, made up 62.8% of victims of violent crime in Chicago, as compared to White (13.9%) and Hispanics (20.8%); this disparity was even greater for homicides, with Black comprising 76.1% of murder victims, White 4.4% and Hispanics 19.3%. In Bell and Jenkins' study, they found that 75% of elementary school children on the south side of Chicago reported having witnessed a robbery, shooting, stabbing, or killing (Bell & Jenkins, 1993). Therefore, it would also be helpful to explore how structural racism plays a role in Black children and adolescents' exposure to community violence.

1.5 Pediatric Consultation-Liaison (C/L):

C/L service is an integral part of the interdisciplinary team approach to patient care at the University of Chicago Comer Children's Hospital (UCMC). They specialize in evaluating the diagnosis of patients and the management of psychiatric disorders that are comorbid with general medical/surgical illness. Despite receiving diverse clinical presentations, the service has not yet established the degree to which trauma exposure occurs in the patient population seen by C/L service. Previous research from UCMC's Recovery & Empowerment After Community Trauma (REACT) clinic suggests that a significant portion of the UCMC pediatric patient population has exposure to significant traumatic events (Mclagan, 2021), which increases an individual's vulnerability to stress, risk of co-occurring psychiatric disorders, and chronic physical ailments (Kosman & Levy-Carrick, 2019; McLagan et al., 2021). However, studies on the typical referral

concerns and patient characteristics within C/L pediatric populations, though few, typically ignore populations in urban settings (Vaughn & Amonoo, 2020). Although the pediatric patients in the C/L population came in for medical reasons, based on the prevalence of trauma exposure in urban settings, it is essential that C/L providers in urban settings serving Black pediatric patients understand and assess trauma in the context of clinical presentations.

1.6 The Present Study

The present study aims to better understand the impact of trauma exposure on psychological functioning, including pediatric mood and anxiety, in pediatric C/L patients. This research study aims to analyze the effects of exposure to traumatic events, such as community violence, on internalizing concerns such as depression and anxieties in children and adolescents living in urban areas. By examining medical record data of pediatric patients, especially those who live in one of the most economically and racially segregated areas, I aim to find the impact of trauma on the functioning and development of internalizing problems including the types and symptoms. The three primary hypotheses are (1) the positive relationship between the number of trauma exposure and the number of DSM-5 diagnoses; (2) trauma exposure, especially the exposure to community violence predicts more internalizing problems in youth; (3) children and adolescents living in economically and racially segregated areas, in this case, those who live in high crime areas of Chicago, are more likely to be exposed to traumatic events. In exploring these research questions, I also hope to provide insights for future researchers on how to help the victims overcome these difficult times. This study hopes to add to the literature regarding youth exposure to trauma and the negative impact the exposure has on an individual's ability to cope and recover. Given the minimal research on the link between exposure to trauma and the

development of internalizing concerns among pediatric C/L patients and the prevalence of trauma exposure in urban settings, particularly, in racially and segregated areas, this study will be a significant contribution to society, public health, and policies.

Method:

Subjects:

This study uses a retrospective chart review of electronic medical records of 79 pediatric patients aged from 3 to 18 years old admitted for non-psychiatric medical reasons and seen by UCMC pediatric C/L psychiatry service between January 2017 and January 2022, to analyze and isolate the effects of trauma exposure on internalizing problems in children and adolescents. These patients were all admitted for medical attention and Psychiatry was consulted due to concerns about psychological and psychiatric functioning or distress. The exclusion criterion for this study was patients not seen by C/L and patients who were admitted solely for psychiatric reasons. Of the 202 pediatric patients seen by C/L service, 69 were excluded because they were not admitted for medical reasons, 43 were seen outside of the time range, 7 were not seen by C/L or declined services, and 4 were 2 years old at the time of admission. As a retrospective chart review study, this research presented no risks to participants. Patient chart information was de-identified: information such as names, birth dates, and addresses was redacted. Study ID numbers were assigned to each patient reviewed to connect them to their diagnoses and maintain confidentiality. This study was approved by the Institutional Review Board of the University of Chicago Biological Sciences Division.

Procedure:

The data was collected through the University of Chicago Medicine's electronic health records and the medical charts were stored in EPIC, a software that contains extensive patient information, including general demographics, trauma histories, medical and psychiatric diagnoses, and psychotherapy notes from therapy services provided by C/L service. C/L service does not systematically assess trauma histories, and patients' medical charts were reviewed to see if any traumatic stressors were documented.

A qualtrics survey was made to draw data that were particularly of interest from the medical charts, such as patients' age, race/ethnicity, sex, education, guardianship, insurance type, city/state of residence, zip code, and neighborhood.

The clinical information of the patients collected includes: the date admitted to the hospital when last seen by C/L service, the reason for referral to C/L service, reason for hospitalization, medical diagnosis, number of admissions seen by C/L, the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) diagnoses, diagnostic rule-outs, change in diagnosis between admission and discharge, C/L recommendations, if trauma was included in the notes, the person that documented trauma notes (C/L service, social worker, or both), length of stay in the hospital for the first admission, re-admittance following discharge, and length of stay in the hospital for the last admission.

The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) diagnoses collected were categorized into six categories for data analysis purposes: (1) Depression related disorder, (2) Anxiety-related disorder, (3) Conduct related disorder, (4) Psychotic disorder, (5) Neurodevelopmental disorder, (6) Other (Seizure, Alcohol Use Disorder, Cannabis Use Disorder).

Patients' trauma information was collected through C/L service notes to specify the type of trauma patients have experienced and whether it is a single event or chronic exposure. There are six types of trauma exposure: (1) Adverse Childhood Experiences (ACEs), (2) Other Lifetime Traumatic Stressors, (3) Traumatic Loss, (4) Victim of Violence in the Community, (5) Witnessing Violence, (6) Ambient Community Trauma.

ACEs contain physical abuse, sexual abuse, emotional abuse, physical/medical neglect, emotional neglect, incarceration of parent or family member, substance use of parent or family member, mental health history of parent or family member, domestic violence between family members, and parental separation/loss, which is further divided into four categories: substitute care (living with non-biological parents with no state involvement), foster placement (with state involvement), parental death, and parents not living together. Other Lifetime Traumatic Stressors include disaster, bad accidents (car accidents, etc.), scary medical treatment, bullying, burn, fire, dog attack, learned about trauma of family members, and experienced domestic violence (between family members). Traumatic loss contains experienced traumatic loss, family member killed, close friend killed, or someone at school died due to violence. Victim of violence includes: jumped/beaten up, direct victim of violent crime, break in (home), been shot, been shot at, been stabbed, robbed, stalked, abduction, torture, and war. Witnessing violence contains: witnessing physical abuse, witnessing sexual abuse, witnessing homicide, witnessing jumping or beating, witnessing stabbing, witnessing shooting, witnessing kidnapping, witnessing torture, witnessing violence at school, and saw a dead body (not at a funeral). Ambient community trauma includes gunshots in the neighborhood, homelessness, and food insecurity.

Data Analysis:

For this study, the statistical analyses included descriptive statistics to describe and summarize the data of the C/L patients. Correlational and linear regression was used to examine trauma exposure and DSM-5 diagnoses of patients. Descriptive statistics included frequencies and percentages for each demographic variable, such as age, youth developmental categories, education level, race/ethnicity, sex, and insurance type of the patients seen by the C/L service. The frequency of trauma types and each specific traumatic event and stressors were assessed to gain a better understanding of what specific traumatic events and stressors are experienced by this population seen by C/L service. Further, DSM-5 diagnoses and diagnostic categories were also studied.

For correlation analysis purposes, trauma exposures were categorized into three main categories: ACEs, traumatic stressors, and community violence exposure since there was not enough data for each small type of trauma exposure. The different types of each trauma exposure included in the three main categories are listed in the table below in Table 1. If a trauma fell into different categories, it was counted for both.

Table 1

Each Type of Trauma included in the Three Main Trauma Categories

Adverse Childhood Experiences	Traumatic Stressors	Community Violence
● Physical abuse ● Sexual abuse ● Emotional abuse ● Medical neglect ● Emotional neglect ● Incarcerated family member	● Physical abuse ● Sexual abuse ● Domestic violence ● Disaster ● Bad accident ● Scary medical treatment ● Bullying ● Burn	● Bullying ● Victim of violence ● Witnessed homicide ● Witnessed shooting ● Witnessing violence at school ● Saw a dead body ● Heard gunshots

● Substance use of parent or family member ● Mental health history of parent or family member ● Domestic violence ● Parental loss/separation.	● Fire ● Dog attack ● Learned about trauma of a family member ● Experienced domestic violence ● Traumatic loss ● Victim of violence ● Witnessed physical abuse ● Witnessed homicide ● Witnessed shooting ● Witnessing violence at school ● Homelessness	

Pearson correlation was used to analyze the relationship between (1) total number of different types of trauma exposure and the total number of DSM-5 diagnoses, (2) total number of ACEs and the total number of DSM-5 diagnoses, (3) total number of traumatic stressors and the total number of DSM-5 diagnoses, and (4) total number of community violence exposure and the total number of DSM-5 diagnoses. To measure the impact of mental health diagnoses, we quantified the number of diagnoses each person had and used the number as a metric of relevant symptoms. This is because, with multiple diagnoses, we are more likely to capture a larger variety of clinical symptoms.

For linear regression analysis purposes, DSM-5 Diagnoses were categorized into whether a patient has internalizing problems, including depression-related disorders and anxiety-related disorders, and non-internalizing problems, which include all of the other disorders. Linear regression analysis was used to analyze the relationship between (1) internalizing problems and the total number of trauma exposure, (2) internalizing problems and the total number of ACEs, (3) internalizing problems and the total number of traumatic stressors, (4) internalizing problems and the total number of community violence exposure.

Further, linear models were used to analyze the relationship between trauma exposure and (1) sex, (2) race, (3) age, (4) education, and (5) location (children living in high-crime neighborhoods of Chicago vs. children living in low-crime neighborhoods)

Results:

Patient Demographics & Descriptives

This study reviewed the medical charts and corresponding questionnaires of 79 pediatric patients seen by the C/L service. Patients' age ranged from three to eighteen years of age (*M = 12.115, SD = 3.357*). Table 2 displays the breakdown of ages at admission by youth developmental category, and Table 3 displays the education level of the patients.

Table 2

Youth Developmental Category of C/L Patients

n=79

Ages	Frequency	Percent
3-5 years old	4	5.1
6-8 years old	8	10.1
9-11 years old	14	17.7
12-14 years old	29	36.7
15-17 years old	24	30.4
Total	79	100.0

Table 3

Education Level of C/L Patients

n=79

Education Level	Frequency	Percent
High School (9-12th)	28	35.4
Middle School (6-8th)	26	32.9
Elementary School (K-5th)	17	21.5
Not in School	8	10.1
Total	79	100.0

Of the 79 patients seen, 39 were female, and 40 were male (49.4% and 50.6%, respectively). 60 patients reside in Illinois, with 36 of them in Chicago, 18 living in Indiana, and one living in Texas. 43.0% were Black or African American, 24.1% were White, 12.7% were Hispanic/Latino, 1.3% were American Indian or Alaskan, 2.5% were Native Hawaiian or Pacific Islander, and 16.5% identified in the "Other" category, typically as Biracial or Multiracial.

Table 4

Race/Ethnicity Demographics of C/L Patients

n=79

Race/Ethnicity	Frequency	Percent
Black or African American	34	43.0
White	19	24.1
Hispanic/Latino	10	12.7
American Indian or Alaskan Native	1	1.3
Native Hawaiian or Pacific Islander	2	2.5

Other	13	16.5
Total	79	100.0

Additionally, 32.9% were insured by Medicaid HMO, 29.1% were insured by Blue Cross Blue Shield, 15.2% were insured by Medicaid, 12.7% were insured by Medicaid out of State, and 8.9% declined to disclose. Of the 79 patients, 68 had guardians that were biological parents, six were relatives, two had a foster placement, two were adopted, and one was a youth in care. Eleven out of 79 (13.9%) patients had Department of Children and Family Services (DCFS) involvement.

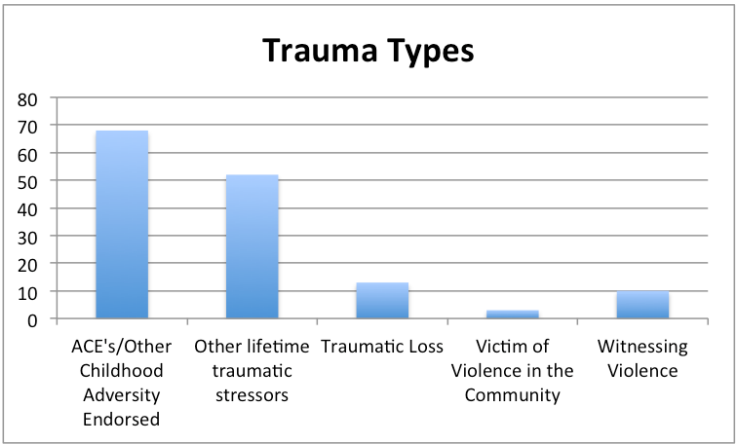
Patient Trauma Histories

Findings from the patient's endorsements of trauma experiences indicated that the most common type of adversity experienced by this population is ACE, followed by other lifetime traumatic stressors (Figure 1). Among all the ACEs, the most common and frequently reported was the mental health history of parents or family members (Figure 2). The majority of the population (72.15%) has experienced some kind of parental loss/separation, and the most common type of parental loss/separation was parents not living together (Figure 3). Among all the other lifetime traumatic stressors, the most common stressor was having experienced bullying, followed by experiencing bad accidents and scary medical treatment (Figure 4). Thirteen patients had experienced the traumatic loss of a parent or close family relative (Figure 5). However, there was not much data on the exposure to community violence, such as being a victim or witnessing violence (Figure 6-8).

Figure 1

Number of Patients who Endorsed Trauma in Each Trauma Category

n=79



Note: The frequency refers to the number of each type of trauma exposure patients endorsed.

Figure 2

Number of Patients who Endorsed Trauma Within Each Category of Adverse Childhood Experiences

n=79

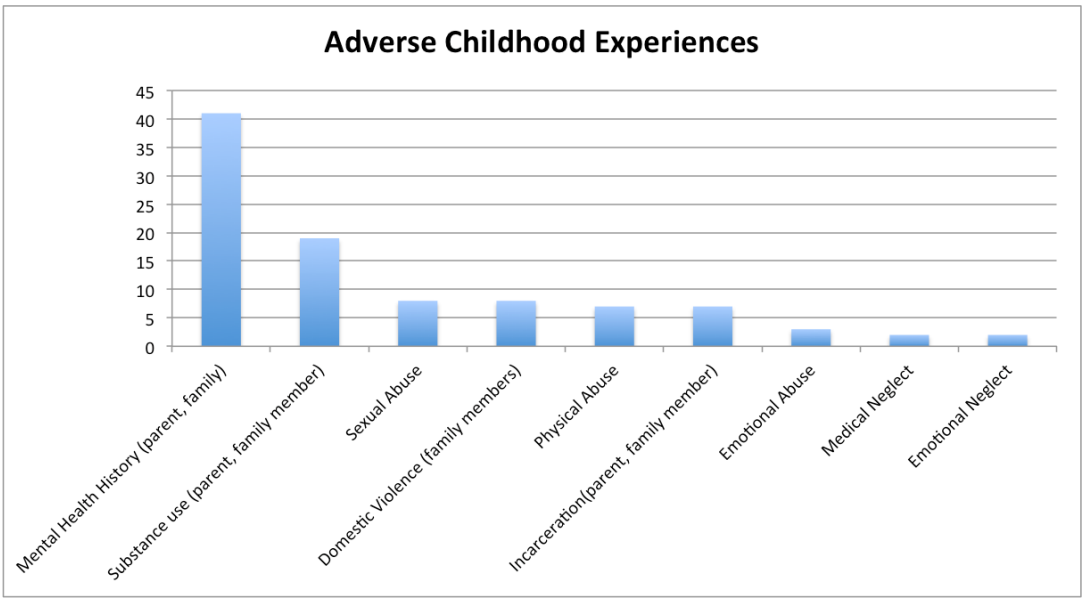


Figure 3

Number of Parental Separation/Loss Endorsed by C/L Patients and by Types

n=79

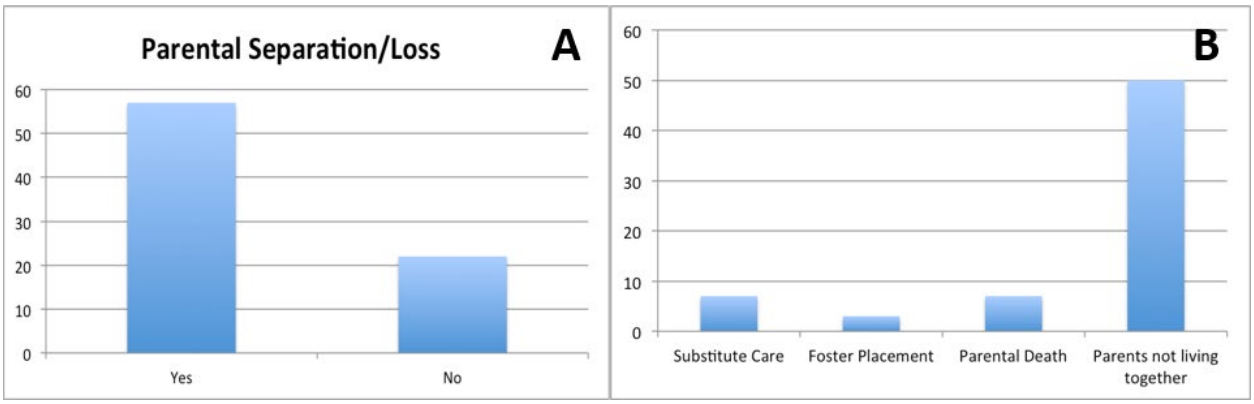


Figure 4

Frequency of Number of Trauma Endorsed by Patients Within Other Lifetime Traumatic Stressors

n=79

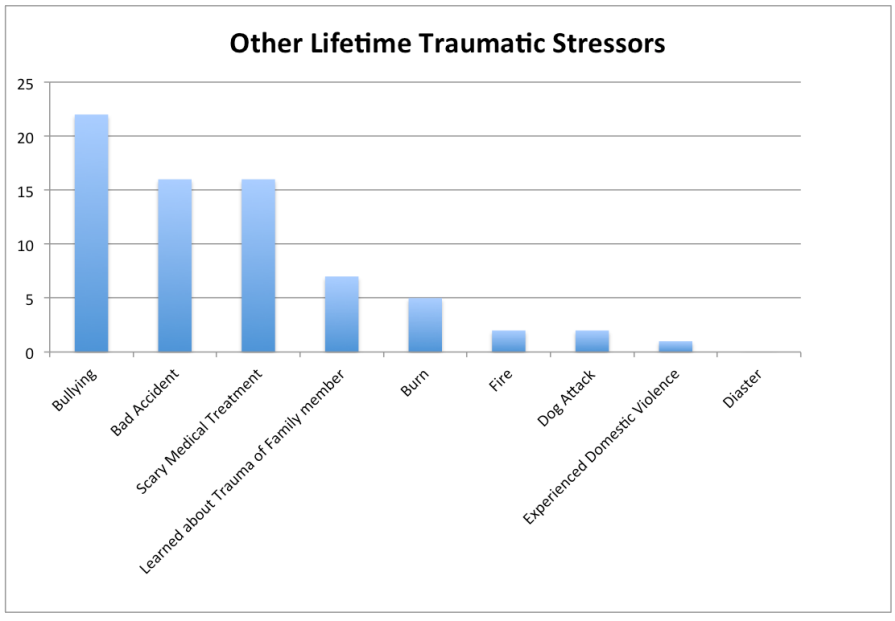
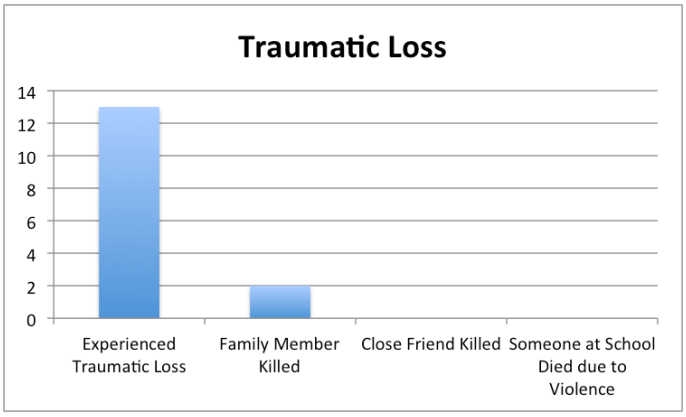


Figure 5

Frequency of Number of Trauma Endorsed by Patients Within Traumatic Loss

n=79



Note: Experienced traumatic loss is defined as experiencing the loss of loved ones including family members, close friends, and relatives.

Figure 6

Frequency of Number of Trauma Endorsed by Patients Within Witnessing Violence

n=79

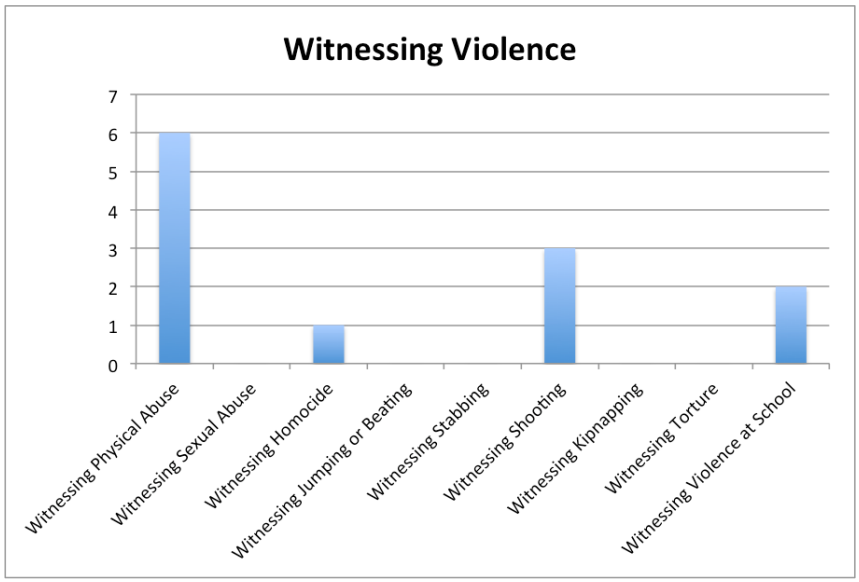
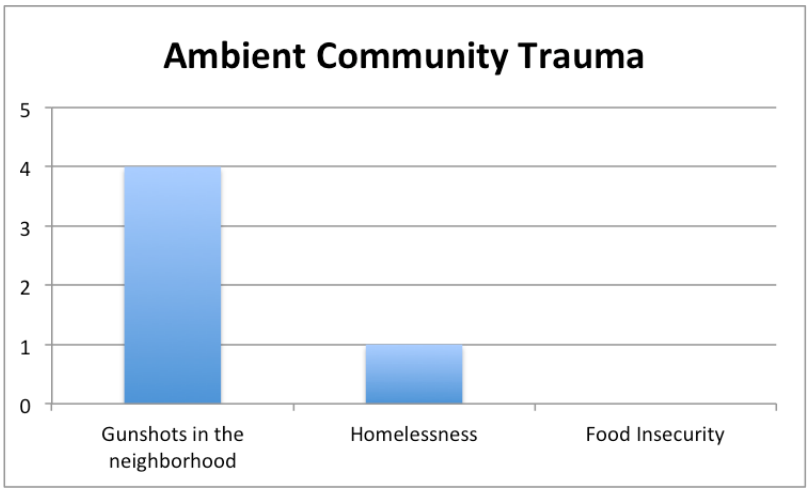


Figure 7

Frequency of Number of Trauma Endorsed by Patients Within Ambient Community Trauma

n=79



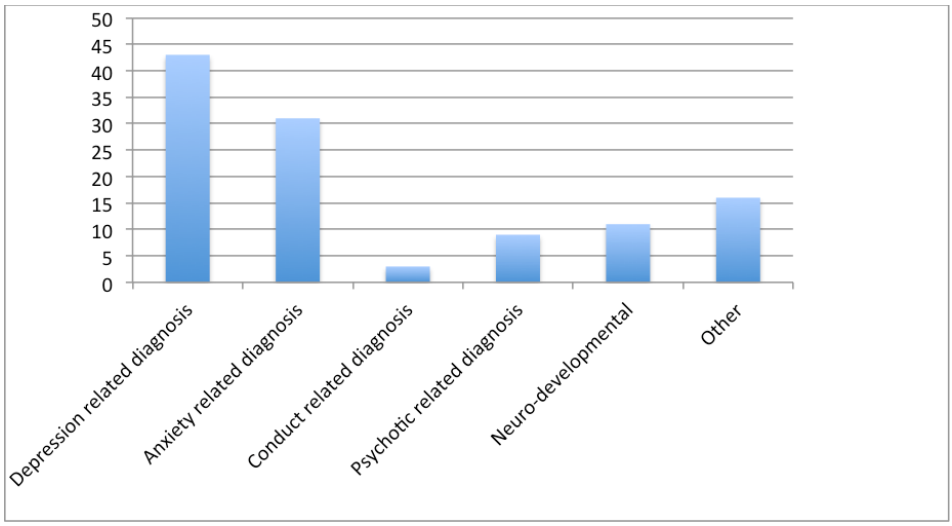
Patients' DSM-5 Diagnoses

The average number of diagnoses patients endorsed was 1.48. The most common type of DSM-5 diagnosis in the C/L population was depression-related disorder, followed by anxiety-related disorder (Figure 8). As shown in Figure 9, patients who had been diagnosed with conduct-related disorder endorsed the highest number of different types of trauma experienced on average, followed by other and depression-related disorders. Patients who had conduct-related disorders endorsed an average of 5 types of trauma and adversity.

Figure 8

Frequency of Number of Diagnoses Patients Endorsed by Diagnostic Categories

n=79



Further, the average number of total trauma exposure in each diagnostic category was calculated. Of the patients who had been diagnosed with conduct-related disorders, they endorsed an average of 5 trauma exposure. Of the patients who had been diagnosed with depression-related disorders, an average of 3.5 trauma exposure was endorsed. Of the patients who had been diagnosed with the anxiety-related disorder, there was an average of 2.7 different types of trauma. Of the patients who had been diagnosed with neurodevelopmental disorders, they endorsed an average of 2.5 trauma exposure, and of the patients who had been diagnosed with psychotic disorders, there was an average of 2.3 exposures to traumatic events.

Patients' Trauma History Based on Neighborhoods

Patients' neighborhood information was collected and categorized into high-crime neighborhoods (*n=34*) and low-crime neighborhoods (*n=45*). High crime neighborhoods include Altgeld Gardens, Back of the Yards, Brighton Park, Bronzeville, Burnside, Dearborn Homes, East Side, Englewood, Grand Crossing, Gresham, Harbour Point Estates, Hegewisch, Hyde Park,

Jeffrey Manor, Little Village, McKinley Park, Park Manor, South Shore, West Englewood, and West Woodlawn. All other neighborhoods are included in the low-crime neighborhoods.

Table 5

Number of Patients that Endorsed Each Type of Trauma by Crimes of Neighborhood

	High Crime (*n=34*)	Low Crime (*n=45*)	Total *(n=79*)
Parental Loss/Separation	29 (85%)	29 (64%)	58 (73.4%) *p=0.079*
Mental Health history (parent, family member of household)	14 (41%)	27 (60%)	41 (51.9%) *p=0.097*
Bad accident	10 (29%)	7 (16%)	17 (21.5%) *p=0.232*
Substance use (parent, family member of household)	9 (26%)	11 (24%)	20 (25.3%) *p=0.984*
Bullying	9 (26%)	13 (29%)	22 (27.8%) *p=0.812*
Experienced Traumatic Loss	7 (21%)	6 (13%)	13 (16.5%) *p=0.414*
Sexual Abuse	6 (18%)	2 (4%)	8 (10.1%) *p=0.048**
Scary medical treatment	6 (18%)	10 (22%)	16 (20.3%) *p=0.616*
Physical Abuse	4 (12%)	3 (7%)	7 (8.9%) *p=0.405*
Domestic Violence (Between family members)	4 (12%)	4 (9%)	8 (10.1%) *p=0.642*
Witnessing Physical Abuse	4 (12%)	2 (4%)	6 (7.6%) *p=0.224*
Incarceration (parent, family member)	3 (9%)	5 (11%)	8 (10.1%) *p=0.441*
Burn	2 (6%)	3 (7%)	5 (6.3%)

			p=0.887
Witnessing Violence at School	2(6%)	0 (0%)	2 (2.5%) *p=0.099*
Emotional Abuse	1 (3%)	2 (4%)	3 (3.8%) *p=0.768*
Medical Neglect	1(3%)	1 (2%)	2 (2.5%) *p=0.823*
Emotional Neglect	1(3%)	1 (2%)	2 (2.5%) *p=0.823*
Fire	1(3%)	1 (2%)	2 (2.5%) *p=0.84*
Dog attack	1(3%)	1 (2%)	2 (2.5%) *p=0.84*
Learned about trauma of family member	1(3%)	6 (13%)	7 (8.9%) *p=0.108*
Experience DV (personal relationship)	1(3%)	0 (0%)	1 (1.3%) *p=0.247*
Been shot	1(3%)	2 (4%)	3 (3.8%) *p=0.729*
Been stabbed	1(3%)	0 (0%)	1 (1.3%) *p=0.247*
Saw dead body	1(3%)	0 (0%)	1 (1.3%) *p=0.247*
Gunshots in the neighborhood	1(3%)	3 (7%)	4 (5.1%) *p=0.455*
Homelessness	1(3%)	0 (0%)	1 (1.3%) *p=0.247*
Disaster	0 (0%)	0 (0%)	0 (0%)
Family Member Killed	0 (0%)	2 (4%)	2 (2.5%) *p=0.208*
Close Friend Killed	0 (0%)	0 (0%)	0 (0%)
Someone at School Died due to Violence	0 (0%)	0 (0%)	0 (0%)
Jumped/Beaten up	0 (0%)	0 (0%)	0 (0%)
Direct Victim of Violent Crime	0 (0%)	1 (2%)	1(1.3%) *p=0.382*

Break in (home)	0 (0%)	0 (0%)	0 (0%)
Robbed	0 (0%)	0 (0%)	0 (0%)
Stalked	0 (0%)	0 (0%)	0 (0%)
Abduction	0 (0%)	0 (0%)	0 (0%)
Tortue	0 (0%)	0 (0%)	0 (0%)
War	0 (0%)	0 (0%)	0 (0%)
Witnessing Sexual Abuse	0 (0%)	0 (0%)	0 (0%)
Witnessing Homicide	0 (0%)	1 (2%)	1 (1.3%) *p=0.382*
Witnessing Jumping or Beating	0 (0%)	0 (0%)	0 (0%)
Witnessing Stabbing	0 (0%)	0 (0%)	0 (0%)
Witnessing Shooting	0 (0%)	3 (7%)	3 (3.8%) *p=0.125*
Witnessing Kidnapping	0 (0%)	0 (0%)	0 (0%)
Witnessing Torture	0 (0%)	0 (0%)	0 (0%)
Food Insecurity	0 (0%)	0 (0%)	0 (0%)

Table 6

Average Number of Total Trauma, ACEs, and Community Violence Patients Endorsed by Crimes of Neighborhood

n=79

Average	Total Trauma	Total ACEs	Total CV
High Crime	3.47	2.26	1.17
Low Crime	3.29	2.02	1.47

Table 6 shows that there is no prominent difference between patients who live in high-crime neighborhoods and those who live in low-crime neighborhoods in overall exposure to

trauma. Surprisingly, the average number of community violence exposure is slightly lower in patients who live in high-crime neighborhoods. This goes against the hypothesis that children and adolescents who live in high-crime areas are more likely to be exposed to traumatic events, especially community violence.

Correlations and Linear Regression

Analysis of Trauma

The predictor variable is the number of trauma exposure patients endorsed and the outcome variable is the number of DSM-5 diagnoses. Three tests were run to analyze the relationship between the two and no significant results were found. First, Pearson correlation indicated that the total number of trauma exposure was not predictive of the total number of DSM-5 diagnoses ($R^2 = 0.000337, F(1,77) = 0.02596, p = 0.8724$); Pearson X Square also did not suggest a correlation between trauma and DSM-5 diagnoses ($X^2 = 14.589, df = 18, p = 0.69$); Lastly, the results of linear regressions indicated that the total number of trauma was not predictive of the number of DSM-5 diagnoses (p-value = 0.394).

For linear regression, the independent variables were the total number of ACEs, total number of traumatic stressors, and total number of community violence exposure, and the dependent variable was the number of DSM-5 diagnoses. Results showed that the total number of ACEs that patients endorsed was also not predictive of the number of DSM-5 diagnoses (p-value = 0.570). The total number of traumatic stressors endorsed by patients was not predictive of the number of DSM-5 diagnoses (p-value = 0.911). Lastly, the total number of community violence exposure that patients endorsed was also not predictive of the number of DSM-5 diagnoses (p-value = 0.949).

Further, another linear regression tested the correlations between these predictor variables: race, sex, age, education, and location, and the outcome variable: total number of trauma exposure. Results indicated there is no relationship between the total number of trauma exposure and race, age, and education respectively, and there is not enough evidence to say that there is a relationship between the total number of trauma exposure and location (whether the patients live in high crime neighborhoods in Chicago or low crime neighborhoods). However, a significant result was found between the number of total trauma exposure and sex; Linear regression suggested that males are more likely than girls to be exposed to trauma ($R^2 = 0.111$, $F(7,71) = 1.268$, p-value = 0.00699).

Analysis of Internalizing Problems

The predictor variable is the number of exposure to trauma endorsed by patients and the outcome variable here is whether the patient has been diagnosed with internalizing disorders, including depression-related disorders and anxiety-related disorders. Linear regression indicated that there is no significant relationship between internalizing problems and the total number of trauma exposure (p-value = 0.394).

Another regression, with the number of ACEs, traumatic stressors, and community violence exposure endorsed by patients as predictor variables and whether the patient has been diagnosed with internalizing disorders as the outcome variable, found no significant relationship between internalizing problems and ACEs (p-value = 0.667), no significant relationship between internalizing problems and traumatic stressors (p-value = 0.130), and no significant relationship between internalizing problems and community violence exposure (p-value = 0.640).

A Chi-Square test was run with two variables: whether the patients live in high or low-crime neighborhoods and whether the patients had been diagnosed with internalizing problems. Although the Chi-square test did not provide a significant relationship between neighborhood crime levels and the diagnosis of internalizing problems (p=0.275), statistics show that of the patients who live in high-crime neighborhoods, 78.38% were diagnosed with internalizing problems, and of the patients that live in low crime neighborhoods, 69.05% developed internalizing problems.

Statistical Analysis

Although no significant result was found between trauma exposure and DSM-5 diagnoses. Statistics showed that on average, children living in high-crime neighborhoods in Chicago have experienced more ACEs (*Mean = 2*) than children living in low-crime neighborhoods (*Mean = 1.90*). Children living in high-crime neighborhoods have also experienced more traumatic stressors (*Mean = 1.649*) than those living in low-crime neighborhoods (*Mean = 1.476*).

Discussion:

This study sought to explore the relationship between trauma exposure and internalizing problems in pediatric patients seen by the University of Chicago Comer Children's Hospital's C/L service through the process of medical chart review. There are three main hypotheses: (1) there is a positive relationship between the number of trauma exposure and the number of DSM-5 diagnoses. (2) Trauma exposure, especially the exposure to community violence predicts more internalizing problems in youth. (3) Children and adolescents living in economically and racially

segregated areas, such as high crime neighborhoods of Chicago, are more likely to be exposed to traumatic events.

Overall, the findings of the study were not completely in line with the hypotheses. Correlational and linear regression did not uphold the hypotheses or suggest any predictions. There was not enough evidence from the analyses to suggest a positive relationship between trauma exposure and DSM-5 diagnoses. No significant relationship was found between exposure to community violence and internalizing problems in children and adolescents. Findings suggest that there is no significant difference in the exposure to traumatic events between pediatric patients who live in high-crime neighborhoods of Chicago and those who live in low-crime neighborhoods. While predictions were not found given the statistical analysis results, a statistically significant result suggests that boys are more likely than girls to be exposed to these events.

Previous research has examined older adults in which individuals who have been exposed to trauma during childhood and adolescence are at heightened risk for developing problems in various domains of functioning such as internalizing problems (Pfluger, 2022). Other research has also found that after accounting for youths' trauma exposures, racial discrimination accounted for significant variance in predicting delinquency but no other internalizing and externalizing problems (Mendez, 2022). However, no previous research has specifically examined the effects of trauma exposure on internalizing problems in pediatric patients who live in racially and economically segregated areas seen by the C/L service.

One limitation of the study is that there are overlaps in the three main categories of trauma because one type of trauma can fit into more than one category. For example, physical abuse and sexual abuse are included in both the ACEs category and the Other Traumatic

Stressors category. It is difficult to classify these trauma types under only one exact category. This could affect the results of the analysis. Another limitation of the study is the lack of data on trauma exposure, especially community violence exposure since C/L service does not systematically assess trauma exposure.

However, this study may facilitate the development of an effective C/L-based trauma-informed protocol in the future and may offer greater insight and therefore better-targeted treatment for children with trauma histories in pediatric hospitals. Since exposure to trauma impacts patients' overall recovery, coping/adaptation/traumatic stress, and adherence to medical care (Bowling, 2020), trauma-informed C/L service care has the potential to minimize traumatic stress reactions, promote positive coping, provide family-centered support, and reduce the risk of medical care perpetuating trauma or triggering traumatic reactions. The current C/L pediatric service at UCMC lacks baseline data on the patient population and therefore, this retrospective medical chart review characterizes patients' significant trauma history endorsed in their medical chart and also contributes to largely missing data on pediatric patients referred to C/L services in urban academic medical centers.

In general, this study shed light on the limitation of small-scale medical chart reviews and the lack of standardization of how C/L services evaluate patients. The lack of data on community violence exposure serves as a limitation of the study. One explanation is that these patients have not been exposed to community violence since they were hospitalized for medical reasons. Another reason is that they did not reliably assess patients' traumatic experiences involving community violence exposure. Since the medical charts recorded self-reported information of the patients and their family, it is possible that some trauma details could be omitted or unknown. Therefore, the lack of extensive trauma exposure histories, especially the exposure to community

violence for pediatric patients, and the shortcoming of a chart review study did not allow for the best chance of finding results that confirm this study's hypotheses. However, this study displays a clear direction for future lines of research to further enrich the literature on trauma exposure, especially in economically disadvantaged and racially segregated communities. Specifically, suppose future studies were able to collect more information on youth exposure to community violence. In that case, claims could be made for predictive relationships between trauma exposures and children and adolescents' mental well-being, and the relationship between community violence exposure and internalizing problems in youth that live in underserved communities.

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