



## Research article

# The COVID-19 pandemic and associated increases in experiences of assault violence among black men with low socioeconomic status living in Louisiana



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## ABSTRACT

**Background:** The COVID-19 pandemic has had mental health, social, and economic implications among communities with high levels of social disadvantage; this may have impacted community violence rates. The objective of this study was to characterize overall trends in assault and social disadvantage of patients experiencing assault before and during the COVID-19 pandemic.

**Methods:** All trauma activations at a level one trauma center serving the entire southeast Louisiana region were included during March–August pre-COVID (2018–2019) and during COVID (2020). ICD-10 E-codes were used to identify trauma intent (assault vs. other). Assaults in this context are defined as physical injuries caused by an act of violence wherein the perpetrator was suspected or confirmed to have intended harm, injury, or death to the victim. Social disadvantage was assessed using the Area Deprivation Index (ADI). Change in the monthly rate of assault-trauma activations was assessed using negative binomial regression with adjustment for race, gender, and injury intent. The study was reviewed and approved by the Louisiana State University Health Sciences Institutional Review Board.

**Results:** A total of 4,233 trauma activations were included. The majority of activations occurred among men. Assaults increased from 27.5% of all activations pre-Covid to 35.6% during the pandemic. Penetrating trauma similarly increased from 29.5% to 35.7% of all activations. Negative binomial regression demonstrated that in addition to this increase in proportion of assaults relative to all activations, the monthly assault rate also increased by 20% during the pandemic. These increases were driven primarily by increased assaults among Black men. ADI rank did not change between study periods.

**Conclusions:** Health disparities in violence worsened during the pandemic: increased cases of assault occurred disproportionately among Black men, and assaults persisted in occurring primarily among low-ADI communities where burden had been high pre-pandemic. There is a critical need for resources and support to Black men, to mitigate violence and improve racial health equity.

## 1. Introduction

The COVID-19 pandemic has disproportionately impacted individuals living in poverty [1], these same communities of which are known to experience high burdens of community violence. However, the specific association between community violence and poverty within the context of the COVID-19 pandemic remains understudied. Community violence has been defined as witnessing or experiencing interpersonal violence in ones' neighborhood residence (including both inside and outside of the

home) [2]. Such violence is common in neighborhoods with high levels of social disadvantage [2]; these same neighborhoods are characterized as medically resource-poor, being of lower socioeconomic status, and having lower levels of housing quality [3]. Living in neighborhoods with high social disadvantage has been associated with poor health outcomes, the mechanism by which this occurs are hypothesized to include increased stress associated with the higher level of social disadvantage leading to chronic physiologic dysfunction [4]. Thus, in summary, individuals living in communities with high levels of social disadvantage

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have on average, worse health outcomes, a greater number of barriers to medical care, and are more vulnerable to financial and housing insecurity.

The COVID-19 pandemic has exacerbated health and social inequities among individuals with high social disadvantage. Specifically, factors related to community violence such as housing insecurity, financial instability, and mental health stress have all increased due to the COVID-19 pandemic [5]. Furthermore, these same communities have experienced higher levels of actual COVID-19 disease burden [6, 7, 8]. Though initial reports have demonstrated an increase in community violence overall in 2020, coincident with the COVID-19 pandemic, these data have been largely focused upon domestic violence incidence among women [9]. No studies have yet examined the impact of social disadvantage upon violence incidence in the context of the COVID-19 pandemic.

Pre-pandemic, New Orleans had a high prevalence of community violence, with severe racial and socioeconomic disparities. Specifically, the city is consistently ranked among the top cities in the United States for homicides per capita [10], and Black men within Orleans parish [county] were victimized at 8 times the rate of White men [11]. These data parallel national trends: Black men overall experience homicide at rate 10 times that of White men when examining all ages, and young Black men (aged 15–24) experience 19.7 times the homicide rate of White male peers [12]. In addition, prior to 2020, 27% of individuals in the city lived in poverty, nearly double the national average of 15% [13].

Given the pre-existing conditions of high community violence and high poverty in New Orleans, an increased unemployment rate [14], and known disproportionate impacts of the COVID-19 pandemic upon low-income communities [1], it is possible, that the COVID-19 pandemic has exacerbated community violence among these same already-vulnerable populations. A recent systematic review found methodological inconsistencies in the assessment of this topic: most studies examining community violence in the context of the COVID-19 pandemic only assessed the proportion of violence relative to all traumatic injuries, and of the minority of studies reporting on rate (traumas per week/month/year), only one was based in the United States [15]. This geographic notation is salient; the authors found that all reports of increased violence were based exclusively in the United States [15]. Moreover, the studies did not assess the implications of patient socioeconomic status. To address these literature gaps, the objectives of this study were to (1) characterize differences in community violence associated with traumatic injuries reported to a New Orleans, level one trauma center before and during the COVID-19 pandemic, and (2) compare the average measure of social disadvantage of victims before and during the COVID-19 pandemic.

Hypotheses for this study were established *a priori*. For the first objective, we hypothesized that the COVID-19 pandemic resulted in an increased rate of community violence relative to previous years, and that this increased rate would be demonstrated by an increased proportion of hospital violence-related trauma activations in 2020 versus the average proportion in 2018 and 2019. For the second objective, we hypothesized that among victims of community violence, the average quantified level of neighborhood socioeconomic status would be equivalent for the two time periods. With this prediction, we anticipated that violent crime would overall remain prevalent among individuals living in low-income communities.

## 2. Methods

This retrospective study examined all trauma activations listed at a local hospital in New Orleans. New Orleans is consistently ranked by the Centers for Disease Control among the top five cities for violent crime [10]. In addition, substantial inequities exist both with regard to the city overall, and violent crime in particular [11, 16]. Thus, New Orleans constitutes an ideal location for assessment of the interaction between violence and social disadvantage.

Trauma activations were included for the time period of March 1 – August 31 for 2018, 2019, and 2020. This 6-month time period selected coincides with the onset of the COVID-19 pandemic in New Orleans in 2020. In March 2020, Orleans parish [county] and the surrounding parishes constituted four of the top six counties in the United States for COVID-19 cases per capita [17]. As of August 2020, the state of Louisiana had over 145,000 confirmed cases and more than 4,700 deaths [18]. Data in 2018 and 2019 were collected for comparison with data from 2020, in order to provide a two-year average for comparison of 2020 data. A stay-at-home order was in effect for the state of Louisiana from March 22 – May 15, 2020. Rates of assault violence were also assessed outside of this period. Patient data protection and all study processes were reviewed and approved by both the local Institutional Review Board and hospital Research Review Committee.

### 2.1. Research setting

The University Medical Center hospital in New Orleans is a safety-net hospital that treats low-income, Medicaid or non-insured patients that come from the entire Southeast Louisiana region. It is the only Level One Trauma Center in the southeast Louisiana region, and therefore receives a high volume of traumatic injury cases. For individuals in New Orleans and the greater southeast Louisiana who experience a severe physically-traumatic injury, this hospital is the default location for treatment stabilization. This trauma center is verified by the American College of Surgeons. Internal data from the UMC Trauma Registry demonstrate an average of 300–400 trauma activations per month. The study was reviewed and approved by the Louisiana State University Health Sciences Center Institutional Review Board (IRB Number 00000177).

### 2.2. Cases of trauma

The trauma registry tracks all cases that meet trauma activation criteria (0–100 + years of age). No age-based exclusion criteria were applied. Trauma activation cases were studied according to the E-code listed per activation in the registry. E-codes are part of the International Classification of Diseases and are used to explain injury circumstances and context (e.g., intent, and mechanism) [19]. Options for the intent E-code include assault, unintentional trauma, self-harm, and undetermined/other [19]. Community violence was considered as all “assault” E-codes; and all other intents were categorized as “other.” In addition to E code, injuries (assaults and non-assaults alike) were classified as blunt, penetrating, or thermal. Within the group of assault trauma activations, penetrating assaults were further sub-classified into stabbings, firearm-inflicted injuries, motor vehicle assault (e.g., intentional running over other individuals), and “other.”

### 2.3. Clinical data

Clinical severity of traumatic injuries were captured using the Glasgow Coma Scale (GCS) and the Injury Severity Score (ISS). Race and gender were collected from the electronic medical record, which is populated using patient self-report during the course of the patient’s hospitalization.

### 2.4. Area Deprivation Index

Social disadvantage of the neighborhood in which assaulted patients live was measured using the Area Deprivation Index (ADI) [3], a composite measure of 17 fields, including education, employment, quality of housing, and poverty taken from the American Community Survey [3]. The ADI is freely available through the University of Wisconsin School of Medicine and Public Health website, with census-tract level data standardized at the national level as a percentile (1–100) [13]. Using participant home address (taken from the electronic health record), we used national ADI data to quantify the degree social disadvantage for

each case. Cases of individuals reported as experiencing homelessness or incarceration were omitted from analysis of residential area disadvantage. All individuals whose home address was listed in Louisiana were included. Residents of other states or countries were excluded in order to limit results associated with tourism.

### 2.5. Statistical analysis

Case characteristics of trauma activations before and during the COVID-19 pandemic were assessed for normality and parametric data were compared using student's t-tests. ISS and GCS outcome data were identified as non-parametric, and thus assessed using the Mann-Whitney U test. Distribution of cases according to categorical demographic data were accomplished with Chi Square tests. The rate of violent trauma (number of assault activations/month) was analyzed via a negative binomial regression. Dates in non Covid years were matched to the study period (i.e., direct use of the 6 month period of March–August) in the negative binomial regression in order to reduce the known confounding influence of seasonality on assault rates [20, 21, 22].

This regression technique is preferable to standard linear regression because negative values for the outcome (i.e., a negative population rate) are not allowed due to common heteroscedasticity among count data (correlation between the expected count and model residual), and because the Poisson regression is overly-restrictive for rate variables [23]. This model produces an estimate of excess risk in the form of a rate ratio (RR).

A TOST (two-one-sided tests) of equivalence was used to compare ADI case data between before and during the COVID-19 pandemic. A 15% margin of equivalence was used to assess equivalence. All data were analyzed using SAS statistical software, version 9.4 (Cary, North Carolina, USA).

## 3. Results

A total of 4,233 trauma activations were identified (Table 1). Among all trauma-activated cases during the study periods, there was no significant difference in age, sex, race, ethnicity, or survival status in 2020 relative to previous years. A chi square test showed a significant difference among injury intent overall, and a Bonferroni correction (alpha = 0.05/8 possible comparisons among categories of injury intent) showed persistence of significance when tested as just a change in assaults before versus during the pandemic (p < 0.0001). Home address was available for the majority of study participants (before the pandemic: 95.5%, during the pandemic: 95.8%). Among all cases, ADI ranking did not change between study periods (p = 0.27).

Table 2 provides case characteristics for cases of assault for the two time periods. No significant difference was found in average age, sex, race, ethnicity, or survival status. Race data were additionally assessed among assault cases among Black and White patients, only (Chi Square; p = 0.14). In addition, no change in ADI ranking were noted before versus during the COVID-19 pandemic. There was a significant change in trends of injury type (p = 0.03). Injury type was similarly assessed among assault cases for patients with blunt and penetrating injuries, only (Chi Square Test; p = 0.006). Overall, proportional incidence of blunt assault trauma reduced by nearly half (11.6%–6.8%), while the proportional incidence of penetrating trauma increased (88.2%–93.0%).

### 3.1. ADI rating among assaulted patients

Among patients experiencing an assault, neighborhood ADI remained consistent (difference of less than 5%). ADI also remained equivalent at the level of 5% when assessed specifically among male patients experiencing assault, among Black patients overall, and among Black male patients. In addition, ADI differed by no more than 15% among female patients overall, and among White patients overall. See Table 3.

### 3.2. Changes in community violence incidence

Negative binomial regression models of monthly rates of assault showed an overall increased rate of assault by 20% during the pandemic relative to the previous two years (p = 0.02; RR 95% CI: 1.03–1.45). Stratified by sex and race, results reflected an increase in cases of assault predominately among Black men. See Table 4.

In addition, data were explicitly tested outside of the state lock down period. When assessing the 3-month period after the lock down (June, July, and August) relative to these same three months in years past, assault violence increased by 45% (p < 0.0001). Similarly, the rate of assault violence was 50% higher in this three month period for Black men relative to years past (p < 0.0001); there was no change in the rate among Black women (p = 0.11), White men (p = 0.37), or White women (p > 0.99).

### 3.3. Characterization of assaults

Finally, among the assault trauma activations, data were assessed for potential changes in the characterization of these assaults. During the study period, the rate of assault activations wherein the patient was

**Table 1.** Case characteristics before (n = 2,803) and during COVID-19 (n = 1,430), all trauma activations.

	Before COVID	During COVID	P
	Mean (SD) % (n)	Mean (SD) % (n)	
<sup>a</sup> Age	38.1 (18.7)	37.4 (17.6)	0.25
<sup>a</sup> ADI	61.9 (20.2)	62.6 (20.0)	0.27
Before COVID: n = 2,676; During: n = 1,370			
	% (n)	% (n)	P
<sup>b</sup> Gender			
Male	74.0% (2,074)	75.1% (1,074)	0.43
Female	26.0% (729)	24.9% (356)	
<sup>b</sup> Race			
Asian	1.1% (30)	0.7% (10)	0.24
Black	57.5% (1,608)	59.9% (857)	
White	35.7% (998)	33.2% (475)	
Other	5.8% (162)	6.2% (88)	
<sup>b</sup> Ethnicity			
Hispanic/Latino	5.3% (147)	6.0% (86)	0.30
Non-Hispanic/Latino	94.8% (2,652)	94.0% (2,652)	
<sup>b</sup> Intent			
Assault	27.5% (770)	35.6% (471)	<0.0001
Self-Inflicted	2.0% (55)	2.6% (35)	
Unintentional	69.9% (1,959)	61.1% (809)	
Other/Undetermined	0.6% (18)	0.7% (9)	
<sup>b</sup> Injury Type			
Blunt	67.1% (1,881)	61.3% (876)	0.0001
Penetrating	29.3% (820)	35.7% (510)	
Thermal	3.6% (102)	3.1% (44)	
<sup>b</sup> Survival Status			
Lived	93.5% (2,620)	94.0% (1,342)	0.52
Died	6.5% (183)	6.0% (86)	
	<b>Median (IQR)</b>	<b>Median (IQR)</b>	<b>P</b>
<sup>c</sup> Injury Severity Score (ISS)			
ISS	5 (1–10)	4 (1–10)	0.003
<sup>c</sup> Glasgow Coma Scale (GCS)			
GCS-Total	15 (15–15)	15 (15–15)	0.31
GCS-M	6 (6–6)	6 (6–6)	0.65
GCS-V	5 (5–5)	5 (5–5)	0.41
GCS-E	4 (4–4)	4 (4–4)	0.67

<sup>a</sup> T Test.  
<sup>b</sup> Chi Square Test.  
<sup>c</sup> Mann Whitney U test.

**Table 2.** Case characteristics before (n = 770) and during COVID-19 (n = 471), assault trauma activations, only.

	Before COVID	During COVID	P
	Mean (SD)	Mean (SD)	
<sup>a</sup> Age	32.9 (13.7)	32.7 (12.9)	0.81
<sup>a</sup> ADI Before COVID: n = 715; During: n = 441	65.8 (18.7)	66.9 (17.2)	0.34
	% (n)	% (n)	P
<sup>b</sup> Gender			
Male	83.9% (646)	86.4% (407)	0.23
Female	16.1% (124)	13.6% (64)	
<sup>c</sup> Race			
Asian	0.3% (2)	0.4% (2)	0.25
Black	84.8% (653)	86.4% (407)	
White	12.7% (98)	9.8% (46)	
Other	2.2% (17)	3.4% (16)	
<sup>b</sup> Ethnicity			
Hispanic/Latino	1.8% (14)	3.2% (15)	0.12
Non-Hispanic/Latino	98.2% (756)	96.8% (455)	
<sup>c</sup> Injury Type			
Blunt	11.6% (89)	6.8% (32)	0.007
Penetrating	88.2% (679)	93.0% (438)	
Thermal	0.3% (2)	0.2% (1)	
<sup>b</sup> Survival Status			
Lived	91.8% (707)	91.7% (432)	0.95
Died	8.2% (63)	8.3% (39)	
	Median (IQR)	Median (IQR)	P
<sup>d</sup> Injury Severity Score (ISS)			
ISS	5 (1–10)	4 (1–10)	0.60
<sup>d</sup> Glasgow Coma Scale (GCS)			
GCS-Total	15 (15–15)	15 (15–15)	0.76
GCS-M	6 (6–6)	6 (6–6)	0.32
GCS-V	5 (5–5)	5 (5–5)	0.93
GCS-E	4 (4–4)	4 (4–4)	0.73

<sup>a</sup> T-test.<sup>b</sup> Chi Square Test.<sup>c</sup> Fisher Exact Test.<sup>d</sup> Mann Whitney U test.

injured by a firearm increased by 37% ( $p = 0.009$ ). No change in rate of stab assaults was demonstrated in 2020 versus pre-pandemic ( $p = 0.84$ ). Similarly, there was no change in the rate of assaults with a motor vehicle as the weapon method ( $p = 0.72$ ).

#### 4. Discussion

This study found an increase in community violence incidence during the COVID-19 pandemic relative to prior years, and that this increase appeared to be driven by an increase in violence victimization among Black men. Moreover, these increases constitute a deepening of pre-existing health disparities, as demonstrated by a near-equal rating of social disadvantage (ADI) among victims of community violence before and during the pandemic.

In this study, the historic level of social disadvantage from the neighborhoods where assaulted patients lived did not change significantly. Understanding such data are critical in order to allow anti-violence community resources and programming, (e.g., CureViolence, Stop the Bleed, economic stimulation programs) to be deployed to these areas. In addition, this finding is supported by known literature regarding the relative isolation of violence within urban networks. For example, Papachristos and colleagues demonstrated that 70% of all gunshot victims in Chicago were isolated to 6% of the city's population [24]. Similarly, an evaluation of these same data in Boston demonstrated that 85%

of all gun violence could be isolated to one social network (a connected, identifiable population within a given community) [25]. Financial and housing instability are known risk factors for community violence among individuals in these social networks [26]. Both of these factors have been shown to have increased throughout the United States due to the COVID-19 pandemic [27]. Specifically, the COVID-19 pandemic has negatively affected the US economy such that US national unemployment reached 11% as of June 2020, and employed individuals experienced an average salary decrease of 35 center per hour [14]. Black and Hispanic individuals have higher unemployment rates at 15.4% and 14.5% respectively, as compared to 10.1% for whites [14].

More generally, this study's finding of any increase in assault violence was expected in New Orleans due to documentation of similar trends following the social pressures that have accompanied other natural disasters. Loss of income and subsequent financial instability have been shown in New Orleans to result in increased use of physical violence for conflict resolution, as was seen between intimate partners following Hurricane Katrina [28]. Analysis of the trauma registry data from this same level one trauma center in New Orleans demonstrated that in the 6 months following Hurricane Katrina (relative to the 6 preceding months), an increase in all trauma activations of 50% occurred, and traumatically-injured patients exhibited higher trauma acuity (Injury Severity Score) and lower Glasgow Coma scale score at initial presentation [29]. This same study noted a higher prevalence of penetrating trauma post-Katrina [29]. In contrast, our data did not reflect worsening of clinical outcomes as measured by Injury Severity Score nor Glasgow Coma Scale when measured among all cases, nor when specifically assessed among cases of assault. This difference may be due to a persistence of gradually increasing stress during the pandemic, versus the immediate overwhelming impact of a hurricane. However, our study did find an increase in use of firearms as the injury mechanism for assault victims, with no change in the rate of stabbings or motor vehicle-induced assaults. It is possible that interpersonal conflicts leading to assaults therefore merely occurred more frequently, rather than additionally representing a change in how assault violence was perpetrated during the pandemic or increased lethality. Continued data monitoring is necessary to ensure that the disproportionate impact of violence among Black men does not become more severe or more lethal.

Chi-square analyses showed an increase in the proportion of violent trauma during 2020. Emergent studies demonstrate a reduction in utilization of emergency department services overall, possibly due to reduced demand for services and/or reductions in seeking of needed care due to fears of Sars-Cov-2 infection during hospital treatment [30]. This relative change in proportion of trauma intent may be related to a lower occurrence of accidental trauma may have occurred (e.g., work-related accidents, motor vehicle accidents) as individuals worked from and stayed at home. Regression analyses demonstrated an increase in the monthly rate of violent trauma incidence though, confirming that there was not simply a relative increase in community violence due to reductions in the other intent categories.

Previous studies on changes in domestic violence incidence in 2020 relative to past years demonstrate increases of approximately 10–25% (New York City, Jefferson, AL, respectively) [9]. Our increased rate of community violence overall, of approximately 23%, is in line with these same findings.

##### 4.1. Limitations

It is possible that some individuals who experienced traumatic injuries did not present for treatment due to fears of being in close proximity to people with COVID at these locations. However, because this hospital is the only level one trauma center in the Southeast Louisiana region, it is anticipated that high acuity traumas (e.g., gunshot wounds) were still directed for services due to the urgent need of treatment outweighing the fears of COVID-19 viral transmission. The comparison of rates of community violence associated with trauma assumed that the

**Table 3.** ADI among assault cases.

	Before COVID	During COVID	Mean Difference (95% CL)	Equivalence P-value		
	N, Mean (SD)	N, Mean (SD)		15%	10%	5%
<b>All</b>	715, 68.8 (18.7)	441, 66.9 (17.2)	-1.1 (-2.9–0.8)	<0.0001	<0.0001	0.0002
<b>Sex</b>						
Males	593, 65.9 (18.6)	337, 66.9 (17.5)	-1.0 (-3.0–1.0)	<0.0001	<0.0001	0.0004
Females	122, 65.5 (19.2)	64, 66.8 (15.9)	-1.3 (5.9–3.3)	<0.0001	0.001	0.09
<b>Race</b>						
Black	608, 67.8 (17.2)	381, 67.5 (17.0)	0.3 (-1.5–2.1)	<0.0001	<0.0001	<0.0001
White	90, 53.5 (23.0)	44, 60.0 (20.2)	-6.6 (-13.3–0.2)	0.02	0.20	0.65
<b>Sex and Race</b>						
Black Males	508, 67.8 (16.9)	320, 67.4 (17.3)	0.4 (-1.9–2.8)	<0.0001	<0.0001	<0.0001
Black Females	100, 67.6 (18.5)	61, 68.2 (14.8)	-0.6 (-6.1–5.0)	<0.0001	0.0005	0.06
White Males	69, 52.6 (23.8)	41, 61.7 (19.9)	9.0 (-17.8–0.3)	0.09	0.42	0.82
White Females	21, 56.4 (20.2)	3, 38.0 (8.9)	18.4 (-6.5–43.2)	0.61	0.75	0.86

Significant Equivalence P values indicate that the 95% confidence limits of the mean difference in ADI between the two study periods is fully contained within the equivalence limits (15%, 10%, or 5%). Data for cases with race of Asian or Other were not assessed due to low sample size.

**Table 4.** Negative binomial regression results for change in assault incidence according to patient race and sex.

Population	Relative Risk	95% Confidence Interval	p-value
<b>All</b>	1.22	1.03–1.45	<b>0.02</b>
<b>Sex</b>			
Males	1.26	1.04–1.52	<b>0.02</b>
Females	1.03	0.74–1.43	0.85
<b>Race</b>			
Black	1.25	1.03–1.51	<b>0.02</b>
White	0.94	0.63–1.39	0.75
Asian	0.94	0.63–1.39	0.75
Other	1.69	0.85–3.35	0.13
<b>Sex and Race</b>			
Black Males	1.26	1.02–1.55	<b>0.04</b>
Black Females	1.20	0.85–1.69	0.31
White Males	1.12	0.76–1.64	0.57
White Females	0.71	0.21–2.39	0.59

Data were inclusive of all cases listed within the trauma registry during the study period.

population at risk was stable across the study period. While the residential population in New Orleans Metropolitan area has been stable, the analysis did not adjust for the any dramatic population shifts that could have occurred at the onset of or during the COVID-19 pandemic. Increased in-state tourism prior to the COVID-19 pandemic would result in increased population at risk and even lower absolute rates for that time period, which would effectively bias the study results towards the null. Thus, our conclusions are robust to this limitation.

In looking at the changes in rates of assault violence before versus during the pandemic, we performed sub analyses to assess these trends among men versus women, and Black versus White patients. In performing separate sub-analyses, we are unable to directly comment on changes in rates among group differences; rather our data simply suggest that the increases occurred among particular demographic groups given that analyses restricted to a given group remained statistically significant while others did not (e.g., 20% increase in assault violence among Black male patients versus no statistically significant changes when the negative binomial regression was restricted to White female patients). Nonetheless, our data provide strong evidence to indicate that Black men did experience a significant change in assault violence victimization, a trend that was notably absent among other demographic groups.

In addition, there are block groups in New Orleans that do not have adequate data for ADI to be calculated (e.g., for the block containing the

Orleans Parish Prison), and individuals for whom home address was missing or was listed as a correctional facility. However, these circumstances impacted only 5.2% of all cases, and thus were not expected to have significantly impacted data analyses.

We had hypothesized that the communities where individuals experienced assault violence prior to the pandemic would be the same communities where violence increased, and that the ADI rating for the neighborhood in which assaulted individuals live would thus be within a 5% margin prior to versus during the pandemic. Similarly stated, assault cases continued to occur among patients living in the same neighborhoods as occurred prior to the pandemic. While it is possible that the “true” ADI of some neighborhoods changed in 2020, if such changes had occurred then this would have biased our equivalence test results towards the null. In addition, use of the pre-pandemic ADI rating allowed for us to assess patient neighborhood level of social disadvantage consistently.

Finally, explicit data are not available for the exact number of traumatic injuries that occur in the greater region nor the proportion that are brought to this hospital, data demonstrate use of trauma registry. This is a methodological concern that permeates the entire field of traumatic injury hospital literature, as no hospital is able to comprehensively assess the number of patients diverted to or from their own location relative to the number of traumatic injuries that occur in the entire city. Nevertheless, trauma registry data, even from a single hospital, have been shown to serve a relevant and pragmatic role of assessing local community trauma burden, particularly in a context such as ours wherein only one level one trauma center is available [31, 32]. In addition, it is up to local Emergency Medical Service (EMS) providers to determine where to bring patients with traumatic injuries when responding to community calls. Emergent data demonstrate that while hospital decision is heavily influence by patient preference among non-traumatic injuries, EMS providers rely on their own personal judgement for destination determination when responding to traumatic injuries [33]. Moreover, changing triage and transport patterns among EMS providers is incredibly difficult; for example, an assessment of the Centers for Disease Control Triage guidelines state-wide in North Carolina, during which all 100 state EMS systems were required to adopt the same protocol, failed to yield any significant differences in destination [34]. In our dataset, there was no change in the clinical severity of patient injury during the time period studied. Taken together with the known challenge that exists with attempting to alter EMS patterns, we believe that while the exact proportion of traumatic injuries represented by our hospital trauma registry relative to the community overall is unknown, the changes in trauma incidence that were captured by our dataset reflect a true increase rather than any change in EMS run patterns.

## 5. Conclusions

Health disparities associated with the COVID-19 pandemic extend beyond viral morbidity and mortality. As the pandemic continues, hospitals must continue to make systems-level changes in order to manage increases in violent trauma. More broadly, policy-level interventions are desperately needed to provide social supports for communities with high social disadvantage, and in particular for the Black men living in these areas. In particular, our finding of increased experiences of assault perpetrated with firearms and not with other types of weapons indicates necessity of gun-specific interventions. Given the consistency of clinical severity with years past and continued occurrence of violent crime among individuals living in neighborhoods where such events were highly prevalent pre-pandemic, it is likely that the increases in community violence would be responsive to known evidence-based interventions.

## Declarations

### Author contribution statement

Kaylin Beiter & Denise Danos: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

Erich Conrad, Stephanie Broyles, Jovanny Zabaleta, Jason Mussell & Stephani Phillippi Conceived and designed the experiments; Analyzed and interpreted the data; Wrote the paper.

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### Data availability statement

Data used in this study were taken from a hospital trauma registry and are not able to be made publicly available due to necessity of patient privacy protection.

### Declaration of interest's statement

The authors declare no conflict of interest.

### Additional information

No additional information is available for this paper.

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