

Are we Truly “Safer-At-Home”? A Test of Contextual Effects on Mental Health and Drug Overdose Incidents During the COVID-19 Pandemic

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Abstract

This study examined whether the social restrictions stemming from COVID-19 impacted the locations of mental health and drug overdose incidents, while controlling for immediate and community contextual indices. Addresses for mental health/overdose calls to law enforcement or emergency medical services between January 1, 2018 and August 13, 2020 were collected from one police department in the Midwestern United States. Businesses and previous victimization/offending were joined with parcels (level-1; N = 20,019), whereas local services and socio-economic indicators were joined with block groups (level-2; N = 32), to allow for a multi-level (HLM7) examination of context on mental health/overdose incidents. Event Rate Ratios (ERR) revealed the greatest contextual effects took place following social distancing mandates. Findings highlight the importance of allocating to areas with the highest likelihood of reporting incidents and suggest that parcels with a history of sex offenses, drug offenses, and prior mental health calls may benefit the greatest from preventative resources.

Keywords

COVID-19, drug overdoses, drug use behaviors, mental health, neighborhoods, safer-at-home order, service providers, victimization

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The high contagion of the novel coronavirus (i.e., coronavirus disease, COVID-19) ([World Health Organization, 2020](#)) has led to unprecedented social distancing efforts across the world, resulting in unique barriers to service acquisition. Although the physical health impacts stemming from this virus have unfolded quickly, our understanding of the impact of restrictions resulting from this virus remain in the largely unknown. Due to social distancing, as well as the attenuation in access to resources critical to support and coping, it is posited that such ramifications have influenced the public's social well-being, including mental health and drug use behaviors. The restrictive measures resulting from the COVID-19 pandemic have had many unintended consequences. Specifically, there has been an increase in symptomatology associated with anxiety and depression, suicidality, substance use, and opioid overdoses following social distancing mandates (e.g., "Safer-at-Home" order) ([Czeisler et al., 2020](#); [Mazza et al., 2020](#); [Slavova, Rock, Bush, Quesinberry, & Walsh, 2020](#); [Weisler & Chrisman, 2020](#)).

In addition to these unintended consequences, restrictions resulting from the COVID-19 pandemic have also introduced unique barriers to service utilization, highlighting the importance of using technology to deliver mental health care ([Weisler & Chrisman, 2020](#)). Unfortunately, some efforts may place individuals at greater risk for suicide or drug overdose. Pharmacies, for example, are dispensing higher volumes of prescription medications to patients (e.g., 90-day vs. 30-day supplies) ([Weisler & Chrisman, 2020](#)), although mental health providers were generally unable to have face-to-face consultations or appointments with patients. Additionally, following Secretary Azar's declaration of COVID-19 as a public health emergency, the [Drug Enforcement Administration \(2020\)](#) approved prescribing controlled substances to patients without an initial in-person medical evaluation. Although such procedures are aimed at streamlining the obtainment of prescriptions while minimizing the need for face-to-face contact between practitioners and patients, the heightened accessibility to larger volumes of prescription drugs may inadvertently lead to an increased risk of drug overdoses among consumers.

Given that COVID-19 has introduced mental health and drug use concerns, it is important to note that the literature has established the intersectionality of mental health and drug use. Here, people with mental disorders often use illicit substances at disproportionately higher rates ([Gregg, Barrowclough, & Haddock, 2007](#); [Sareen, Chartier, Paulus, & Stein, 2006](#)) with high comorbidity between mood and anxiety disorders and drug dependence disorders ([Conway, Compton, Stinson, & Grant, 2006](#)). For example, a study conducted by ([Sareen et al., 2006](#)) found that individuals with anxiety disorder diagnoses are more likely to report lifetime stimulant, cocaine, hallucinogen, and heroin use compared to those without anxiety disorders diagnoses. Further precipitating the melding of mental health and drug use behaviors, people with mental illnesses are also at increased risk for drug-related overdoses, with certain symptoms of mental illness (e.g., hopelessness and depression) linked with higher odds of drug use/overdose ([Turner & Liang, 2015](#)).

As the current social restrictions are unprecedented in this modern era, it is essential to not only identify potential associations between these restrictions and social outcomes, but also, how these restrictions may be particularly dangerous to those with mental health or drug use histories. This study contributes to the existing literature by examining the relationship between several contextual variables on mental health and drug overdose incidents. Moreover, because these social restrictions have cut-off pathways of coping support systems, we identify how sexual victimization and prior mental health incidents are tied to overdoses. In addition, we include a measure reflecting previous drug offenses to capture drug history. Further, we examine whether these effects vary following the social restrictions following the "Safer-at-Home" order. Through the recognition of how social restrictions have impacted the locations most likely to experience mental health and drug use behaviors, it may be possible to delegate valuable personnel and resources more effectively and efficiently towards those initiatives in need of the most support.

Literature Review

Prior research suggests that large-scale catastrophes negatively impact an individual's well-being. Experiencing such events can consequently lead to mental health issues, maladaptive coping through substance use, and, potentially, an increase in drug overdoses.

COVID-19 And Mental Health

Large-scale negative events, such as disease outbreaks or natural disasters, can result in poor psychiatric outcomes among affected individuals (Czeisler et al., 2020; Galea et al., 2002; Mazza et al., 2020; Rogers et al., 2020). Following the September 11th (i.e., "9/11") terrorist attacks, 7.5% of adults living in Manhattan, New York showed signs of Post-Traumatic Stress Disorder (PTSD) and 9.5% exhibited symptoms of depression five to 8 weeks after the attack (Galea et al., 2002); however, these symptoms have been shown to persist for years. Additionally, Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) outbreaks have been associated with reported experiencing symptoms such as depressed mood, anxiety, and insomnia (Rogers et al., 2020).

Specific to the COVID-19 pandemic, in a 2020 Center for Disease Control (CDC) survey of 5,412 adults in the U.S., 30.9% reported symptoms indicative of anxiety or depressive disorder, 10.7% had contemplated suicide, and 26.3% experienced symptoms associated with Trauma- and Stressor-Related Disorder (TSRD) (Czeisler et al., 2020). Overall, 40.9% of respondents reported having at least one mental/behavioral health disorder, which was three to four times higher than the previous year (Czeisler et al., 2020). One explanation is that social distancing mandates have disrupted the "social fabric" associated with traditional coping, which typically relies on the support of social networks; therefore, many may rely on other mechanisms to cope with feelings of loss, isolation, and depression (Brooks et al., 2020; Simon, Saxe, & Marmar, 2020). Consequently, we argue that prior mental health or sexual victimization may be connected to heightened risk of further mental health incidents during the COVID-19 pandemic.

COVID-19, Mental Health, and Trauma

Although COVID-19's long-term effects are unknown, research has begun exploring the effect of the global pandemic on many criminological processes. In addition to increased mental health symptomology, this body of research has established increased rates of homicides (Corley, 2021), child maltreatment (Lawson, Piel, & Simon, 2020), and victimization (Daigle, Hancock, & Chafin, 2021; Piquero, Jennings, Jemison, Kaukinen, & Knaul, 2021). Unfortunately, many of these negative outcomes are linked to stay-at-home orders. For example, the rates of domestic violence increased by approximately eight percent in the U.S. after implementing stay-at-home orders (Piquero et al., 2021). Further, the severity and frequency of intimate partner violence (especially among those experiencing sexual or physical intimate partner violence) worsened at the start of COVID-19 (Jetelina, Knell, & Molsberry, 2020).

Lifestyle/routine activity theory (L/RAT) highlights that victimization risk increases when people are perceived to be suitable targets, and are exposed to motivated offenders (Cohen & Felson, 1979; Hindelang, Gottfredson, & Garofalo, 1978). In this light, perhaps it is unsurprising that research examining the impacts of COVID-19 have found increases in victimization rates. Here, it is surmised that stay-at-home orders and societal shutdown measures have resulted in increased exposure of these key elements converging, as people may be isolated from guardians who could intervene during victimization, and may even be isolated with offenders in their homes. Further, heightened feelings of isolation and social support have been linked to increased rates of

mental health symptomology (Czeisler et al., 2020), which is associated with increased risk of victimization (Goodman et al., 2002; Hiday et al., 1999; Teplin et al., 2005). Research has also established that among people experiencing mental health problems, involvement in conflicted relationships increases the risk of victimization (Silver, 2002). Further, those with mental disorders typically have a tighter social network of people to provide guardianship, which has been linked to increased risk of victimization (Teasdale, Daigle, & Gann, 2021). Consequently, due to such shut down measures and increased rates of victimization, it is likely that people may turn to maladaptive coping techniques, such as substance usage, during the global pandemic.

COVID-19, Substance Use, and Drug Overdose

Beyond harmful mental health-related outcomes, previous studies have examined the impact of epidemics, natural disasters, and other catastrophic events on both legal (i.e., cigarettes and alcohol) and illegal substance use (Dewart et al., 2006; Vlahov et al., 2004). Research conducted by Alexander et al. (2019) established an increase in cigarette use, as well as relapse among former smokers, following Hurricane Katrina; however, the impact of hurricane exposure on cigarette use and relapse was indirect and mediated by depressive and PTSD symptoms. Increased use of cigarettes, alcohol, and marijuana was reported by nearly one quarter of adult Manhattan residents six to 9 months after the 9/11 terrorist attacks (Vlahov et al., 2004). In addition, among residents who did not report using substances prior to 9/11, 3.3% began smoking cigarettes, 19.3% started drinking alcohol, and 2.5% began using marijuana (Vlahov et al., 2004). Binge drinking has been identified as a pervasive issue among individuals directly exposed to the events of 9/11, especially among rescue and recovery workers (Welch, Zweig, McAteer, & Brackbill, 2017). Further, research suggests that stressors stemming from these attacks may have contributed to drug use and relapse among individuals participating in substance abuse treatment programs (Dewart et al., 2006).

Based on such findings, one can ascertain that some individuals turn to substance use as coping mechanisms during times of uncertainty, trauma, and stress. Although inherently different than natural disasters, researchers have started to point to similar trends in increased substance use during the COVID-19 pandemic. For example, 13% of respondents from the CDC study indicated starting or increasing substance use “to cope with stress or emotions related to COVID-19” (Czeisler et al., 2020, p. 1051). Similar increases in overdoses were identified in an analysis based on emergency medical services (EMS) data in Kentucky, which revealed a 17% increase in opioid overdose transports and a 50% increase in responses to suspected opioid overdoses with deaths following the COVID-19 state emergency declaration (Slavova et al., 2020).

Given the unprecedented social restrictions spawning from COVID-19, identification of associations between social restrictions and public health outcomes is imperative. This study examines whether the locations of sexual victimization, drug offenses, prior mental health calls, and other contextual indices are tied to the locations of mental health and overdose incidents. Perhaps most novel, analyses test for variation in these relationships prior versus during the social restrictions set in place by the COVID-19 “Safer-at-Home” order.

Data And Methods Sample

The sample for this study is one Midwestern city. According to the United States Census Bureau, the city is approximately 15 square miles, and has an estimated population of nearly 48,000 residents (U.S. Census Bureau, 2020a) residing within about 20,300 households (U.S. Census Bureau, 2019). Based on the U.S. Census Bureau’s (2020b) urban-rural definition, the sample city is located in an urban county, as this county’s population is 115,000 residents, which exceeds the 50,000 residents needed to be identified as an urban area. That said, the sample city has a much

larger population density (3,571 residents/square mile) compared to the county as a whole (226 residents/square mile) (U.S. Census Bureau, 2019).

We use multi-level modeling (i.e., Hierarchical Linear Modeling; “HLM-7”) to test whether the locations of mental health and overdose incidents are associated with contextual effects taking place both at the immediate environment and neighborhood level. The level-one unit of analysis for this study is census-defined parcels. After removing streets and waterways (N = 2,727), there are a total of 20,019 parcels located within the sample city. The level-two unit of analysis for this study is Census-defined block groups. Within the sample city, there are 32 block groups.

Measures and Data Dependent Variables

Data on all mental health and overdose calls reported or responded to by the city’s police department (or EMS) between January 1, 2018 and August 13, 2020 were obtained from the police department (see Appendix A). Based on the date the “Safer-at-Home” order was enacted in sample jurisdiction (March 25, 2021), four dependent variables were created. The first reflects the number of mental health calls per parcel that took place prior to the “Safer-at-Home” order (i.e., January 1, 2018-March 24, 2020) (*Pre-COVID Mental Health Calls*; N = 2,827). The second measures the number of all overdoses per parcel during the pre-COVID timeframe (*Pre-COVID Overdoses*; N = 359). The third and fourth variables measure the number of mental health (*COVID Mental Health Calls*; N = 505) and overdose (*COVID Overdoses*; N = 72) incidents taking place following COVID-19 (i.e., March 25-August 13, 2020).

Independent Variables

Parcel-level. Because prior research highlights the intersectionality between sexual victimization and drug overdoses (Konkel & Hoffman, 2021), data on the locations of sex offenses were collected from the sample jurisdiction’s police department. Based on these data, two measures were created to reflect the number of reported sex offenses occurring at each parcel prior to COVID-19 (*Sex Offenses Pre-COVID*) and during the COVID-19 phase (*Sex Offenses COVID*). Two additional measures were created to reflect drug availability and historical drug use within one’s immediate environment. Data on the number of drug offenses per parcel during the pre-COVID and COVID timeframes (*Pre-COVID Drug Offenses* and *COVID Drug Offenses*, respectively) were collected from the sample city’s police department. Because “drug trafficking organizations/gangs” are a predictor of proximal drug overdoses (Johnson et al., 2020, p. 13), data obtained from the sample city’s police department was used to create two additional binary measures were created, including whether each parcel was a known drug house (*Drug House* coded as “1,” non-drug house coded “0”) or housed at least one known gang members (*Gang Member residence* coded as “1,” non-gang member residence “0”). Two measures were created to reflect risky environments, yet also locations that someone may be likely to report a mental health or overdose incident. Both reflect the presence (“1”) or absence (“0”) of the parcel housing a bar (*Bar*) or a gas station/mini mart (*Gas Station/Mart*). Data on the locations of bars and gas stations/marts were obtained from Data Axle, which is an online search engine that allows users to query specific types of businesses and organizations based on Standard Industrial Classification (SIC) codes. Once the query has been run, the user is able to export business data, including the address of each individual business. Finally, the number of mental health-related incidents per parcel that took place during the pre-COVID timeframe were obtained from the sample city’s police department and was included in the final model.

Neighborhood-level. The pandemic has also impacted the U.S. economy, which has been linked to increased suicide rates (Oyesanya, Lopez-Morinigo, & Dutta, 2015). Furthermore, the literature has identified that a strong relationship between concentrated disadvantage and deaths resulting from a drug overdose (Johnson et al., 2020). As such, a measure reflecting *Concentrated Poverty* was included in analysis (Massey, 2001). This measure was computed as

$$\text{Concentrated Poverty} = \left[\frac{(\text{Number of affluent households} - \text{Number of impoverished households})}{\text{Total number of households}} \right] (-1)$$

This resulted in an index where a block group scoring -1 indicates all households have annual earning of at least US\$100,000, whereas a score of $+1$ indicates extreme concentrated poverty, meaning all households within that block group have annual earnings below the poverty line. Because heterogeneous populations are more likely to engage in crime and deviance, as well as experience victimization (Kornhauser, 1978; Shaw & McKay, 1942), a measure of racial/ethnic *Heterogeneity*, based on Blau's (1977) heterogeneity index, was included in analysis. This measure was computed as $1 - \sum p_i^2$, where p_i is the proportion of each racial category within the population (Cahill & Mulligan, 2007). This index ranges from 0 to 1, in which 1 signifies complete heterogeneity. Finally, *Mobility* was captured by the percent of block group residents who reported moving into their residence within the past 3 years. *Population Density* was reported as the number of residents per 10,000 square feet was included as a control. Data on these measures come from the American Community Survey; 2018—5-year estimates (U.S. Census Bureau, 2018).

Because service providers may often report mental health and overdose incident, two measures reflecting access to the number of community and social services (*Soc-Comm Services*) and the number of mental health services (*MH Services*) per block group were included. Data on these two categories of services were obtained by the same method described above by querying service-related SIC codes within the Data Axle database (see Appendix B). Prior to multi-level analysis, all variables were grand mean centered.

Analysis Plan

Using a series of models, we test how the relationship between mental health and overdose incidents with immediate and neighborhood context vary between pre-COVID and COVID timeframes. Before beginning analysis, several model fit indices were examined. First, all dependent variables had smaller means than standard deviations (Table 1). In concordance with the literature, Poisson modeling was identified to be the most appropriate analytic approach to model these data. Although Poisson distributions assume equal means and variances, this is not the case with the current data, resulting in negative binomial regression model dispersion parameters for each dependent variable. Additionally, correlation coefficients ranged from an absence of to moderate levels of correlation and Variance Inflation Factors were smaller than 5. Therefore, multicollinearity was deemed unlikely. Based on model fit statistics an Overdispersed Poisson distribution was identified as being the most appropriate model for analysis.

Due to nested nature of parcels within block groups, as well as the non-independence of observations and error terms, HLM was selected as the most appropriate modeling technique (Raudenbush, Bryk, & Congdon, 2011). Because of our focus on level-one effects related to mental health and drug overdose incidents, findings were reported based on unit-specific effects models with robust standard errors (Raudenbush et al., 2011). Null models were examined for

Table 1. Descriptive Statistics Of All Variables.

	Minimum	Maximum	Mean	Std. Dev
Dependent Variables				
Pre-COVID mental health calls	0.000	133.000	0.141	1.557
Pre-COVID overdoses	0.000	51.000	0.018	0.391
COVID mental health calls	0.000	17.000	0.025	0.271
COVID overdoses	0.000	8.000	0.004	0.081
Neighborhood-Level Variables				
Concentrated poverty	-0.305	0.429	0.063	0.191
Heterogeneity	0.470	0.923	0.710	0.123
Mobility	1.579	35.177	16.854	6.912
Soc-comm services	0.000	3.000	0.563	0.948
MH services	0.000	6.000	0.625	1.264
Population density	0.280	44.410	17.551	11.852
Parcel-Level Variables				
Pre-COVID sex offenses	0.000	10.000	0.013	0.151
COVID sex offenses	0.000	2.000	0.002	0.046
Pre-COVID drug crimes	0.000	15.000	0.028	0.326
COVID drug crimes	0.000	4.000	0.004	0.083
Drug house	0.000	1.000	0.008	0.088
Bar	0.000	1.000	0.003	0.056
Gas station/Mart	0.000	1.000	0.001	0.032
Gang member	0.000	1.000	0.010	0.089

each dependent variable, and the calculated Intraclass Correlation Coefficients (ICCs) indicated that multi-level modeling was suitable for analysis. Specifically, 3.4% of the variation in pre-COVID mental health calls, 19.3% of the variation in COVID mental health calls, 7.4% of the variation in pre-COVID overdoses, and 26.6% of the variation in COVID overdoses took place between block groups. Due to variation among block groups and parcels, multi-level modeling was employed.

Results

Descriptive statistics on all variables are presented in [Table 1](#). [Figure 1](#) shows standard deviations-based Kernel Density map. This map highlights the areas with the highest densities of mental health and drug overdose incidents that took place in the pre-COVID and COVID timeframes. When comparing the locations of where the highest densities of these incidents took place, one can observe that mental health-related incidents stayed somewhat similar; however, gravitated slightly toward the southern portion of the jurisdiction. On the other hand, the locations of drug-related overdoses were largely dispersed from the downtown area of the city, and were partially displaced in the western and southern areas of the city. The locations of mental health and overdose calls were highly concentrated, with all pre-COVID mental health calls taking place at approximately 6.8% of all city parcels (N = 1,353 parcels) and all pre-COVID overdose calls taking place within only 1.2% of all city parcels (N = 255 parcels). During the COVID timeframe, all mental health calls took place at only 1.7% of all city parcels (N = 338) and all overdose calls for service came from only 0.3% of all city addresses (N = 63 parcels).

[Table 2](#) presents findings on the relationship between all predictor variables on pre-COVID and COVID mental health calls. Although no neighborhood-level variables were significantly associated with mental health calls, several parcel-level predictors were associated with mental

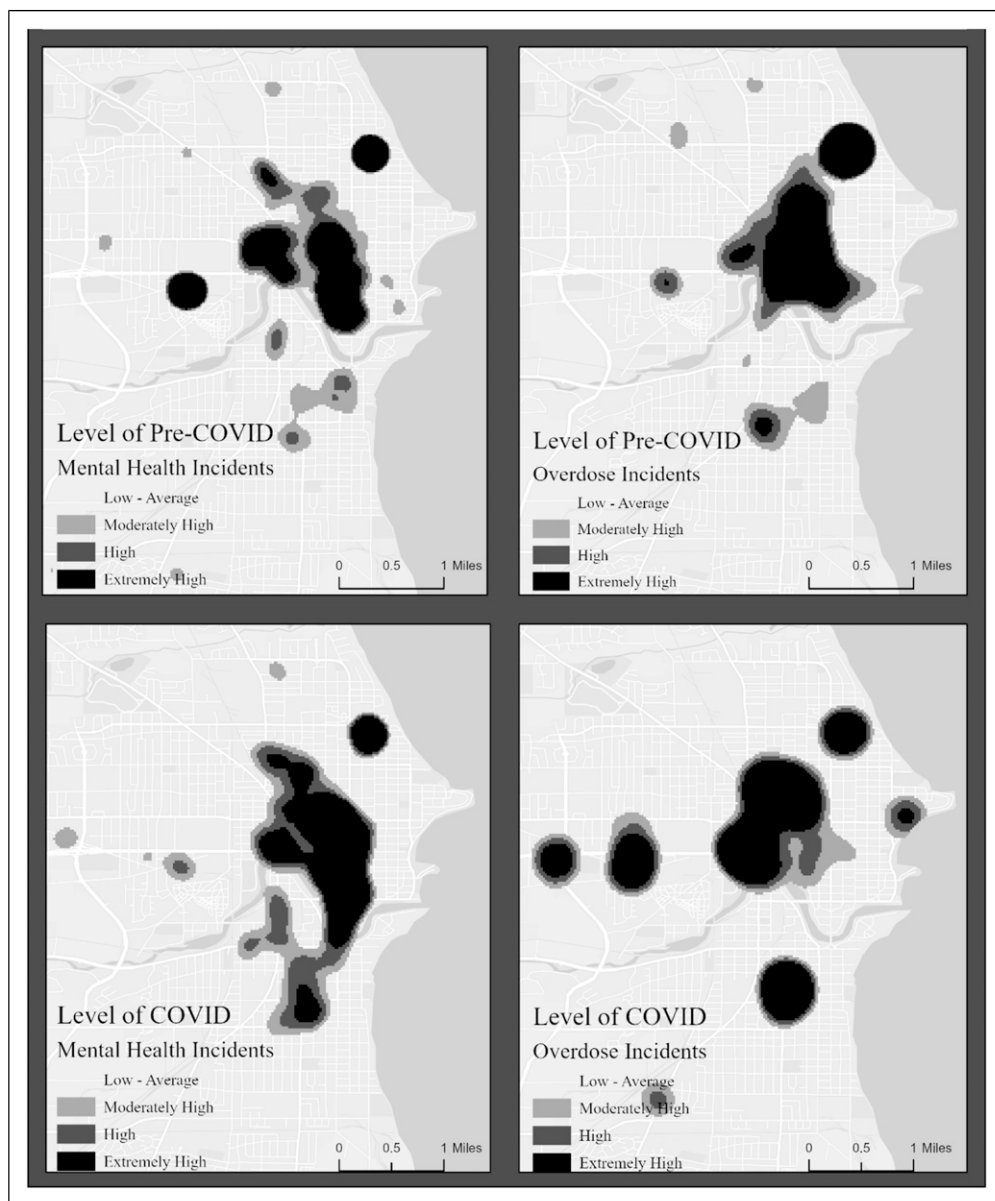


Figure 1. The series of maps below show clusters of mental health and drug overdose incidents during the Pre-COVID and COVID timeframes. Levels are displayed based on the following standard deviation breaks: Low to average (<2 std. dev. above the mean), Moderately high (2-2.5 std. dev. above the mean), High (2.5-3 std. dev. above the mean), and Extremely high (>3 std. dev. above the mean).

health incidents. Examination of the Event Rate Ratio (ERR) revealed that each additional sex offense reported at a given parcel was associated with a 57% increase of a mental health incident taking place. Similarly, each drug offense was associated with a 47% increase of a mental health incident occurring at that parcel. Further, gas stations/marts and gang presence had a strong and positive relationship with the number of mental health calls taking place during the Pre-COVID timeframe. Gas stations/marts were 511% more likely to have a mental health incident take place

Table 2. Results From Multi-level Negative Binomial Regression Models Predicting Pre-Covid And Covid Mental Health Calls.

	Pre-COVID Mental Health Calls			COVID Mental Health Calls		
	b	SE	ERR	b	SE	ERR
Neighborhood-Level Variables						
Concentrated poverty	1.855	0.928	6.391	1.853 ^a	0.791	6.379
Heterogeneity	0.625	1.118	1.868	-0.893	0.748	0.409
Mobility	0.015	0.016	1.015	0.011	0.015	1.011
Soc-comm services	0.094	0.131	1.100	0.070	0.090	1.072
MH services	0.081	0.109	1.085	0.182 ^b	0.061	1.200
Population density	0.023	0.109	1.023	0.017 ^a	0.007	1.017
Parcel-Level Variables						
Pre-COVID sex offenses	0.453 ^c	0.128	1.573	—	—	—
COVID sex offenses	—	—	—	2.273 ^c	0.443	9.708
Pre-COVID drug crimes	0.388 ^c	0.065	1.474	—	—	—
COVID drug crimes	—	—	—	0.682 ^c	0.155	1.977
Drug house	0.612	0.462	1.843	1.285 ^c	0.387	3.616
Bar	0.493	0.307	1.638	0.554	0.450	1.740
Gas station/Mart	1.631 ^b	0.590	5.109	2.419 ^c	0.431	11.234
Gang member	1.478 ^c	0.242	4.383	1.600 ^b	0.602	4.951

^ap<.05.^bp<.01.^cp<.001.

and parcels identified as housing at least one gang member were 438% more likely to have a mental health incident take place. Next, the effect of all predictors on mental health calls during COVID were examined. Although consistent with the previous model, results indicated key differences. At the neighborhood-level, concentrated poverty and population density were both associated with COVID mental health incidents. Additionally, each mental health service provider was associated with a 20% increase in a mental health incident taking place at a parcel located within that block group.

At the parcel-level, all predictors, with the exception of bars, were associated with the number of mental health calls during COVID. Here, the impact of sex offenses increased by almost six-fold, in which each sex offense was associated with nearly a 1000% increase in the odds of a mental health incident occurring. Additionally, drug houses were associated with a 362% increase in the likelihood of experiencing a mental health incident and parcels housing gang members were nearly five times as likely to experience a mental health incident. Finally, gas stations/marts were 11 times more likely to experience a mental health incident.

Table 3 examines overdoses during the pre-COVID and COVID timeframes. During the pre-COVID phase, no neighborhood-level variables were associated with overdoses; however, several parcel-level variables elicited significant relationships. For example, each sex offense was associated with a 77% increase in the likelihood of an overdose taking place. Similarly, each additional drug offense was associated with a 64% increase in the likelihood of an overdose occurring. Further, parcels with a gang presence were nearly five times more likely to experience an overdose and those with a bar were 4.5 times more likely to experience an overdose.

Unlike the pre-COVID timeframe, two neighborhood-level variables were associated with overdoses during the COVID phase. Specifically, parcels located within more racially heterogeneous

Table 3. Results From Multi-level Negative Binomial Regression Models Predicting Pre-Covid And Covid Overdoses.

	Pre-COVID Overdoses			COVID Overdoses		
	b	SE	ERR	b	SE	ERR
Neighborhood-Level Variables						
Concentrated poverty	0.656	1.805	1.928	1.314	0.945	3.721
Heterogeneity	1.581	1.914	4.862	-3.873 ^a	1.792	0.021
Mobility	0.042	0.032	1.042	0.007	0.018	1.007
Soc-comm services	-0.113	0.164	0.893	0.262	0.137	1.300
MH services	0.029	0.145	1.237	0.201	0.123	1.222
Population density	0.029	0.109	1.030	0.030 ^a	0.013	1.031
Parcel-Level Variables						
Pre-COVID sex offenses	0.573 ^a	0.247	1.773	—	—	—
COVID sex offenses	—	—	—	1.730 ^b	0.244	5.642
Pre-COVID drug crimes	0.494 ^c	0.129	1.639	—	—	—
COVID drug crimes	—	—	—	1.415 ^c	0.244	4.116
Drug house	0.697	0.832	2.007	1.973 ^c	0.476	7.190
Bar	1.499 ^c	0.431	4.479	1.477	0.944	4.380
Gas station/Mart	0.456	0.966	1.577	-0.128	1.917	0.880
Gang member	1.570 ^c	0.430	4.806	-1.385	1.141	0.250
Pre-COVID MH calls	—	—	—	0.060 ^c	0.004	1.062

^a=*p*<.05.^b*p*<.01.^c*p*<.001.

neighborhoods experienced fewer overdoses, and those within neighborhoods with higher population densities were associated with a greater prevalence of overdoses. Similar to the pre-COVID period, at the parcel-level, prior offenses that occurred during COVID were associated with increased odds of overdoses. Specifically, each additional sex offense was associated with a 564% increase in the likelihood of an overdose taking place. Further, each drug offense was associated with a 412% increase in the odds of an overdose occurring. Additionally, drug houses had seven times the likelihood of experiencing an overdose. Finally, parcels with more mental health calls during the pre-COVID timeframe were associated with increased odds of overdoses occurring during the COVID phase. Here, each pre-COVID mental health incident was associated with a 6% increase in the likelihood of an overdose taking place during COVID.

Discussion

Researchers have begun to explore outcomes associated with the COVID-19 pandemic; however, the impact COVID-19 on public health outcomes remains underexamined. We address this gap by testing neighborhood and immediate contextual effects on mental health and drug overdose incidents before and during COVID-19. First, at the neighborhood-level during the pre-COVID timeframe, no neighborhood-level variables were associated with mental health calls; however, during the COVID phase, both concentrated poverty and population density were positively associated with the likelihood of a mental health call taking place at a given parcel. As established in the literature, neighborhoods with higher levels of poverty often experience increased strains, burdens, and stressors, which in turn can lead to a breakdown in the ability of residents to offer tangible or emotional support (DeLeon-Granados, 1999). Further, residents' attachment to conventional values

in such communities may become attenuated, leading to difficulty in establishing agreed upon social norms and, moreover, a unified effort to uphold conventional values (Warner, 2003). This, coupled with the weak institutional base experienced within many impoverished communities, often leads to residents in such neighborhoods feeling “social isolation” or blocked from attaining goals (Kornhauser, 1978; Shaw & McKay, 1942; Wilson, 1987). As a result, mental health problems are likely to manifest (Anakwenze & Zuberi, 2013), as supported by our findings. Although puzzling, mental health service providers were positively associated with the number of mental health calls during the COVID period. After consideration, we contend that because normal contact between individuals decreased during COVID, mental health incidents may have gone undetected and unreported; however, mental health professionals may have maintained contact with patients and are likely reporters of severe mental health-related episodes. As mentioned, COVID-19 has introduced unique barriers to service utilization (Weisler & Chrisman, 2020). Our findings emphasize the importance of such services (especially mental health services) given that the pandemic has significantly increased mental health issues (Czeisler et al., 2020; Mazza et al., 2020).

Next, we turn to the immediate (i.e., parcel-level) environmental effects on mental health incidents before and during COVID. First, the number of sex offenses per parcel was positively associated with pre-COVID and COVID mental health calls, lending support for the connection between victimization and mental health consequences (Thompson, Arias, Basile, & Desai, 2002). In fact, the impact of sex-related offenses on mental health incidents increased by almost six times between the pre-COVID and COVID period, in which each additional sex offense was associated with nearly 10 times the odds of a mental health incident taking place at that parcel. Sex crimes occurring within parcels are likely a proxy for personal or vicarious victimization. As such, the current study’s findings indicate the need for resources, services, and other intervention strategies targeted towards victims of sex offenses. Similarly, the number of previous drug offenses was associated with mental calls during both timeframes. Although a smaller impact, each drug offenses was associated with double the odds of a mental health incident taking place at the same parcel. Given that mental health calls were highly concentrated within parcels, we encourage officials to implement and allocate a greater number of resources to areas experiencing higher rates of sex and drug offenses.

Drug houses and gang member residences were associated with increased odds of a mental health incidents during the COVID phase. Further, the odds of a mental health call occurring at a gas station/mart increased during the COVID timeframe, compared to the pre-COVID period. Although the increased odds of mental health incidents occurring at gas stations/marts between the pre-COVID and COVID timeframe are likely due to these locations remaining open during the COVID phase, the increased odds of mental health incidents occurring at drug houses are likely attributed to the negative psychological effects of social isolation resulting from quarantining (Brooks et al., 2020). Previously stated, loneliness and isolation have been cited as main contributors of mental health problems (Alexander, Ward, Forde, & Stockton, 2019). As such, policymakers should attempt to increase resources and service providers in areas with heightened social isolation.

Several striking results appeared when examining drug overdoses between the pre-COVID and COVID timeframes. For example, at the neighborhood-level, none of the predictors significantly increased the odds of an overdose occurring during the pre-COVID phase; however, during the COVID phase, both racial/ethnic heterogeneity and population density were associated with overdoses. As noted above, socially disorganized neighborhoods with higher levels of heterogeneity and population density may experience difficulty in establishing and maintaining social norms and neighborhood support systems. Residents in such areas may feel socially isolated and experience greater goal blockage. As a result, residents use maladaptive coping techniques, such as substance use (Oetting, Donnermeyer, & Deffenbacher, 1998), which can lead to overdose. It is similarly possible that such neighborhood-level characteristics are indicative of ineffective

guardians and other control mechanisms, which may also lead to an increased risk for overdoses. Thus, the need for resources and services in such areas appear to be gravely important.

Similar to the mental health models, sex and drug offenses significantly increased the odds of an overdose occurring within one's immediate context (i.e., parcel) before and during COVID, with the magnitude of both effects increasing during the COVID phase. As stated above, it is likely that parcels experiencing an increase in sex offenses also have heightened rates of personal and vicarious victimization, emphasizing the importance of having a victim advocate connect with victims of sexual violence. Of similar importance, previous drug offenses, which is a likely proxy for repeat drug use, was associated with overdose. Here, we emphasize the importance of disseminating services to those with histories of drug use, as these individuals may be at a heightened risk for overdosing.

Also, at the parcel-level, mental health calls that took place in the pre-COVID phase were associated with increased odds of an overdose occurring during COVID. Because drug usage can be a maladaptive coping method for those experiencing mental health issues (Gregg et al., 2007), it is especially important for people who have previously experienced mental health incidents to be referred to services to attempt to prevent maladaptive coping mechanisms. Finally, the odds of experiencing an overdose during COVID increased by seven-fold within known drug houses. Illicit drug use is common in response to large-scale negative events (Vlahov et al., 2004). Beyond the increased access to illicit drugs within drug houses, we argue that drug houses may have served as an alternative avenue of social interaction. As mentioned previously, 13.3% of U.S. adults reported that they started or increased substance use to cope with emotions and stress related to the pandemic (Czeisler et al., 2020). This is further supported by the finding that although bars were positively associated with overdoses pre-COVID, this effect diminished to a level of non-significance during the COVID timeframe. Although hypothetical, it is possible that people were not only frequenting known drug houses to access and use drugs, but to also experience some type of social interaction, which they may have traditionally gained through patronage at a bar.

Limitations

Despite the importance these findings may have in directing mental health and drug use resources, this study is not without limitations. First, the data come from a single Midwestern jurisdiction in the United States, which can limit generalizability to other cities, states, or countries. Second, many measures relied on police report and intelligence data. Because victimization and other behaviors are often underreported, it is possible that not all offenses, gang members, or drug houses were included within the dataset. Similarly, overdoses that were unknown to the police department (e.g., those treated outside the sample area or in a non-medical setting) were not included within the dataset. Third, because of individual mobility, it is possible that some outcome data do not consistently reflect the same people.

Conclusion

Despite these limitations, our research is one of many steps in the investigation of the effect of COVID-19 on mental health and overdose incidents. Findings from this study suggest that contextual characteristics significantly impact mental health incidents and overdoses, and such characteristics changed during COVID-19. Future research should additionally explore individual-level correlates related to mental health and overdose incidents. Research should also continue to identify neighborhood institutions and resources that may mitigate the effects of social distancing on the overall well-being of residents. Based on our findings, we encourage policymakers and local agencies to further funnel resources and services to residents and communities who may be most at risk during the uncertain times experienced with the current social ramifications stemming from the COVID-19 pandemic.

APPENDICES

APPENDIX A

Call Descriptions.

Category	Included Calls	Description
Mental health		
	Chapter 51	Calls related to alcohol, drug abuse, developmental disabilities, or mental health
	Chapter 55	Calls regarding adult protective services/adults at risk
	EMS overdose	Calls requesting assistance from EMS for an overdose
	Self-committal	Calls usually involving mental health issues (e.g., individual requesting transportation to the emergency room, psychiatric unit, etc.)
	Suicide	Calls regarding an individual threatening, attempting, and/or committing a suicide
	Welfare check	Calls requesting a welfare check
Overdose		
	Assist fire department-overdose	Calls requesting medical assistance from the fire department related to an overdose
	Death/drug-related	Calls reporting a drug-related death
	Drugs/health or safety	Calls requesting a welfare or health check related to drug use
	Overdose call	Call reporting an overdose
	Miscellaneous call with an overdose	Incidents where officers responded to a non-overdose call; however, upon arrival there was an overdose situation
Sex offense		
	1st degree sex offense	1st degree sex offense
	2nd degree sex offense	2nd degree sex offense
	4th degree sex offense	4th degree sex offense
	Fondling completed/attempted	Fondling or attempted fondling (4th degree sexual assault)
	Rape	Rape
	Rape/attempted	Rape (attempted)
	Rape/drug induced	Rape (drug induced)
	Rape/elderly/disabled/attempt	Rape or attempted rape of an elderly or disabled individual
	Sex assault with object	Sex assault with object
	Sex offense	Sex offense
	Sex offense/disabled/elderly	Sex offense/disabled/elderly
	Sodomy/oral sex	Forced sodomy/oral sex
Drug offense		
	Drugs: Possess	Possession of amphetamine, cocaine, hallucinogen, heroin, marijuana, non-narcotic, opium or derivative, or a synthetic drug
	Drugs: Sell/manufacturing	Selling or manufacturing amphetamine, cocaine, hallucinogen, heroin, marijuana, non-narcotic, opium or derivative, or a synthetic drug

APPENDIX B

Categories of Service Providers.

Category of Service	Type of Services	SIC Code
Social-community	Education, religious, and charitable institutions	6732
	Civic, social, or fraternal organizations	8641
	Government-individual/family social services	8322
	Community food services (i.e., food banks/pantries)	832,229
	Social service and welfare organizations	832,218
	Community centers	7999
	Family planning information centers	809,303
	Emergency social services	832,203
	Social service (not elsewhere classified)	8399
Mental health	Counseling services	832,206
	Counselors	832,206
	Counselors-licensed professional	832,206
	Crisis intervention service	83,220,302
	Family and family counselors	832,205
	Group homes	83,619,905
	Mental health services	8093
	Psychologists	804,904

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