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A tale of three cities: Crime and displacement after Hurricane Katrina

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ABSTRACT

When Hurricane Katrina struck New Orleans in August 2005, it greatly disrupted both the physical and social structures of that community. One consequence of the hurricane was the displacement of large numbers of New Orleans residents to other cities, including Houston, San Antonio, and Phoenix. There has been media speculation that such a grand-scale population displacement led to increased crime in communities that were recipient of large numbers of displaced New Orleans residents. This study was a case study of three cities with somewhat different experiences with Katrina's diaspora. Time series analysis was used to examine the pre- and post-Katrina trends in six Part I offenses (murder, robbery, aggravated assault, rape, burglary, and auto theft) to assess any impact of such large-scale population shifts on crime in host communities. Contrary to much popular speculation, only modest effects were found on crime. Social disorganization theory was used to frame both the analysis and the interpretation of these results.

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Introduction

The devastation and destruction Hurricane Katrina inflicted upon New Orleans and the Gulf Coast is well documented in media accounts, government reports, and scientific inquiry. Much of this discussion focused on Katrina's effects on the social fabric and physical environment of affected communities, as well as those communities that received Katrina's diaspora. Media accounts (see Campo-Flores, 2006; Cooper, 2006) highlighted changing crime patterns in the communities that received the largest influx of residents forced to flee the Gulf Coast region. Commentators initially made little mention of the possible negative consequences associated with Katrina's diaspora. Later, serious concerns emerged about problems such as crime in the months following this disaster and displacement. Local policymakers largely explained sharp increases in crime in the latter part of 2005 and into 2006 as resulting from the infusion of large numbers of displaced persons from the Gulf region (i.e., Bustillo, 2006), many of whom were from the most economically disadvantaged segments of society.

Public conjecture that survivors may have actually "brought crime" to host communities played on some of society's worst features. Questions of race and social class were introduced into this discourse as a large percentage of persons displaced by Katrina were people of color and/or economically distressed. Consequently, commentary on the presumed negative effects of Katrina's population displacement

was often highly polarizing. The tone of this debate was well reflected in two postings to CNN's Anderson Cooper's on-line blog about the effects of Katrina on Houston's crime. One blogger wrote:

Well, I live here, yes Houston. And we do feel the increase in our crime. When you wake up and almost everyday there is either [sic] another shooting, robbery, or apartment fire. It always has a [n] evacuee angle to it. Granted, not all are bad – some our [sic] my neighbors and they are nice people. But, overall they are just having a huge problem with 'fitting in.' Part of me see's their issues, but overall Houston is not a welfare town. We all work hard and don't ask for much. I see hard working people from Mexico that never complain [sic] - and they are highly respected here. All we ask is - find a home, find a job (plenty around here) and get on with your life. Gangs and turf wars don't fly here. Also, Texans carry guns - they shoot back! (Cooper, 2006)

Another blogger argued that any suggestion that evacuees were responsible for increases in crime was irresponsible and merely out of convenience. She wrote:

Why is it, when something like Katrina happens, the so called 'host com[m]unties' blame all of their crime and other social issues on the people who they offered help to? Get real, the issues in your communities were there way before this, you ignored them and now you have scape[g]oats to blame it on. I hope what has happened to them, never comes to your doorstep, but if it does, remember your words to the current victims. Shame on you!!! (Cooper, 2006)

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Taken together the comments spoke to the tone of the arguments about Katrina's effects that took place in public and private conversations.

The effort to disentangle Katrina-related effects on crime proved difficult. While there was plausible evidence that Katrina survivors were implicated in the growing crime problem in communities like Houston (Moreno, 2006), early published analyses did not sufficiently address rival explanations. These accounts tended to simply compare fluctuation in Houston's crime rate with comparable time periods before August 2005, when Katrina struck (see Cooper, 2006). These over-simplistic accounts failed to adequately consider if post-Katrina crime trends were part of longer trends already in place or whether the trends were the direct result of this tragic event. Moreover, existing media accounts did not consider how Houston's experiences in the aftermath of Katrina corresponded to those of other communities that also received sizable numbers of displaced persons. Thus, it was difficult to differentiate the effects of Katrina on crime with the existing level and quality of analysis that had been provided.

This article examines crime rate trends in Houston, San Antonio, and Phoenix during a 143-week period encompassing Katrina's landfall. More specifically, the study examined how crime trends in the period preceding Hurricane Katrina differed from those after the event. The analysis sought to understand how or if this disaster influenced crime rates, particularly within the communities receiving an appreciable proportion of the residents forced from New Orleans and other Gulf Coast communities. This study was not intended to be an analysis of crime trends in New Orleans or the surrounding area in the aftermath of Hurricane Katrina, nor was it intended to be considered an exhaustive study of national or even regional crime effects of Katrina. Instead, this study sought to understand the impact of Hurricane Katrina on crime in three cities that received sizable numbers of displaced persons. In the aftermath of Katrina and the related influx of residents, all three communities began to explain away crime increases as something other than locally grown. Katrina survivors, in many ways, became the scapegoats for crime increases. The analysis examined crime data using time-series statistics and used social disorganization theory and other theoretical perspectives on the sociology of disasters to place findings into perspective.

Destruction and displacement: the effects of Hurricane Katrina

Clear accounts of when and where Hurricane Katrina's displaced populations went from the affected areas remain a challenge for scholars and government officials.¹ In the month after Katrina's landfall, the Federal Emergency Management Administration (FEMA) processed some 1.36 million requests for assistance ("Storm and Crisis," 2005). Several proximate urban centers responded to this human tragedy by hosting large numbers of displaced residents. Houston was the largest receiving point outside of the state of Louisiana, accepting some 240,000 persons in the week following Katrina's landfall.² Other cities such as San Antonio, Texas and Phoenix, Arizona also agreed to provide support to Katrina's victims, although receiving smaller yet still substantial numbers of displaced persons.³ The impact of evacuees on the local infrastructure was felt almost immediately, testing the capacity of local institutions such as schools, hospitals, social welfare organizations, communications, and other local infrastructure to handle the rapid and large-scale population increase ("Storm and Crisis," 2005). Population growth is typically a slow-moving statistic, cast often in years and decades. This single event, Katrina, shifted populations rapidly, condensing the effects of such changes for the receiving communities in profound ways.

A review of news accounts in the weeks following Katrina revealed that host communities quickly began to experience significant challenges accommodating these sudden population increases. Miller's (2007) case study of Huntsville's (Texas) difficulties absorbing a nearly 50 percent increase in population associated with Hurricanes

Katrina and Rita are noteworthy. Problems associated with day-to-day functions like laundry and bathing facilities proved to be substantial. It is also important to consider that many of the evacuees were among the most economically disadvantaged, arriving with few if any resources or connection to family or friends that could offer financial support. A large proportion of the evacuees were highly dependent on the government, local charities, and generous private citizens to provide for their most basic needs including food, clothing, and shelter. In many cases, the need was both immediate and longer-term in scope. Coping immediately with such a disadvantaged population surge, as well as planning for what clearly became an expectation of a long-term time horizon for restoring the damage of Katrina, posed many problems for the receiving communities. In places like Phoenix, for example, local reports suggested that the influx of Katrina evacuees created acute housing shortages among the local needy (Magahern, 2005).

The effects of Hurricane Katrina on its survivors, especially some of the most ill-prepared and economically disadvantaged, can be difficult to comprehend.⁴ It is likely that many survivors were confused, disoriented, and often separated from immediate family members, loved ones, and social support networks (see Morrow, 1997; Shaw & Shaw, 2004). Net of all of these problems was a population that was scared and confused, lacked routine knowledge of the areas in which they now found themselves, was separated from customary social support networks, and had limited and often marginal economic support. As evidenced by the aftermath of other disasters (see Bates & Peacock, 2008; Dash, Peacock, & Morrow, 1997), coming to terms with Katrina's devastation was nearly impossible for most, but especially for the poorest of the poor.

Literature review

Scholars have been drawn to the study of disaster because such incidents are sociological microcosms—laboratories for testing social and psychological theories relating to individual and collective behavior (Barton, 1969; Drabek, 1986; Lanza-Kaduce, Dunham, Akers, & Cromwell, 1998). Disasters by their very nature affect the level of order in an area providing researchers the opportunity to study the type(s) and level(s) of disruption, as well as how order is reestablished over time (Sweet, 1998). Though incidents of disaster naturally pique scholarly curiosity, conducting rigorous analyses of how disasters influence social structures and social processes has been a more difficult enterprise. Though quasi-experimental designs can be employed, the unplanned nature of disasters usually resulted in pre-/post-incident data of insufficient quality; researchers often relied on nonequivalent samples, readily available data, and recollection-based data gathered after an incident occurred (e.g., Adams & Adams, 1984; Aguirre, 1980; Bates, Fogleman, Parenton, Pittman, & Tracy, 1963; Palinkas, Downs, Petterson, & Russell, 1993; Shore, Tatum, & Vollmer, 1986; Sweet, 1998). Despite these limitations, research into the social effects of disasters has provided insight into the impact of such events on routine life.

The human response to disaster

Regardless of their specific origin (climatic event, terrorist attack, industrial accident, and the like), disasters and critical incidents tend to exude some level of disruptive influence. Individuals affected by disaster may experience disruptions in their family and community life, interruptions in their occupational status, damage or destruction of housing, loss of financial status and stability, and challenges to accessing everyday consumer, health, and government services. Entire communities can experience comparable effects, with the additional loss of family members and friends due to injury, death, or displacement (Ursano, McCaughey, & Fullerton, 1994). Damage in some situations has been so extensive that it resulted in "collective

stress” whereby the demand placed on a system exceeded its response capacity (Barton, 1969). Within this milieu, a variety of individual, community, and victim characteristics (some preexisting, others emerging in the aftermath of an incident) influenced the collective responses to disasters (Barton, 1969; Bolin, 1985; Drabek, 1986; Dynes & Quarantelli, 1980; Quarantelli & Dynes, 1977). Quarantelli and Dynes (1977), for example, explained that the response of groups to disasters is understood very much in the context of pre-event “readiness.”

The precise social impact of disasters remained somewhat unclear; some research suggested disasters have a destructive effect on the social fabric thereby causing “anomic” conditions such as looting (see Drabek, 2007; Quarantelli & Dynes, 1970; Tierney, 2007). Other theoretical frameworks suggested quite the opposite, where such events had a cohesive effect that drew communities together (see Miller, 2007; Quarantelli & Dynes, 1970, 1977). Looting, for example, may be conceptualized normative response by other law-abiding citizens in response to breakdowns in social order (see Quarantelli & Dynes, 1970). In contrast, the September 11, 2001 attacks in New York, Washington, DC, and Pennsylvania served as evidence that individuals and communities could experience social cohesion after major disasters (Neria, Gross, & Marshall, 2006). Residents from affected areas experience a sense of solidarity through surviving the disaster, seeking to rebuild and reclaim their community, showing their unity in the face of adversity, and demonstrating their individual and collective resilience and strength (Bates & Peacock, 1987; Miller, 2007; Morrow & Peacock, 1997; Siegel, Bourque, & Shoaf, 1999; Turner, 1967). Disaster can bring citizens together, enhancing community cohesion (Drabek, 1986; Friesema, Caporaso, Goldstein, Lineberry, & McCleary, 1979), goodwill, unity, and altruistic concerns for one’s neighbors and community. Citing the overwhelming evidence of benevolence and good will that often follow disasters, scholars largely rejected the “anomie” argument (Quarantelli & Dynes, 1970).⁵

Disasters and their aftermath often interrupt normal social networks and communal relations. Even when citizens do not lose access to their normal support systems, disasters often created excessive demand on such systems (Barton, 1969; Siegel et al., 1999). Individuals have experienced a range of negative psychological effects due not only to the incident (Fullerton, Ursano, & Norwood, 2004; Shaw & Shaw, 2004), but the aftermath of the incident and the process of negotiating what are often complex processes designed to provide help and restore normalcy. In fact, Weems et al. (2007) found that not only did Katrina have a substantial psychological impact on many survivors, but the degree of the impact was mitigated by local “context” including the quality of support systems and preexisting levels of racial discrimination. Findings also suggested the destructive effects of disasters were particularly problematic in areas already suffering from weak social bonds, such as economic and socially disadvantaged neighborhoods (Genevie et al., 1987; Siegel et al., 1999). Thus, consistent with the suggestions of a long line of researchers (Barton, 1969; Bolin, 1985; Miller, 2007; Quarantelli & Dynes, 1977), pre-disaster conditions explained much of the post-disaster responses. The duration of destructive elements (temporary or long-term) is dependent on the nature of the disaster, the capacity of local infrastructure to provide assistance, and the quality of the social support systems on which victims must rely. With time, affected citizens and communities should acclimate to and cope with their circumstances, overcoming the damage wrought by disaster; in effect, the social destruction created by disaster may follow a decay curve (Drabek, 1986) though some permanent change may persist.

Disasters and crime: prior research

The study of the impact of disasters focused on a range of economic, social, and psychological effects, including considerations

of how disasters affected levels of crime (specific types or in general) and disorder. Though researchers have examined the disaster-crime nexus for a number of decades, results have not been conclusive. Differences in crime rates were not witnessed after the Northridge (California) earthquake in 1995 (Siegel et al., 1999), the Quebec ice storm of 1998 (Lemieux, 1998), the New York City blackout of 1965 (Blackout History Project, 1965), or the Detroit blackout of 2003 (Hansen, 2003). In contrast, higher crime rates were found in the aftermath of the New York City blackouts of 1977 (Genevie et al., 1987) and 2003 (“Wasn’t So Calm,” 2003), Hurricanes Andrew (Cromwell, Dunham, Akers, & Lanza-Kaduce, 1995) and Hugo (LeBeau, 2002), and other disasters (Adams & Adams, 1984; Fothergill, 1996; Friesema et al., 1979). In reality, the effects of disasters on crime and disorder may have been one of *both* consensus *and* conflict. Tierney (2007), for example, drew on historical accounts of disasters and found that accounts of heroic behavior and altruism masked instances of violence that was oftentimes against lower-class communities.

As suggested by Tierney (2007), the relationship between disasters and disorder was much more nuanced than it first appeared. Considerations of crime across an urban area, for example, might actually have missed variation across neighborhoods and types of crime. For example, the 1977 New York City blackout resulted in pockets of arson, looting, and violence (Blackout History Project, 1977; Curvin & Porter, 1979; Genevie et al., 1987). While the New York City blackout of 2003 did not seem to influence the crime rate and while the raw number of arrests made was slightly below the norm for a summer night, the number of reported burglaries was double the number recorded on the same day the previous year (“Wasn’t So Calm,” 2003). Depending on the nature of a disaster, crime rates may initially decline as citizens (even “career” offenders) seek shelter and must “dig out” of the damaged area; personal shelter and survival needs may trump criminal motivations (Cromwell et al., 1995). The type of offending may also change as time progresses after an incident; opportunistic property crimes might give way to fraud, scams, and price gouging of a vulnerable population (Cromwell et al., 1995). In this vein, LeBeau (2002) found short-term increases in domestic violence, burglary, and “man with a gun” calls in Charlotte, North Carolina, after Hurricane Hugo, though these increases were relatively short in duration.

The majority of research studying the disaster-crime relationship failed to consider the possible influence a disaster might have had outside of the affected zone (Fradkin, 2005). While not relevant in all types of disasters, such consideration is germane where disasters result in a mass out-migration of affected citizens. The large numbers of citizens displaced by Hurricane Katrina raised questions of whether and how crime rates changed in communities receiving those displaced residents. Even with the influx of additional government personnel to provide for displaced residents, Houston experienced an increase in targets suitable for some offenses, an influx of persons who might have become motivated to offend, and a relative decline in the presence of informal capable guardianship (see Decker, Varano, & Greene, 2007). Those who served the latter function in their former neighborhood might have been less inclined to serve that role in a new area, presuming they were even proximate to former neighbors. Capable guardians native to Houston were dealing with an unfamiliar population and disrupted routines (i.e., tasked to serve that role outside of routine locations or assignments) making the maintenance of social control even more difficult.

Methodology

The purpose of the current research was to determine the effects of Hurricane Katrina on crime in communities that received large numbers of displaced residents. The following section presents a series of analyses testing for Katrina-related effects in three host communities in the twelve months following the event. This analysis

built on media accounts that the influx of Katrina survivors to communities like Houston resulted in a substantial increase in serious crime. The analysis compared crime trends for the city of Houston to two comparison cities, San Antonio, Texas and Phoenix, Arizona using both bivariate (pre-post Katrina) and time series analyses.

Research setting

Houston, San Antonio, and Phoenix represented a cross-section of cities that received evacuees in the aftermath of Hurricane Katrina. Estimates indicated that Houston initially received some 240,000 affected citizens, with approximately 150,000 staying well into 2006 (Bustillo, 2006; O'Hare, 2007), an approximate 7 percent increase in that city's 2000 population (www.census.gov). This influx placed Houston at the top of "host communities" in terms of number of persons accepted. Other estimates suggested that approximately 30,000 displaced persons relocated to San Antonio (Bensman, 2006), an increase of nearly 3 percent in 2000 population (www.census.gov). In contrast to Houston, reports suggested that a large proportion of evacuees stayed in San Antonio for a shorter period of times and left for other destinations within a few months of their arrival. Finally, estimates suggested that Phoenix hosted approximately 6,000 evacuees, many of who were thought to have stayed (Reckdahl, 2006). This increase represented less than one-half of 1 percent increase over the 2000 population (www.census.gov).

Houston, San Antonio, and Phoenix represented important comparison locations for several reasons. First, all three cities share regional characteristics that provide a degree of cross-community comparability. All three communities received appreciable numbers of evacuees from Hurricane Katrina; each experienced near simultaneous increases in concern about crime and the capacity of local human/social service systems to address the needs of evacuees. All three communities also experienced an increase in serious violent crime pursuant to the influx of evacuees, increases that were directly or indirectly linked to Katrina evacuees. Most notable in both Houston (Leahy & Villafranca, 2006; O'Hare, 2006) and San Antonio (Bensman, 2006), local law enforcement officials and the media alike perpetuated the image that crime increases in the latter half of 2005 and into 2006 were attributable to Katrina evacuees. Houston, San Antonio, and Phoenix represented three communities with somewhat different experiences responding to the Katrina diaspora. The purpose of this research was to provide a case study of three similar but different communities that received a notable number of displaced persons and experienced crime-related concerns in the following weeks and months.

Data and measures

The data used for this study came from crime data supplied by the police departments in each of the study locations. For purposes of the study, the analysis was restricted to homicide, rape, robbery, aggravated assault, auto theft, and burglary; these offenses were conventionally considered to be among the most serious crimes and had generated public concern in the host communities. It is important to note these data represented official crimes known to and reported by the police. The Phoenix Police Department provided weekly crime counts for each Uniform Crime Report (UCR) Part I crime class for the period January 2004 through September 2006. Crime data for Houston were downloaded directly from a publicly available Web site that lists incident-level crime data for each neighborhood (police beat) in the city of Houston (<http://www.houstontx.gov/police/stats2.htm>). These data were downloaded and aggregated to weekly counts covering the period January 2004 through September 2006. The San Antonio Police Department's Crime Analysis Unit provided data for the city of San Antonio. Data were provided for each recorded criminal event in San Antonio for the study period. Like Phoenix and Houston, the data were

aggregated to weekly counts for each Part I UCR violent crime category covering the period January 2004 through September 2006. Each city's weekly counts were first transformed to rates per 100,000⁵ for the six dependent variables (crime types) and then ultimately transformed again to standardized z-scores. The z-scores allowed for the comparison of crime levels across cities that experienced different base rates of crime. With a mean of zero, z-scores represented deviations from the mean, which were expressed in standardized increments.

Analysis

To test for apparent Hurricane Katrina effects on the serious crime, 143 observation points were included in the analysis for each jurisdiction that measured standardized weekly crime totals. The main force of Hurricane Katrina hit Southwest Louisiana during the morning of August 29, 2005 and lasted approximately two days. The week starting September 5, 2005 was used to demarcate the "intervention" point or the time when the effects of the large number of displaced residents resulting from Hurricane Katrina should begin to be realized if indeed any existed. The time series data set included eighty-seven pre-intervention and fifty-six post-intervention⁷ observation periods.

Bivariate analysis

Pre- and post-Katrina descriptive statistics as well as bivariate analysis are presented in Table 1. Included in Table 1 are standardized crime counts (z-scores) and crime rates (per 100,000) that were computed for the time periods before and after Katrina. Z-scores were computed to allow for comparison of different crime levels over time, which is especially useful for crimes with low base rates. This analysis presents within-city data, as a foundation to describing crime patterns over time.

Average weekly crime rates were included in Table 1 for each of the three study locations. These figures allowed for a general comparison of crime levels between cities.⁸ Among the most noteworthy findings, Phoenix experienced the highest levels of murder and auto theft both before and after Katrina. The auto theft rate was nearly three times San Antonio's rate and nearly twice that of Houston. Houston, in contrast, experienced the highest levels of robbery and aggravated assault. Finally, with the exception of burglary, San Antonio's weekly crime rates were the lowest of the three sites.

Bivariate comparisons of average weekly crime totals are also presented in Table 1 for the three locations. The data presented indicated that all three communities experienced significant post-Katrina increases in several forms of serious crime. Houston, for example, experienced significant ($p < .05$) increases in murder, robbery, and auto theft. Phoenix also experienced significant increases in robbery and aggravated assault; San Antonio experienced significant increases in robbery and auto theft. There were significant decreases in burglary in Phoenix and rape in San Antonio after Katrina.

The data presented in Table 1 provided initial support for the conclusion that there was a significant increase across a cross-section of crime types in communities that received large numbers of displaced persons in the aftermath of Hurricane Katrina. With a few exceptions, the changes were in the positive direction, meaning that there was more crime experienced in the post-Katrina period. While these initial findings were important, the analysis of weekly trends did not adequately parse out if changes in crime that were related to the influx of Katrina survivors or merely part of a pre-existing trend.

Many communities across the United States, including those not directly affected by Katrina-related population shifts, also reported increases in violent crime between 2004 and 2006. A recent report by

Table 1
Pre-post intervention weekly totals; standardized z-scores and rates per 100,000 (included in parentheses)^{a, b, c}

City	Crime type	Pre-Katrina (n = 87)		Post-Katrina (n = 56)		Total series (n = 143)	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
Houston	Murder*	-0.17 (0.23)	0.89 (0.11)	0.35 (0.29)	1.06 (0.13)	0.03 (0.26)	0.99 (0.12)
	Robbery*	-0.26 (7.98)	0.99 (1.07)	0.42 (8.72)	0.92 (1.00)	0.01 (8.27)	1.02 (1.10)
	Rape	0.07 (0.66)	1.06 (0.19)	-0.02 (0.64)	0.91 (0.16)	0.03 (0.65)	1.00 (0.18)
	Agg. assault	0.16 (9.62)	1.02 (1.26)	-0.12 (9.28)	0.93 (1.15)	0.05 (9.49)	0.99 (1.22)
	Burglary	-0.03 (20.78)	0.42 (1.45)	0.06 (21.10)	1.55 (5.38)	0.01 (20.91)	1.02 (3.54)
	Auto theft*	-0.11 (16.33)	0.94 (1.64)	0.30 (17.05)	0.96 (1.68)	0.05 (16.61)	0.96 (1.69)
Phoenix	Murder	-0.14 (0.31)	0.98 (0.17)	0.15 (0.36)	1.00 (0.17)	-0.02 (0.33)	1.00 (0.17)
	Robbery*	-0.03 (5.73)	0.97 (0.88)	0.51 (6.21)	0.99 (0.88)	0.18 (5.92)	1.01 (0.90)
	Rape	-0.13 (0.69)	0.88 (0.25)	0.10 (0.74)	1.06 (0.25)	-0.04 (0.71)	0.96 (0.23)
	Agg. assault*	-0.11 (7.87)	1.00 (0.21)	0.38 (8.54)	0.86 (1.18)	0.08 (8.13)	1.01 (1.38)
	Burglary*	0.00 (23.80)	0.96 (1.87)	-0.48 (22.86)	0.93 (1.80)	-0.19 (23.43)	0.97 (1.89)
	Auto theft*	0.03 (36.18)	0.96 (2.80)	-0.43 (34.86)	0.91 (2.65)	-0.15 (35.66)	0.96 (2.81)
San Antonio	Murder	-0.07 (0.14)	0.97 (0.12)	0.11 (0.16)	1.05 (0.13)	0.00 (0.15)	1.00 (0.12)
	Robbery*	-0.22 (3.86)	0.97 (0.98)	0.34 (4.42)	0.96 (0.97)	0.00 (4.08)	1.00 (1.01)
	Rape*	0.14 (2.92)	0.93 (0.63)	-0.22 (2.69)	1.08 (0.73)	0.00 (2.83)	1.00 (0.68)
	Agg. assault	0.13 (3.49)	1.05 (1.69)	-0.19 (3.34)	0.89 (0.76)	0.00 (3.43)	1.00 (0.76)
	Burglary	-0.18 (25.11)	1.05 (3.33)	0.13 (25.79)	0.91 (2.89)	0.00 (25.37)	1.00 (3.17)
	Auto theft*	-0.22 (11.55)	0.98 (1.69)	0.35 (12.53)	0.95 (12.53)	0.00 (11.93)	1.00 (1.73)

^a Mean comparisons calculations based on z-scores; * $p < .05$ for pre-post comparison.

^b Crime rates included in parentheses.

^c Crime rates based on 2000 census populations; Katrina diaspora confounds base rate.

the [Police Executive Research Forum \(PERF\) \(2007\)](#), for example, noted sharp increases in aggravated assaults with firearms in many communities across the United States during this same period. Communities such as Arlington, Texas; Baltimore County, Maryland; and Detroit, Michigan experienced increases of more than 30 percent in robbery during the same period. These increases led [PERF \(2007, p. 2\)](#) to warn of a “gathering storm” of violent crime. Thus, it was necessary to conduct more sophisticated analysis of the data series before concluding that the crime increases noted above were independently associated with the Katrina disaster.

Interrupted time series analysis

Interrupted time series analysis was used to further test the effects of Katrina on crime levels in the three study locations that received substantial numbers of displaced persons. ARIMA models are effective for controlling for time-dependent components common to sequentially ordered data sets. Several problems commonly associated with time series data such as seasonality and time-dependency violate the assumptions of OLS regression and require appropriate statistical techniques to control for their potential influences (see [Box & Jenkins, 1976](#); [Box & Tiao, 1975](#)). Autocorrelation, for example, exists when the error corresponding to observations are correlated with other points in the same series. This creates serial dependency in the data. The “interrupted” time series design is a specific type of ARIMA technique that allows for the inclusion of a temporary or sustained “intervention” ([McDowall, McCleary, Meidinger, & Hay, 1980](#)). The technique allows for the comparison of pre- and post-intervention trends after controlling for time-dependency.

There are three structural parameters to ARIMA models that must be diagnosed and modeled to find the appropriate “fit” for the data: autoregressive (p), difference (d), and moving average (q) ([McDowall et al., 1980](#)). The autoregressive component is the relationship between an observation and the k^{th} preceding values. The first order process (ARIMA(1,p,d)) is among the most common autoregressive function ([McDowall et al., 1980, p. 32](#)). The moving average component accounts for levels of stationarity in the series or the degree to which the series demonstrates shifting patterns of serial correlation. In this case the series must be differenced. Finally, the moving average is similar to the

autoregressive parameter with the exception that it models error that is not captured in the autoregressive term.⁹

The estimated ARIMA models for Houston's crime data are presented in [Table 2](#) for each of the six crime categories. The estimated ARIMA parameters are included in the crime-specific column headings. For example, diagnostics of the murder data series indicated a significant autoregressive parameter but no concerns with differencing or moving averages. Thus, the model for murder was ARIMA (1, 0, 0) where the “1” indicated a first order autoregressive component.¹⁰

The variable labeled “post-Katrina” represented the intervention effect of the influx of displaced persons. Looking across the models, the findings suggested that there were significant increases in weekly levels of murder and robbery after the occurrence of Katrina after controlling for preexisting trends in the data in Houston. The data, however, also indicated these observed increases were not uniform across all crime types but specific to murder and robbery. The coefficients for rape and aggravated assault, although nonsignificant, were in the negative direction. The increases in violence were then not consistent across all types of assaultive violence. These findings were generally consistent with the findings in [Table 1](#). The findings also indicated that there was no significant change in auto theft levels after controlling for seasonal and nonseasonal moving averages and auto-regression.

The findings for Phoenix and San Antonio are presented in [Tables 3 and 4](#) respectively. Like the previous models, the parameter estimates are included in the column labels. Looking across the Phoenix models, the post-Katrina intervention effect was significant for only one model, murder. This supported the conclusion that Phoenix's homicide levels were significantly higher after Hurricane Katrina controlling for the time-dependency in the data. The intervention effect was not statistically significant for the post-Katrina period for any of the other crime types. The preliminary finding in [Table 1](#) indicating a significant increase in robbery, aggravated assault, burglary, and auto theft in the wake of Katrina no longer remained after controlling for preexisting trends in Phoenix. The San Antonio models presented in [Table 4](#) indicated the effects of Katrina were not significant for any of the crime types. Although the bivariate findings in [Table 1](#) indicated significant increases in robbery, rape, and auto theft, the effects were no longer significant after controlling for time-dependency. Thus, none of the pre- and post-Katrina weekly crime levels was significantly different in San Antonio, only homicide was

Table 2
Time series analysis, Houston, Texas

	Murder (1,0,0)		Robbery (1,0,0)		Rape (1,0,0)		Aggravated assault (0,1,1)		Burglary (0,0,2)		Auto theft (1,0,1)	
	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE
Autoregressive function	-0.08	--	0.34***	0.08	-0.16*	0.08	--	--	--	--	0.82**	0.08
Moving average	--	3.68	--	--	--	--	0.77**	0.06	-0.11	0.09	0.46*	0.13
Post-Katrina	0.35**	0.17	0.66**	0.23	-0.09	0.15	-0.67	0.62	-0.09	0.20	0.46	0.38
Constant	--	--	-0.25	-0.15	0.07	0.09	0.01	-0.00	-0.03	0.13	-0.12	0.38

* $p < .05$.

** $p < .01$.

*** $p < .001$.

different in Phoenix, and homicide and robbery in Houston. Overall, the contention that displaced persons significantly altered a city's crime problem found limited support in this analysis.

The analyses suggested that net of other trends already underway in Houston, Phoenix, and San Antonio, rises in certain types of serious crime could not be directly and independently associated with Hurricane Katrina. The timing of the displaced New Orleans population that ended up in these host cities did not correspond to the observed changes. On the other hand, murder and robbery did increase in Houston in the post-Katrina period, and Houston was the city that received the most of Katrina's victims. Moreover, in Phoenix, the city with the smallest influx of post-Katrina evacuees, murder rates were also affected, while no changes in serious crime rates occurred in San Antonio, where the absorbed post-Katrina population was proportionately the second largest of the three cities studied.

So it was clear that the rapid influx of population in some of the cities receiving Katrina evacuees had some affect on certain crimes, most particularly murder, followed by robbery. Equally important, however, was the absence of change in other serious crime types including other personally violent crime (assault and rape), and property offending (burglary, auto theft, and arson), crimes where economic motivation may be said to have been the most visible in the case of the displacement of so many people.

Discussion

Large-scale disasters like Hurricane Katrina, similar to other types of planned (protests, cultural events, sporting events, etc.) or unplanned (terrorist acts) events, have the ability to create social conditions that result in an increase in disorder. Such events often result not only in the destruction of physical space and infrastructure, but may also result in the destruction or displacement of formal and informal mechanisms of social control that help in the recovery and regulate/control behavior in the process. Hurricane Katrina was a uniquely devastating event because the destruction was so complete and covered such a large region that recovery efforts have proven difficult. In the end, Hurricane Katrina represented a unique type of event in that it resulted in an extraordinarily large diaspora scattered across the country with few cultural or social connections assisting recovery.

The large-scale diaspora associated with Katrina was also quite different from other disasters in that it affected communities across the country not directly harmed by the original storm. That is, communities across the country were faced with substantial challenges associated with absorbing large numbers of displaced persons. Cities like Houston, for example, experienced nearly a 10 percent population increase almost overnight. The natural challenges were only exacerbated by the extreme financial needs, and physical and mental health problems associated with the displaced population. The human service and public safety sectors of many host communities were overwhelmed by the sudden and sustained nature of the resulting population shifts.

Taken together, the "mixed findings" presented here suggested that Katrina did have some effect on serious crime at least in two of the three cities examined, but those effects were neither widespread (across all crime categories), nor pervasive (across the three cities). This suggested that local circumstances, coupled by the volume of displaced persons being absorbed by any particular city play a role in increasing crime, and that disaster planning and relief efforts should be cognizant of issues of "over-saturation" in the capacity of receiving communities to adequately adjust to such disasters. Equally important was the idea that those displaced were not a criminogenic mob to be "blamed" for crime increases. While this analysis looked at cities as the frame of reference, displaced persons were not likely to be equally distributed across these cities. Rather, they were likely to be situated in neighborhoods and communities that themselves evidenced some level of stress and social disorganization. Evacuation planners should also be cognizant of the social and community dynamics of the places that receive those displaced by disasters.

In the wake of Hurricane Katrina, public planners are faced with coming to grips with the short- and long-term affects of disasters. Such considerations, however, should not be restricted merely to locations directly effected by the storm, but those communities helping with the recovering by hosting displaced persons. Developing response protocols for large-scale events is a challenging process given the complex mix of converging circumstances, situations, and resources. Even where planning is possible and even where an event is defined as having been "successful," lessons can still be learned (Decker et al., 2005). Much of the focus on the Hurricane Katrina response was appropriately centered on New Orleans and other

Table 3
Time series analysis, Phoenix, Arizona

	Murder (2,0,0)		Robbery (1,0,1)		Rape (1,0,0)		Aggravated assault (1,1,1)		Burglary (0,1,1)		Auto theft (1,0,1)	
	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE
Autoregressive function 1	-0.08	0.08	0.80***	0.11	-0.05	0.09	-0.18	0.11	--	--	0.88***	0.06
Autoregressive function 2	-0.18*	0.08	--	--	--	--	--	--	--	--	--	--
Moving average	--	--	0.60**	0.16	--	--	0.70***	0.08	0.78***	0.05	0.61***	0.10
Post-Katrina	0.29*	0.14	-0.49	0.32	0.23	0.16	-0.19	0.56	0.12	0.56	-0.45	0.37
Constant	-0.14	0.08	0.13	0.21	-0.13	0.10	0.01	0.02	--	--	0.17	0.23

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 4
Time series analysis, San Antonio, Texas

	Murder (2,0,0)		Robbery (2,0,0)		Rape (3,0,0)		Aggravated assault (2,0,0)		Burglary (0,1,1)		Auto theft (0,1,1)	
	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE
Autoregressive function 1	0.25*	0.08	0.16	0.08	0.23**	0.08	0.25**	0.08	--	--	--	--
Autoregressive function 2	0.13	0.08	0.26	0.08	0.05	0.08	0.13	0.08	--	--	--	--
Autoregressive function 3	--	--	--	--	0.29**	0.08	--	--	--	--	--	--
Moving average	--	--	--	--	--	--	--	--	0.69**	0.06	0.72***	0.06
Post-Katrina	-0.16	0.26	0.48	0.26	-0.23	0.33	-0.16	0.26	-0.12	0.58	0.42	0.57
Constant	-0.06	0.16	-0.20	0.17	0.07	0.20	0.06	0.16	--	--	0.00	0.02

* $p < .05$.

** $p < .01$.

*** $p < .001$.

affected areas. What should not be ignored, however, is the influence large-scale events may have on other areas, particularly those receiving displaced populations (Buerger, 2007).

Some parallels can be seen between the impact of receiving large numbers of new residents from a disaster such as Katrina and hosting large-scale planned events such as protests, conferences, or sporting competitions (see Alpert & Flynn, 2000; Decker et al, 2005; Decker et al., 2007). In both cases, local agencies must balance routine service demands with those generated by the event or population influx. A key distinction, however, is that planned events typically provide an influx of additional public safety personnel and by definition, a capacity for planned responses to support population shifts. The parallels, however, are only limited. In the case of unplanned events like large-scale disasters, sudden population shifts to communities outside the area directly affected may not receive an influx of resources, especially those relating to public safety. Thus, public safety resources are likely to remain relatively fixed, while the absolute numbers of individuals experiencing extraordinary economic and social stressors may increase.

The current study was intended to provide a case study of the possible effects of sudden and population shifts on crime in the wake of such an event. Popular culture in communities across the country receiving Katrina's diaspora speculated that there was a notable and sustained increase in serious crime. The degree to which communities like Houston, San Antonio, and Phoenix experienced a "spike" in crime in the months that followed, local policymakers explained away the phenomenon as imported with Katrina survivors. The data presented above indicated there were significant increases in homicide and robbery in some cases, but such effects were not widespread. It is quite difficult to disentangle this complicated relationship. It seems safe, however, to conclude that the Katrina-related diaspora did not correspond with a wide-scale dramatic increase in crime. While any increase in serious forms of violence is intolerable, the increases in crime in particular communities was likely more modest than public opinion might suggest. In fact, if anything, the current analyses were conservative estimations of crime changes since they did not account for the week-to-week and month-to-month population shifts that occurred in the aftermath of Katrina. From a public policy perspective, it is important to disentangle the tendency to explain away crime trends as imported and not locally grown, or as in this case, part of longer trends. These fears may certainly influence the decisions of other communities to assist in the future.

When one considers the likely outcomes associated with a disaster, it is also important to understand the local context. In fact, Weems et al. (2007) argued the psychological affects are mitigated by such factors. In assessing the looting following the New York City blackout of 1977, Genevie et al. (1987) noted that the existing problems in a community provided a context for understanding behavior. "The social problems, which relate to the quality of life in a community, could be viewed as "push" factors, forces that worked to increase the extent of looting. When unemployment, crime, fear and underground economic activity were high, residents did not develop a

strong sense of attachment to the community and were more likely to behave destructively when opportunities like the Blackout arise" (Genevie et al., 1987, p. 229). In this case, Katrina was again unique in that a good deal of the "human recovery" needed to occur in locations to which victims had little or no connections. Implications for police officials were not limited to the immediate area of impact (Rojek & Smith, 2007), but also extended into communities across the country. Clearly, new residents in a community fail to share in that "sense of attachment" that can enable them to more successfully resist the criminal opportunities posed by a disaster or critical incident.

Social control in neighborhoods exists to ensure that residents can go about their lives in relative safety. One challenge of informal social control is that it seeks to enforce norms that are informally derived (see Greenberg & Rohe, 1986). As a consequence, external challenges that upset the informal patterns of social control should be expected to yield higher crime rates. Contrary to the expectations derived from social disorganization theory, the crime in Houston did not increase significantly in four of six categories. In Phoenix, only one of six crime types, albeit murder, increased and in San Antonio, none of the six crime types increased. These results suggested that there was an internal capacity for control in communities to absorb disruptions in social control created by the introduction of large numbers of displaced residents into a community. The findings indicated that social control is an elastic commodity, capable of expanding and adapting to the challenges of mobility and change. This, however, should not lull planners into a state of complacency, but instead encourage them to consider moving "planning" beyond the immediate site of disasters and consider responses that build strong communities.

Study limitations

There were several limitations to this study that should be taken in consideration when evaluating the outcomes. First, this was not intended to serve as an exhaustive study of the effects of Katrina-related diaspora. Instead, it was intended to serve as a case study of three similar communities and their experiences in the aftermath of Hurricane Katrina. Different from other studies on the topic, the intent was to consider the broader impacts specific to crime experienced by these host communities. Such a story, however, was extraordinarily complex and could not be reduced to a time series of crime data. The primary goal was to recommend a more cautious approach when attempting to place wholesale blame on Katrina survivors for the increases in crime in some host communities. In fact, only limited, but notable, support was shown for Katrina-related effects. A more exhaustive study would have to consider a broader cross-section of communities, but also be able to control for certain features of the displaced populations and local conditions of host communities that play important roles in crime. For example, the current research was unable to account for variations in the characterizations of the displaced populations across cities. Houston, for example, received one of the largest, initiative waves of displaced persons. It was

possible those individuals were among the most disadvantaged and destitute compared to additional waves moved around in the following weeks. This was a complicated set of issues that the current research could not control for.

This study also did not account for the role of Katrina survivors in any apparent increases in crime. Popular opinion had largely cast survivors in the role of perpetrators; increases in crime had been caused by an influx of criminogenic persons who brought their “criminal ways” to host communities. While there might be anecdotal evidence of this, it was not possible to glean such findings from the current analysis. The analysis relied on officially reported crime that traditionally does not collect data on the residency status (native resident or in the current context, “evacuee”) of victims or offenders. It was possible that the small but notable crime increases were as reflective of *victimization* of evacuees as they were of *offending*. Thus, policymakers should be cautious about how they assign meaning to these sorts of changes in crime.

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Notes

1. Tracking where members of the diaspora went over time has proven a challenge due to the absence of a unified data system tracking the number and location of displaced individuals. While some of the diaspora was easier to track because of their dependence on government assistance, others financed their own relocation and may not appear in government data. The migration of the diaspora over time further complicates estimations of its size and distribution. Many affected individuals relocated more than once, perhaps to an initial receiving community, then to a second community to stay with relatives, and then back to their home community. While many residents returned to their original community (some quickly, others over long periods of time), a large number have permanently left the affected zone. The city of Houston estimated approximately 150,000 individuals relocated to Houston and stayed well into 2006 (Bustillo, 2006; O'Hare, 2007), representing a population increase of around 7.5 percent. San Antonio received a smaller number of displaced individuals (“Storm and Crisis,” 2005), with most staying a short period of time before relocating. Phoenix received a small number of displaced individuals and families (“Storm and Crisis,” 2005).

2. See <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5440a3.htm>.

3. Anything approximating firm data on the destinations and length of stays for Katrina-related displaced persons was nearly impossible to access. Dr. Rick Weil (personal communication, 2006), a sociologist at Louisiana State University who had studied the impacts of Katrina on the broader community context of New Orleans, indicated there was no national data on this question.

4. There was a strong relationship level of pre-Katrina preparation and economic disadvantage. Powell, Jeffries, Newhart, and Stiens (2006, pp. 64–65) describe New Orleans' pre-Katrina evacuation plan as a “middle-class oriented evacuation plan” that was based on individuals leaving in their own cars. The fact that many of New Orleans most disadvantaged citizens did not own cars appeared to have “escaped” planners (see also Drabek, 2005, 2007; Gladwin & Peacock, 1997; Perry, 1987).

5. Disaster scholars long have identified looting behavior in the aftermath of disasters as a specific area of inquiry (see Auf der Heide, 2004; Quarantelli & Dynes, 1970). These scholars have noted that extensive looting is quite rare following disasters. Auf der Heide (2004), for example, argues that even apparent “looting” often times is nothing more than the lawful salvaging of disaster victims' own property. When traditional looting does occur, Auf der Heide (2004) notes that it is more likely than not perpetrated by outsiders rather than residents of the affected area. Looting and other forms of antisocial behavior do sometimes occur following disasters, but more commonly riots. When such behavior does occur, Quarantelli and Dynes (1970) suggest it is better viewed as a form of “group protest” that looters may or may not be conscious about and less about individual greed.

6. It should be noted that the crime rates computed above were based on U.S. Census Bureau 2004 population estimates (<http://www.census.gov/popest/cities/subest2004-4.html>). It could be argued that the current analysis should continually adjust the population base rate to account for the population increases and decreases in the study locations pursuant to Katrina-related displacement. As discussed earlier, the Katrina-related population shifts increased quite dramatically in the immediate aftermath of the tragedy and eventually decreased over the coming months. The week-to-week population data that would be necessary to compute such discrete crime rate trends were not available.

7. The pre-intervention periods included weeks starting December 29, 2003 (starting first full week in January 2004) through August 29, 2005; the post-intervention period included weeks starting September 5, 2005 through September 25, 2006.

8. Crime rates were included to permit between-city comparison of crime levels before and after Katrina. Readers should note that their inclusion in the current instance was somewhat problematic since exact population figures after the arrival of Katrina survivors were questionable.

9. The process for estimating ARIMA parameters is nonspecific to some degree, a reality that has led some to characterize it more as “art” than science. The process involves “eyeing” autocorrelgrams (graphs of autocorrelation error terms) that visually depict error terms. Autocorrelgrams are subsequently compared to model graphs that are representative of estimated models. The estimated models are subsequently run and the error terms modeled, a process that will eventually yield what is eventually characterized as the best model” by analysts. The nonspecific nature of these estimates can result in different estimates by different analysts for the same data series. See Kleck (1997) for a critique of this form of data modeling.

10. Lower order models are the most common in social science research (McDowall et al., 1980, p. 28).

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