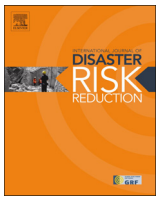
International Journal of Disaster Risk Reduction 39 (2019) 101232

Contents lists available at ScienceDirect

International Journal of Disaster Risk Reduction

journal homepage: www.elsevier.com/locate/ijdrr



Fraud in disaster: Rethinking the phases

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ARTICLE INFO

Keywords:
For indexing: Epistemology
Crime
Disaster
Phases

ABSTRACT

This paper reexamines the link between disasters and crime to argue that the relationship between the two becomes more evident once the diachronic nature of the disaster is specified. The first section appraises the literature on crime and disaster and calls for more attention to this topic. The subsequent sections of the paper present multiple evidence for the occurrence of crimes and fraud in disasters and the results of preliminary empirical research using U.S. Department of Justice information on the reported white collar and other types of crimes occurring in the aftermath of the Katrina Hurricane and the British Petroleum Gulf Coast oil spill. The findings indicate that crimes and frauds occur during the earliest phases of disasters and that the probability for the occurrence of costlier crimes, akin to white-collar crime, increases, as time elapses. The conclusion calls for a reconceptualization of the phases of disasters.

The analysis of criminal behaviors was a central but limited component in the early development of disaster studies as an emerging field. In the aftermath of World War II, social scientists in the United States directed their efforts toward establishing the legitimacy of social science research and theorizing and eventually supplanted a civil defense perspective of disaster management (the details are in Refs. [1,2]. Some of the "myths" (or inaccuracies) they refuted centered on the assumption of an increase in crime, panic, psychological dependence and shock, looting and price gouging [3].)

1. Gemeinschaft

These scholars adopted a Gemeinschaft perspective to explain the presumed lessening of crime in the immediate post-impact periods of disasters. Credible scholarship indicated that most persons who experienced disaster firsthand as victims became involved in prosocial, accommodating behavior during the immediate period after the impact, when warnings, evacuation, search and rescue, emergency food and shelter, reestablishment of transportation and communication, essential services, and the start of the reconstructions of the built environment of communities occur. Early on, Dynes and Quarantelli [4] successfully argued that the presumed increase in deviance, especially looting in the immediate aftermath of disaster impacts were inaccurate (a near-complete review of this literature is in Ref. [5]. Fritz [6] and Barton [7] offered theoretical explanations for the emerging consensus with their propositions of the emergence of a therapeutic community. Turner [8] hypothesized the emergence of Gemeinschaft solidarity during the immediate post-impact period as a precondition for the success of a subsequent, more impersonal, bureaucratic program.

According to Dynes [9]; 84–99), the sharing of disaster experiences gave rise to collective solidarity among the victims, which facilitated cooperation and the founding of community organizations. Until this reinterpretation occurred, the disorganization approach that assumed widespread panic and asocial collective behavior had been the accepted perspective on the effects of disasters in the U.S; a view that was facilitated by the collective anxieties of the Cold War years (see Ref. [10]; 13–33.) While differing in their design and measures, the preponderance of findings from studies over approximately 40 years (e.g. Refs. [5,11–15]; [16–18], affirmed the appropriateness of the new outlook. Thus Settles and Lindsay [19] concluded that the evacuation of approximately 250,000 people from New Orleans during Katrina did not have a significant effect on Houston's crime statistics. Similarly, Abe et al. [11], analyzed official crime statistics in the aftermath of the 2011 Great East Japan earthquake and tsunami catastrophe and succeeded in convincing most government officials and personnel from agencies that there was no significant increase in deviance, crime, or otherwise antisocial behavior in the aftermath of the disasters.

Concurrently with this reinterpretation was an effort to convince public officials in charge of responding to community crises and disasters to provide accurate information about the hazards and other risks the public faced. Fischer [20]; see also [21] reviews these efforts and the continued challenges associated with giving expedited information

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https://doi.org/10.1016/j.ijdrr.2019.101232
Received 8 May 2019; Received in revised form 30 June 2019; Accepted 1 July 2019
Available online 05 July 2019

when there are differing perceptions of the disaster by the public, disaster responders, mass media personnel, and the organizations active in the response. The need to distribute accurate and timely information was part of the effort to improve the efficiency of disaster-related preparedness and response at the time disaster studies was gaining a foothold in sociology, geography and policy studies [22]; 16–112 examines the history of civil defense and the creation of the Federal Emergency Management Agency, FEMA.) All these changes took place alongside the increasing professionalization of the specialty of disaster research and management side by side with the establishment of FEMA. In sum, the government and the military wanted to know about the possibility of soaring, rapid increases in deviant and criminal activity in the dreaded aftermath of nuclear war, a concern that was dispelled through research during this period (see Ref. [23]; for the testimony of a principal participant observer.) Relatively few disaster researchers have shown an interest in reanalyzing the substantive issues associated with some of these previously refuted notions, such as whether people commit crimes during disasters. Some of them are mindful of the need to discourage responsible officials from reconsidering the risks associated with disasters and perhaps fear that it would damage public safety [24].)

There are social science studies of crime in disasters, but it is not a typical research topic. For example, there were 83842 citations that used the word “disaster” in the Web of Science (consulted on April 26, 2019), but only nine articles when the search combined the words “crime” and the “social sciences.” Among them are publications by Eckenwiler [25] on social solidarity; Helbing et al. [26] study of complexity science; Kovtcher's (2015) research on victim identification; and Aldritch's (2012) study of civil society actions in the aftermath of the Tokyo earthquake of 1923. Extant studies have also examined domestic violence [27]; child abuse (WHO, 2004; [28], sexual exploitation, and price gouging in disasters, among others (see also [3,29,30] and literature cited therein.) In partial summary, the inquiry in this subject is restricted and uneven even as the government and civic organizations, criminologists, economists, and other specialists recognize that white collar and other crimes occur during disasters.

There are several investigations of looting [31] provides a useful summary of this literature. A well-known case is the widespread looting that occurred in the Caribbean island of St. Croix during and in the aftermath of Hurricane Hugo in 1989. Quarantelli [32] accurately argued that the looting in St. Croix was an exception that happened because of the confluence of longstanding discrimination suffered by the majority of Blacks in the island. He also pointed to the extreme severity of the effects of the storm; the resulting absence of functioning institutions including the police and other public security agencies; the lack of information about the help that was coming; and the pre-existing high levels of criminality. In the aftermath of the St. Croix, the Katrina tragedy in New Orleans, and other instances of looting throughout the world such as the aberrant participation of Latinos in the Los Angeles 1992 riot [33], as well as the impact of community characteristics on the likelihood of looting in Chile (Dussaillant and Guzman, 2014}, the more central substantive question as Quarantelli intimates is not whether looting occurs, but rather what set of conditions make looting likely. The answer to this and similar questions would facilitate what until now is a relatively rare type of cross-disciplinary collaboration involving criminologists and disaster researchers. In contrast to the attention devoted to looting, there is a relative dearth of studies of white-collar crimes in disasters.

Recent studies are reinterpreting the meanings of crimes. Kuhlicke [34] contends that the belief in criminal activity during disasters helps people make sense of the unknown when disasters occur. Brezina and Kaufman [35] assert that recent changes in the U.S., together with the increasing use of deadly force make the acceptance of the crimes more believable. These authors interviewed doctors in the emergency room of New Orleans' Tulane Hospital during the Katrina incident who reported gunshots fired at them. Other interviewees witnessed people throwing heavy objects from road overpasses. Additional authors have found evidence of crimes during the so-called Gemeinschaft period (among others see Refs. [14,36,37]; Frailing and Harper [29,38,38]; Part 1.) Furthermore, symptomatic of this shift is that in the aftermath of the 9/11 terrorist attacks and the Katrina tragedy the criminological community has recognized the importance of crimes in disasters, as reflected in part by the call ([39] for the development of a “criminology of disasters.”

1.1. Phases of disasters

Neither the corpus of studies arguing that crimes are rare immediately after the disaster occurs nor have the more recent efforts affirming the contrary show that interested scholars sufficiently articulate the temporal dimensions that are implicit in their reasoning. In the first case, the “Gemeinschaft School” affirms that crimes are much less likely to occur during the “initial phase of disasters,” but there is no consensus about the length of this phase. In the second case, which sustains that crimes occur, it does not put enough attention to how the types of crimes vary during the post-impact stages of the disasters. A partial exception is a study by Thornton and Voigt (2012; see also [29].) that uses Killian's phase model (2002) to group a lengthy list of crimes according to the frequency in which they occur in the assumed phases. However, as these authors show there is much slippage in the chronology, such as any crime can occur in more than one phase.

There is not now, nor most probably will there be in the foreseeable future much agreement about the: a) number of disaster phases that occur, b) functions and processes that typify them, including their length, and c) appropriate methodological approaches to study them. Nejat et al. (2014, 33) recently proposed to systematize the methodology to analyze recovery by offering a latent class analysis involving four significant features seen as relevant to all studies of community recovery: place attachment, and economic, social, and capital infrastructure. Each of these four has twenty “recovery hubs” such as future risks, schools, neighborhoods, and family, what we would call institutions which would structure research on substantive community recovery topics and improve the inter-study knowledge-accumulating process. Parenthetically, currently, there is no consensus about the theory and methods that should guide studies of recovery, nor about the substantive issues addressed by each of the phases. This lack of consensus occurs even though FEMA, other federal agencies and many of their international counterparts use the fourfold phases of preparedness, response, reconstruction, and recovery to bring about mitigation.

Carr's [40]; 211–212) is probably one of the earliest studies in the U.S. that examined the complex longitudinal dimensions of disasters. He refers (p. 211) to the period immediately before the disaster as the “prodromal period,” to indicate the potential sources of vulnerabilities of social systems facilitating its occurrence. The catastrophe phase characterized by “dislocation and disorganization” of communities follows it, and then a final stage in which individual, social and social readjustments occur. Others have hewed closely to his ideas. In this fashion, a recent article [41] argues that irrespective of the type of hazards, disaster phases are based on properties rather than on time. It identifies six phases: 1) pre-event state; 2) event; (3) damage; 4) changes in societal functions; 5) relief interventions; and 6) recovery interventions. Similarly, Killian's [42] four-phase model includes the stages of warning, impact, emergency, and recovery. As in Carr's, the warning phase occurs before impact, and the emergency phase is nowadays called the phase of reconstruction.

Decades after Carr [43], used a modified geometric time progression series and estimated that each of the stages last roughly ten times longer than the preceding stage, so, for example, a 2-week response stage will be followed by a 20-week restoration interval. They identified four periods: the first is the emergency, lasting approximately three weeks, followed by a restoration phase taking place between 0.8 and 11th weeks. The third is the replacement and reconstruction phase occurring

during the 7th to 10th weeks, paving the way to the developmental reconstruction stage that takes place during the 50th to the 600th weeks (or more than 11 years). As shown, the temporal lengths of the phases overlap, thus increasing their content validity for in most instances it is inappropriate to differentiate between preparedness and response programs, or between reconstruction and recovery processes. However, their model does not include the emotional and psychological recovery of the victims. Employing Kates and Pijawka's model, Cutter et al. [44] estimated that the long-term recovery and reconstruction from Hurricane Katrina would take approximately 11.5 years, given that immediate recovery took 60 weeks or close to 14 months (for other studies using Kates and Pijawkas's model, see Ref. [45].

There is also no agreement about the length of the phases, particularly the moment when or if Gemeinschaft solidarity ends, which is a matter of some interest to this study. Adams (2013, 178 ff.), in her useful qualitative study of the New Orleans recovery from Katrina approximately five years after its impact, found in 2010 both a “Katrina” and a “compassion” fatigue. She uncovered that the victims, who suffered from an inefficient, exploitative, for-profit system of public assistance were no longer concerned with the plight of others and concentrated instead on their unsolved difficulties. Similar findings were reported earlier by Kroll-Smith and Couch [46] in the study of the Centralia, PA., chronic underground fire. The lack of agreement is also due to the different professional specialties of scholars in the specialty [47]; 171–172).

Four examples illustrate this diversity of perspectives. Wang et al. [48]; 776) studying the January 1998 Yao, an earthquake in China, used a human security perspective and pointed out that post-earthquake recovery involves not only repairing the man-built environment but also life (clothing, food, housing, medical care), psychological and economic recoveries, and that each of these types of recovery has its distinct temporal paces. Bonanno et al. [49]; 12) examined the methodological shortcomings of studies on the impact of disasters on psychological well-being and identified four mental recovery processes: chronicity, delayed, recovery and resilience. Rathfon et al. [50]; 346) examined housing and maintained that residential recovery involves six orderly segments: sheltering, temporary housing, roof repairs, other repairs, demolition, and new construction. Finally, Collins [51]; interested in the sociological study of public traumas in the aftermath of 9/11, proposes four stages: an initial few days of shock; (2) one to two weeks for establishing standardized displays of solidarity symbols; (3) two to three months of a “high solidarity plateau”; and (4) the gradual decline toward normalcy in six to nine months.

Limited as they are, these cases show that multiple typologies of disaster phases exist and very often the types in these typologies are not mutually exclusive, which is contrary to standard practices, but not necessarily a bad thing: the lack of consensus about what functions define them reflects the many dimensions of disasters and the different questions raised. Nor is there agreement about the temporal length of the period of the Gemeinschaft solidarity during which crime rates drop, which would have helped determine the subsequent periods in which there may be higher proportions of fraud [52]. It is for these reasons that the ordinal measurements represented by phases to examine the diachronic dimension of disasters are thus less preferred. This study uses a ratio-level measurement (the number of months between the inception of the disasters and the month in which the arrest occurred) as a proxy, to assess the temporality of the crimes and determine if costlier white collar crimes increase over time. The Results will show that there is no unitary phase sequence, but instead many dimensions or processes such as crime, that have their distinct characteristics and temporal patterns.

1.2. White collar crime and disaster generated demands

The next paragraphs discuss white collar crime (WCC), its presence in disasters and the social demands created by the disasters. As mentioned earlier, the more recent approach argues that fraud is widespread. This section only considers some of the targets or victims of crimes that occur in disaster contexts. WCC is more economically damaging than any other form of criminal behavior (for current scholarly monographs on the topic of fraud and corruption see Ref. [53].) The World Bank (2017) estimated that businesses and individuals pay $1.5 trillion in bribes each year, equivalent to about 2% of global GDP and ten times the value of overseas development assistance. So far, an accurate rendering of WCC for the U.S. is unavailable [54]; GAO. 2017). Anderson [55]: Table 3) reported an estimated 37.8 million annual incidents of fraud nationwide. Financial frauds accounted for 4.1 million of these incidents (including episodes of advance fee loan fraud, mortgage relief frauds, pyramid scheme incidents, and incidents of debt relief fraud). Consumer frauds accounted for the other 33.7 million incidents.

The concept of WCC has a long history in the field of criminology (Ross 1907; Sutherland 1934; 1986). While there is not a consistent definition of WCC, scholarship generally agrees on several essential elements. First, instances of WCC involve a breach of trust (Sutherland 1986). Second, WCC initially referred to those in the white-collar professions who would use their professional expertise to commit crimes (Sutherland 1986). Later definitional debates would extend it to not only include crimes committed by the wealthy but also by the middle classes (see Weisburd et al., 1991). Third, it involves the taking of property from others without force or illegal entry (Shapiro 1990). Consistent across definitions of WCC is that an opportunity to deceive or violate the trust of another must be present. Initial definitions attached the source of opportunity to a person's professional standing, whereas latter definitions recognized that opportunities to commit forms of fraud and financial improprieties might also be available to members of other social categories [56]. This perspective notes that opportunities for a crime can stem from institutional, organizational, group, and individual level statuses. The built environment, available targets, the decision-making of an individual and social control shape the availability of criminal opportunities. Routine activity theory, (RAT) initially proposed by Cohen and Felson [57]; was adopted to the study of disasters by Cromwell et al. [58]. It emphasizes how social routines facilitate criminal behavior by creating opportunities for criminal behavior to occur. Crimes depend on people converging in time and space, as well as on institutional routines that enable this convergence by providing places where both victims and offenders meet regularly. Three factors facilitate the occurrence of a crime: suitable targets, motivated offenders, and the absence of capable guardians.

Potential Disaster-Related Targets. According to the Federal Bureau of Investigations (FBI), the most common types of WCC in the aftermath of disasters are counterfeiting/forgery and fraud [59]. They take the form of corruption, bribery, embezzlement, antitrust violations, deceitful charitable solicitations, price overcharging, home-repair contractor fraud, vendor fraud, property insurance fraud (the filing of false claims or information with insurance companies for profit), and forgery (the use of false documents such as insurance checks and receipts for payments or applications submitted to insurance companies.) The means employed in these acts are usually the mail, telephone, and the World Wide Web. At the federal level, 15 U S. agencies dispense disaster assistance (www.disasterassistance.gov.) They oversee the different emergency response and recovery support functions of the National Disaster Recovery Framework [60] The number of federal employees involved in disaster-related activities is not known. FEMA alone has close to 2800 employees but is one of the smallest agencies of the federal government (see Ref. [61] for its 2015 budget). FEMA's grant program for five years (2009–2014) cost $3.44 billion. Other FEMA programs with separate funds focus on the provision of disaster housing, low-interest loans, aid programs, and assistance during the application process. The entire federal outlay devoted to disaster-related programs is many orders of magnitude larger. According to Fugate

[61]; FEMA's aid to victims of the Katrina storm for three years (2001–2003) cost 15 billion dollars; it included more than $6 billion paid directly to Hurricane Katrina victims for the cost of housing and other assistance and more than a billion dollars for help state and local governments. The losses are enormous. By 2005, FEMA had lost an estimated six billion dollars to crime, most of it related to the broken phone registration system that was part of its expedited initial assistance program for Katrina victims. Later, FEMA anti-fraud programs continued to receive an unfavorable evaluation from the U.S. Office of Inspector General [62].

Criminal Subcultures and Disaster Demands. Disasters can trigger the emergence of criminal opportunities as individual, communities, and organizations respond to changing social conditions brought about by the disasters. Communities differ in the presence of criminal subcultures (CS) and their relative capabilities to gain a degree of control of neighborhoods and other spaces where their members can congregate, socialize, and plan in the near absence of formal agents of social control for periods of varying lengths. They also differ in the social capital, personal identities, and group leadership these spaces and subcultures provide, and in the extent of community-wide organized corruption, chronic inequality, and widespread and ongoing historical discrimination and exploitation of minority subpopulations that may generate unresolved grievances and transform the disasters into shared occasions for the enactment of illegal behaviors. Net of other factors communities faced with unexpected, inordinately disaster-generated demands, and a preexisting criminal subculture including unresolved grievances among subpopulations will experience more disaster-related crimes [14]. In a strict sense disaster do not cause crimes, just as the presence of hazards do not mean that a disaster has occurred. Just as in the latter instance social organization mediates the relationship between the occurrence of hazards and disasters, the impact of a disaster on the probable occurrence of crime and fraud is mediated by features of the social organization of social systems such as those mentioned earlier.

Hazards vary in the speed, scope, complexity, and severity of their effects, such as the destruction of communication, lifelines, the operation of industrial plants and other economic entities, and the weakening of traditional means of formal social control. In turn, the disasters societies may experience generate different demands with different consequences on the political, cultural, social and financial institutions. For example, floods have a different effect than hurricanes due to differences in the duration of their impacts: usually, flood waters rise slowly, so that there are more chances to prepare, but it also takes longer for them to recede. As the case of St. Croix shows, higher severity of the demands of a disaster on a community or region, other things equal, is likely to bring about higher levels of disruption of the functioning of social organizations. The hazards often destroy the headquarters, communication links, create personnel disruptions, and weaken social control agencies and other instrumentalities safeguarding these agencies and the community they serve (Lein et al., 2009). Severe disasters are more likely to bring about the lowering of the effectiveness of the protective systems of bureaucracies, rendering the communities more vulnerable to the emergence and operation of criminal opportunity structures and crime. Anecdotal information about FEMA's experiences during Hurricanes Andrew and Katrina points to the importance of these issues [63].

2. Evidence of WCC in disasters

2.1. Preliminaries

Many evidentiary sources show the presence and importance of crimes during disasters. These range from published material on the news, monographs, journal articles, video recordings, reports from interested agencies and associations, as well as government efforts to control and minimize the costs associated with these types of crimes. Fraud is prevalent in disaster. It occurs in many *mitigation projects*, for instance, it was carried out by the construction companies engaged in erecting a series of gates to contain Venice's (Italy) lagoons to relieve the chronic flooding in the city [64]; p. 1). Alternatively, during the international *humanitarian responses* to disasters, fraudulent activities carried out by some non-governmental organizations are a common occurrence. A costly example involving the loss of billions of dollars took place during the international response to the 2004 Indian Ocean Tsunamis [65]; 64–78). Fraud is also present in regional *remediation efforts* in the aftermath of technological disasters, such as the millions of dollars lost to fraud suffered by the British Petroleum Corporation (BP) as it responded to its oil spill accident in the Gulf of Mexico. Then again, crime and fraudulent acts are the Results of *bureaucratic mismanagement*, as happened during FEMA's flawed response to Hurricane Katrina in the Gulf Coast [62]. This failure brought about the creation, in 2006 of the U.S. Hurricane Katrina Task Force (2006, 4–6.) It investigated crimes during hurricanes Katrina, Rita, Wilma, Gustav, and Ike and referred more than 17,000 complaints to law enforcement agencies and district attorneys throughout the U.S. for further investigation. Eventually, they charged 907 individuals in 43 federal judicial districts across the country with the commission of federal crimes. Later, in 2011, the US Disaster Fraud Task Force indicted another 1438 people in 1350 cases of crimes committed in the aftermath of hurricanes Katrina and Rita as well as 43 defendants for crimes arising from false claims against BP. Their work continues to this day.

Economic studies. Considerable numbers of publications, most of them by economists (e.g. Ref. [66], corroborate the view that frauds occur during disasters, and that their probability of occurring increases with the government aid made available. It is a surprising finding that is robust, invariant to different sources of information and different ways to measure the fundamental concepts, sets of controls and alternative predictors in the equations used to estimate the effects of the predictors. Sobel and Leeson (2006; see also [67] showed a significant positive statistical relationship between the amount of money spent on disaster assistance by FEMA and other agencies and the extent of disaster-related corruption in the states receiving the aid. Ambraseys and Bilham [68] concluded that the most “corrupt countries are the poorest” (p. 154). Escaleras et al. [69]; see also [70] examined 344 major earthquakes striking 42 countries and established that “an earthquake of a given size can be expected to cause significantly more deaths in a country that has a relatively high level of public sector corruption than in a less corrupt country” (p. 221). Fraud is one of the leading contributors to both disasters and the deaths they bring about: unchecked, it aggravates or creates the structural and social vulnerabilities that make the demands created by hazards overwhelming to the social system. In turn, such weaknesses increase the chances of experiencing future corruption as well as intensifying the vulnerabilities. The hazards and their impacts are socialized rather than being exogenous to the social system.

2.2. A study of criminal behavior during disasters

Method. The analysis presents the Results of a secondary statistical analysis of information collected by the FBI [71] It draws on machine-readable information derived from published reports about the people accused of committing crimes in the aftermath of the Katrina and Rita hurricanes and the British Petroleum accident in the Gulf of Mexico. It is a sample of 275 cases obtained from the population of 1438 cases charged by the U.S. Disaster Fraud Task Force [72]; see also [73].) The three incidents, involving different types of hazards, are included to maximize variation in the sample. While nonrandom, it is not widely different from the parameters of the population in many respects, such as the average age, gender, and proportion of repeat offenders. 11% of the 275 people charged were eventually exonerated. The rest were found guilty and near half received probation. SPSS's generalized linear model (GLM) procedure was used to examine the data [74] GLM is more inclusive and flexible than OLS regression. GLM requires that the

Table 1
Pearson correlation matrix.

LOG10$	GENDER	AGEOFF	SIZEGRP	REPEAT	MONTHTRIAL	MONTHARREST	FEMAVICT	FEMAFRAUD	FRAUDOFF
1	.000	.235*	-.032	190*	.203*	-.063	.267*	-.276*	.069
GENDER	1	-.162*	.016	.017	-.043	-.059	.010	-.002	-.062
AGEOFF		1	-.053	.162*	-.034	.002	.066	.080	.017
SIZEGRP			1	-.330*	.208*	-.147*	-.254*	-.233*	-.029
REPEAT				1	-.067	.027	.103**	.023	-.093
MONTHTRIAL				,	1	.233*	-.563*	-.564*	.060
MONTHARREST						1	.598*	.455*	.071
FEMAVICT							1	.880*	.001
FEMAFRAUD								1	.294*
FRAUDOFF									1

*p < .000.
**p < .05.
N = 375.

DV to be normally distributed, which is satisfied in this case. Bypassed is the assumption about the normal distribution of errors on the levels of the explanatory variables. It is also more appropriate when using counts, such as the number of months to arrest as is done here.

3. Results

The dependent variable (DV, mean = 49, std. dev = 26) is the number of months from the date of the occurrence of the disaster to the date of the arrests of the accused (#MONTHARREST.). Its distribution approximates a standard curve, with a range of 1–90 months. Forty nine months is its mean score, and 26 is its standard deviation. It is a proxy of the post-impact diachronic features of the disasters, used in place of phases to represent the periods when the crimes took place. The number of months from the occurrence of the hazard to the month the avowed criminal *activity took place* would have been a more accurate measure to use in this analysis, but it was unavailable. Compared to the date of the offense, a better indicator, the dates of the arrest can take place only at or after the time the crime happened, and a subsequent investigation uncovers enough evidence to indicate a potentially prosecutable offense. It overestimates to an unknown extent the number of months between the inception of the disaster and the crime although it does not seem to bias the results. In the U.S., as well as in many other countries the law (Habeas Corpus) requires the police and other court officials to bring the arrested persons in front of a judicial officer within 24–72 h to face the charges levied against them. The granting of this right at times involves a good deal of deliberation by the courts which create delays in adjudication.

Furthermore, other intervening factors can also create delays, among which is that lawyers can in many instances obtain postponements of court hearings on many grounds. Also, those arrested who cannot afford bail often spend months incarcerated while their case is pending a court hearing. Court-appointed lawyers in some instance do not perform their duties adequately, and their clients do not get their day in court in a timely matter. Flango and Clarke [75]; 72, 73) describe the typical procedures of U.S. courts and the widespread use of plea bargaining, as it occurred in this instance.

The test also includes other potentially competing predictors to test their comparative effect on the DV. These other independent variables are a) The cost of the crime in dollars, log10 transformed due to its non-normal distribution and high skewness (LOG10$, mean 1.45, std. dev. 61.) b) The number of months between the inception of the disaster and the trial (MONTHTRIAL, mean 48, std. dev. 21), which is assumed to be statistically associated positively to the DV but in a functional rather than a causal form, for both may reflect on the efficiency of the bureaucratic regimes of FEMA and the BP. Its inclusion in the statistical model allows for a preliminary examination of the operations of the two bureaucracies; c) The effect of the number of people in the group charged with the crimes, (SIZEGRP, mean 2.8, std. dev. 2.9), cannot be predicted. It may be associated negatively to the DV since in larger groups there is a higher probability for one or more of the members to get arrested and reveal more quickly to the police the identities of the others in the group. Contrarywise, it may be that group size increases the level of sophistication and specialization of labor among group members which would enable them to carry out more complex types of crime and delay their apprehension. d) Whether the accused is a repeat offender (REPEAT, mean .1.8, std. dev. 0.38). It should be associated negatively to the DV, for repeaters compared to nom repeaters can be expected to have more knowledge of how to deal with the criminal justice system and to be more skillful in postponing their arrest. e) The age of the detained at the time of their arrest (AGEOFF, mean 40.7, std. dev. 9), which should be associated with shorter average periods to arrest. Research [76] indicates that while people are less likely to commit crimes past their 20s, they are nevertheless more vulnerable to detention as they age and lose contact with their criminal associates. f) The gender of the accused (GENDER, mean 0.45, std. dev. 0.49), scored 1 for female; it is included in the analysis due to the growing importance of gender in contemporary disaster studies, although we are unaware of studies that would help identify its relationship to the DV. g) Whether FEMA was the victim of the crime (FEMAVICT, mean .38, std. dev. 0.49), scored 1 for FEMA and 0 for the BP. It should be associated positively with the DV due to the initial difficulties faced by FEMA and the justice system in New Orleans in the aftermath of the disaster. h) Whether the crime is a fraud (it FRAUDOFF, mean 0.85 std. dev. 0.35), which is assumed to be associated positively with the DV for they are on average more complicated and take longer for the police and federal officials to investigate than property and other types of crime, and i) A multiplicative interaction term (FEMAFRAUD, mean 0.33, std. dev. 0.47) found to have a significant statistical effect on the DV in a parallel analysis that searched for nonlinear relationships among the predictors (not shown, available upon request.)

Table 1 displays the bivariate correlations among the variables included in this study. It shows a few patterns: a) The numbers of months to trial and the size of the offending group are both significantly associated with the DV; b) Size of offending group (SIZEGRP) is correlated significantly with all but one of the other predictors (FRAUDOFF); c) The DV is positively related to FEMA as the victim of the crimes. d) Unsurprisingly repeat offenders are more likely to victimize FEMA; e) FEMA if compared to the BP took more time on average to arrest the suspects but was quicker than BP in bringing them to trial. f) Repeat offenders are less likely to be older and to be members of larger groups (−.33.) g) Gender (Female = 1) is not significantly related to all but one of the other predictors included in the equation, or to the DV. h) Older defendants are more likely to carry out costlier crimes.

Using Cutter et al. 's [44] estimate that the period of community recovery from Hurricane Katrina took 14 months, the *median* amount of losses due to crimes for this period is $22,000. High-cost crimes that usually involve fraud occurs throughout the periods under study

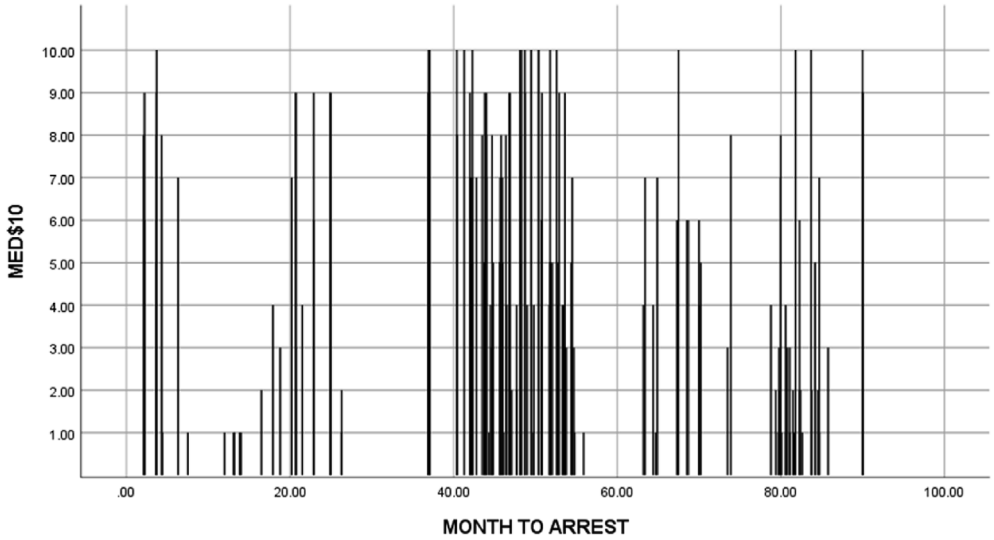

Fig. 1. Median amount of dollars lost to crime by month of arrest (in tenths).

(Fig. 1.). A case of fraud costing $15,000 took place during the first weeks after impact. Fig. 1 plots the square root transformation of the *median* amount of dollars lost to crime by the number of months to arrest (DV) grouped in approximately ten similar categories. The range of the DV is up to 90 months, but most of the crimes occur between 20 and 60 months (five years) after the occurrence of the disasters.

Fig. 2 interpolates the log10 dollars lost to crime by the number of months to arrest. It shows the pronounced variability of the costs of the crimes. The figures show that high-cost crime, what we refer to as fraud, takes place throughout the entire period under study although it occurs much less often during the first twenty-two months after impact than in subsequent periods (Fig. 2.) Fig. 2 shows that during the first 20–24 months there is a comparatively lesser number of crimes and those that occur tend to cost less than those in the subsequent periods. The figure also indicates that the period between 40 and 60 months is when the lion shares of the frauds and other crime incidents take place. In sum, the costs are lower during the first 24 months, and higher average dollar losses to crimes occur more frequently as time progresses. Neither figures support the hypothesis of a geometric progression of the lengths of the presumed stages.

GLM. Preliminary Results (not shown) indicate that all tolerance indices were less than 1, demonstrating the absence of multicollinearity among the predictors retained in the equation. The P–P plots of the residuals are standard. The initial number of respondents per number of predictors is thirty, exceeding the recommended proportion of 20. The bootstrap procedure in SPSS using 1000 synthetic samples indicate that there are no observable sample effects on the findings and that the frequency distributions of the variables are within 95% confidence intervals.

Table 2 displays the reduced model's unstandardized (b) and standardized (B) regression coefficients showing the effect of changes of one unit of each of the predictors when the others are zero on the number of months between the onset of the disaster and the date of arrest (DV). R Squares of the two models are virtually the same: the excluded predictors are not statistically significant: They are nevertheless included in the full model in Table 2 for purpose of illustration. The reduced model includes the dollar cost of the crimes, the primary independent variable of interest in this study, as well as the other three predictors that also proved statistically significant in the stepwise GLM procedure (p of F to enter = .05). The reduced model in Table 2 fits the data well.

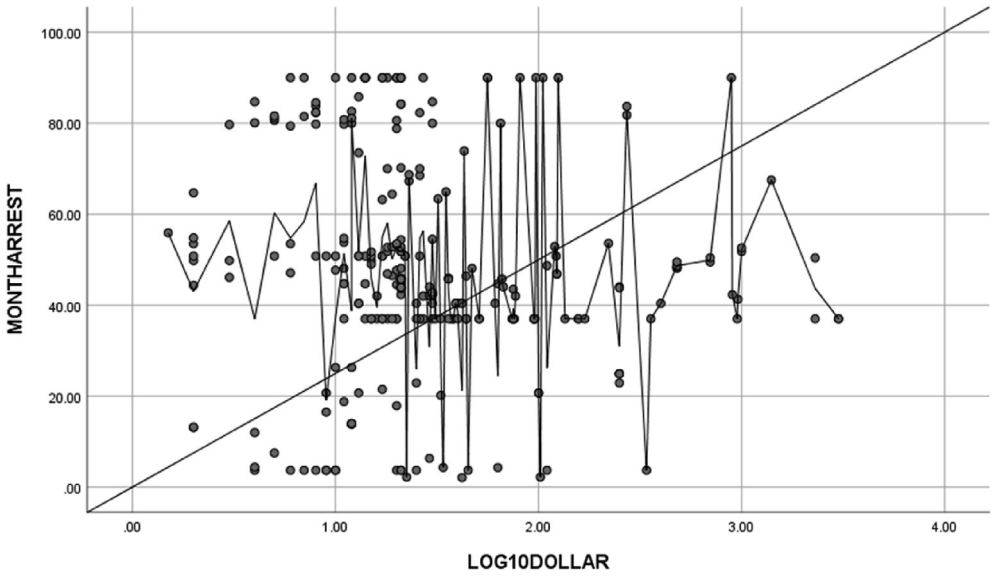

Fig. 2. Interpolation of dollars lost to fraud by month of arrest.

Table 2 A
GLM of Months to Arrest by Dollars Lost to Fraud and Other predictors, full model.

Dependent Variable: MONTHARREST					
Parameter	b	Std. Error	t	Sig.	B
Intercept		3.774	−1.245	.214	−12.133
MONTHTRIAL	.942	.036	26.485	.000	.872
SIZEGRP	-.486	.218	−2.231	.027	-.916
AGEOFF	-.142	.069	−2.071	.039	-.278
FRAUDOFF	4.238	2.242	1.891	.060	-.176
FEMAFRAUD	−8.055	3.603	−2.235	.026	−15.150
GENDEROFF	−1.909	1.193	−1.601	.111	−4.257
REPEAT	−3.414	1.679	−2.034	.043	−6.719
FEMAVICT	59.770	3.149	18.982	.000	53.570
LOG10DOLLAR	2.489	1.080	2.304	.022	.362

Table 2 B
GLM of Months to Arrest by Dollars Lost to Fraud and Other predictors, reduced model.

Parameter	b	Std. Error	Beta	t	Sig.
Intercept	−5.04	3.27		−1.54	.12
MONTHTRIAL	.96	.04	.83	27.8	.000
AGEOFF	-.15	.07	-.057	−2.25	.026
FEMAVICT	53.97	1.51	1.09	35.7	.000
LOG10DOLLAR	2.77	1.05	.07	2.64	.009

N = 273; Adj. R Square = 0.84; F = 347.8, p < .000; Durbin Watson = 1.17.

Its adjusted R Square is 0.84, significant at p = . 000. It is discussed next.

As hypothesized, the number of months to trial is significantly associated with the higher number of months to arrest (b = 0.96), supporting the conjecture that they are both parts of a functional process. It is not that the number pf months to trial causes delay in incarceration, for the expected temporal order among them would have to be reversed, but that they both convey information about the functioning of FEMA and the Gulf Coast Claims Facility (GCCF) administered by Kenneth Feinberg on behalf of BP during these disasters [77]; p. 1344.) For both agencies the cases that take longer to apprehend also take longer to bring to trial. It is also the case that the older the offenders are, the higher are the chances for their quick arrests (b = −0.15). Moreover, also as predicted cases when FEMA is the victim of crimes tend to take longer for arrests to occur (53.97.) Finally, in support of the primary hypothesis driving this paper, the Results indicate that the higher number of dollars lost to crimes tend to occur with increases in the number of months to arrest (b = 2.77). It is important to emphasize, however, that the relative importance of these predictors as revealed by their Beta standard coefficients is that the costs of the crimes that took place during these disasters are of much lesser importance for the understanding of the diachronic features of disasters (Beta = 0.07) than the number of months to trial (0.811) and FEMA as the victim of crime (1.20): the dollars lost to crime (0.063) is many orders of magnitude smaller. It is in this light that future studies of crimes during disasters should not exclude a consideration of the more extensive criminological features in which this sort of deviance takes place. These results reproduce in a multivariate context the past patterns observed in the bivariate correlations and graphs previously discussed. The findings provide forewarning to future disaster researchers examining crimes occurring during different disaster stages or phases. Contrary to what has been the practice until recently a more satisfactory analysis of these processes requires interdisciplinary collaboration by criminologists and disaster specialists.

4. Conclusion

The study has examined crime during the post-impact time to address a disciplinary question of some interest. Its findings are suggestive only. They need replication in many different disasters to determine their validity, as well as the use of better-quality information. This study is a secondary analysis of data that utilizes proxies for many of the central concepts, and future studies should use direct indicators as well as other relevant information that is not available to us. Such research efforts could help clarify the extent to which different disasters with different levels and types of effects facilitate or impede different patterns of crime. This study lacks information on pre-disaster WCC done against public agencies. As previously reviewed scholarship suggests, the addition of assistance benefits and probably other opportunities created by disasters increase the number of criminal offenses against these and other agencies. Information about fraud directed against welfare and public agencies both pre- and post-disaster if used in future studies would help to better assess the post-disaster patterns of crimes and fraud relative to their pre-existing offense levels. The analysis also lacks information on the means used to commit crimes and frauds such as over the phone or online, and on the local criminal opportunity structures (LCOS) that are hypothesized in this study to be significant drivers for crimes, including crimes in the aftermath of disasters. Future studies would also need to control for the extent to which the perpetrators of fraud come from outside the community to exploit victims in the affected areas rather than from the area proper as the ecological theory of crime used in this study proposes. This study does not differentiate between technological and natural disasters, which perhaps could prove useful. It also does not include detailed descriptions of the two hazards (hurricanes and oil spill) and the disasters they caused since many other authors have written such accounts, and its purpose rests elsewhere. Despite these shortcomings, the high adjusted R Square in the present GLM model is a reason for optimism that future research will reproduce some of these findings.

More research attention to the criminological aspects of disasters is desirable that would examine the occurrence, origins, and structural opportunities that facilitate WCC. The complex inter-effects between disaster demands and LCOS should be a line of future research, for there is merit in conceptualizing some of the effects of disasters as functions of criminal opportunity structures that are created by the new social demands produced by the disasters. The interconnections and inter-effects among them probably determine the short and long-term patterns of criminal activity. The Results of this analysis do not address or challenge the relatively well-established viewpoint that people continue to help each other to carry out required tasks, and that crime diminishes in the immediate aftermath of the disasters although it does not disappear. It adds to it that disasters at some point after they occur create conditions that facilitate crimes occurring, including high-cost crimes akin to WCC during the long-term recovery. Crime and fraud take place to varying extents throughout the many processes in which communities in the aftermath of the occurrence of disaster events are engaged, which is contrary to the assumptions that disaster crimes are myths and that serious crimes seldom occur during the gemeinschaft period.

Rather than continuing to use the disaster phases as metaphors for time, perhaps it would be preferable, first, to conceptualize disasters as sudden shifts of sociocultural complexes that may be co-present in social subsystems impacted by hazards, with very often distinct and dissimilar temporal patterns. Implied in this view is the need to disaggregate the meaning of disasters and allow that the demands created by the disaster are not necessarily uniform throughout a social system impacted by the hazards. Some parts of the social system may not be in crisis mode while others are. Such a reconceptualization is inspired by and complement Nejat et al. [78] new methodological approach to the study of recovery previously discussed. The hope is that it will encourage moving away from theorizing the post-disaster as sequentially ordered into distinct stages. Instead, there is a need to examine the different functions over time of the subsystems that are part of different types of social organizations and social institutions each with their own set of distinct requirements and vulnerabilities, some of which may

have to strive towards reconstitution in the aftermath of the impact of the hazards. It would be a way to disaggregate in an ordered and inclusive way the complexities inherent in disasters and of acknowledging the diversity of professional interests and the variety of substantive questions about recovery without abandoning the effort to employ a common conceptual framework for use in both research and practice.

The needed consensus would facilitate knowledge accumulation in the study of disasters. Charles Fritz's (1961, 655; see also [79] widely used functional definition of disasters stating that they are "a serious disruption, occurring over a relatively short time, of the functioning of a community or a society involving widespread human, material, economic or environmental loss and impacts, which exceeds the ability of the affected community or society to cope" needs to be more specific in the implications of its explicit functional analysis if it is to be more compelling. A greater emphasis on the variations of the impact of disasters on the specific subunits of society is needed. There is also a need to establish disciplinary consensus about the appropriate definition of disaster. As documented by Perry's [80] comprehensive review and analysis of most of the various extant definitions of disasters there is no agreement at present. Perhaps as David Neal mused more than 20 years ago (1997) the phases do not exist and are instead a contemporary version of the ether for the physics of the 19th century thought to be a required transmission medium for gravitational, magnetic, and electric forces.

Acknowledgments

The study is funded in part by the University of Delaware, Illinois State University and by NSF Grant No. 1638186.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijdrr.2019.101232.

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