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Social Capital and Disasters: A Study of Post-Hurricane Behavior & Attitudes in the United States

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ABSTRACT

This thesis examines what effect disasters have on social capital. Given the ambiguity in the literature on the relationship between social capital and disasters, it is important to study this intersection further. This relationship is analyzed through a quantitative inquiry of Hurricane Irene (2011), Hurricane Sandy (2012), and Hurricane Matthew (2016) in the US as well as a qualitative case study from news sources in Hoboken, NJ following Hurricane Sandy. I break down social capital into attitudinal and behavioral components. My findings suggest that social capital generally increases following hurricanes. What is notable about these findings is that not all components of social capital reacted uniformly, with formal membership in civil society groups declining overall. There was evidence in the case study to suggest that this trend was offset by informal group behavior and effective government, business, and philanthropic aid. My findings demonstrate that both informal groups and governmental aid can promote post-disaster social capital.

CHAPTER 1. INTRODUCTION

The central question asked in this thesis pertains to the effect of experiencing a disaster on social capital, which is integral to civic life and democratic norms. Do disasters encourage a commitment to pro-democratic norms, such as civic participation and engagement with community? Or might it have the opposite effect or none at all? While this relationship has been studied before, the literature remains inconclusive as to its nature, with some studies showing that disasters increase social capital while others show that they decrease it (Toya & Skidmore, 2014; Albrecht, 2018).

This project analyzes World Values Survey (WVS) data to investigate the effects of three hurricanes on social capital among respondents in the areas affected by these hurricanes. The results are compared to unaffected states in the US. These findings will be considered in the context of the larger literature on disasters and their associated political effects. This approach is complemented by a qualitative analysis of local news sources from Hoboken, New Jersey following Hurricane Sandy.

Hurricanes are a climate-related event known to be of concern to Americans that are projected to increase in intensity as climate change progresses (Leiserowitz et al., 2018; NASA 2008). This makes it a pertinent area to study, given the large effects of such storm. As the storms become more intense, any associated political effects will become more evident.

It is not hard to imagine how such an increasingly disruptive future environment might exacerbate trends of inequality and individualism, reducing community engagement and cohesion. Disasters may increase inequality, as FEMA restores lost property wealth, resulting in more money paid to those who had more in the first place (Howell & Elliot, 2019). Additionally, it may increase individualism, as following disasters there are often reports of anti-social

behavior, such as theft (Rodríguez et al., 2006, p.83). On the other hand, a well-organized grassroots effort to prepare local communities for the worst of climate-change related effects could conceivably reinvigorate political and civic engagement, like that envisioned in Dryzek's (1996; 2013) ecological democracy discourse analysis.

Taking this into account, a central aim of this thesis is to determine the effect of disasters on social capital by studying the states affected by three major hurricanes in the US between 2011 and 2017 in addition to undertaking a case study examining one community in depth through newspaper accounts. Investigating this through quantitative and qualitative methods will add to the growing body of work on the effects of disasters.

PREVIOUS WORK

While it is known that disasters can influence politics, there remains a lot to study as to their effects on a variety of political processes. Some well-studied areas include voter retrospection, voter turnout, and social capital (Arceneaux & Stein, 2006; Chen, 2013; Ramos & Sanz 2020; Bechtel & Hainmueller, 2011; Toya & Skidmore, 2014; Sinclair et al., 2011; Jenkins, 2019). Nonetheless, there is little consensus as to the effects of disasters on those areas (Albrecht, 2018; Rubin, 2020).

In the past, hurricanes have been found to impact elections and public opinion of elected officials (Moynihan, 2012; Chen, 2013; Derickson, 2014; Lay, 2009). While some point to the shark attacks during President Wilson's administration to show that disasters are typically blamed on incumbents regardless of their control over the issue (Achen & Bartels, 2016), more recent research about Canada and Spain has demonstrated that in some cases effective management of a disaster can increase support of an incumbent (Bodet et al., 2016; Ramos &

Sanz, 2020), indicating a diversity of potential electoral responses to disasters. On policy issues, hurricanes have been found to increase the political popularity of taxation and social programs in the US, seen as a form of altruism following a disaster whereas they are generally cast in a negative light (Frankovic, 2008).

This raises questions about what impacts climate-driven disasters may have on political and civic participation, particularly given the concern many Americans have around the climate. While younger generations typically participate in politics at lower rates than older groups, environmental issues are an exception to that trend, with the young leading the charge on environmental activism (Twenge et al., 2012; Census, 2016; Ballew et al., 2019). Approximately half of Americans say they have experienced effects from climate change and 61% are worried about heat waves and flooding, yet less than half say there is any social norm to act (Leiserowitz et al., 2018). Others have found that while disseminating information of flood risk can raise individuals' desire to become politically active, there is no assurance that their desire will necessarily translate into concrete action (Lieske et al., 2014). Research suggests that there is an opportunity for- but no assurance of- an environmental rejuvenation of political involvement.

This points to the salience of studying the political effects of disasters, not only because disasters will become stronger as climate change progresses, but also because of the deep impact they have on individuals' lives. The impact of these events may incentivize them to alter how they act and how they think about the world. Social capital in particular is not only important for individuals and their relationship to others but is also integral to supporting key democratic norms (Putnam, 1993; Putnam, 2001).

The literature on the relationship between social capital and disasters indicates that disasters provide opportunities to grow existing stocks of social capital as well as opportunities

for the disaster to disrupt and diminish existing social capital. There is a large degree of ambiguity as to whether social capital will grow or deplete as a result of a disaster (Toya & Skidmore, 2014; Albrecht, 2018). Not only is the degree to which there are opportunities for the growth or diminishment of social capital important, but there are a multitude of contextual factors that can mediate this relationship. Some of these factors can include the role of the government and the media, local community characteristics, and sup-population group dynamics. This ambiguity points to the importance of studying social capital as one political effect of disasters.

SIGNIFICANCE

Democratic norms are essential to the functioning of a democracy, with social capital being one important normative component of that (Putnam, 1993). While most people think of democracy as being defined by the ability of citizens to vote for their leaders, a true democracy requires more than that to function properly. A fully-fledged democracy must be a liberal democracy, balancing the rights of individuals with the right of the majority to self-govern[1] (Mounk, 2018). There is danger both in excessive division among groups and excessive, unchecked power vested in the government (Madison et al., 1987). The way governments are constructed has significant sway over how those factors play out (Ginsburg & Huq, 2018). Beyond the institutional set up of a democracy, it also matters what people do. It matters how those in elected office act (Levitsky & Ziblatt, 2018). It also matters how the people themselves act (Putnam, 1993; Tocqueville, 1841). This is to say democratic norms matter.

[1] This reference to liberal democracy is a reference to the concept of protecting minority rights and the right of the majority to self-government in opposition to so-called "illiberal democracies" who proport to be democratic but seek to exclude sub-populations from full citizenship and rights, damaging democratic integrity (Muller, 2016, p. 50).

Social capital has long been associated with successful democracies. As Alexis de Tocqueville (1841) pointed out over century and a half ago, what made democracy work in America was that the people participated in civic life, an integral aspect of social capital. This point was substantiated in the work of Robert Putnam (1993), pointing out that there were "more successful regional governments [in 20th century Italy] merely because they happen[ed] to be more civic" rather than richer or more developed (p.98-99). Those in less civic regions had less generalized trust and subscribed more to 'law and order' ideals to solve the collective action dilemma to get a group to cooperate (Putnam, 1993, p.111-112).

Given that research on the political effects of disasters is varied and the democratic norms supported by social capital are critical for the health of a democracy, this is an important intersection to study. We know that hurricanes have produced political effects (Achen & Bartels, 2016; Akarca & Tansel, 2016; Arceneaux & Stein, 2006; Bechtel & Hainmueller, 2011; Chen, 2018; Goebel et al., 2015; Hart, 2014; Jenkins, 2019, Xu et al., 2020). However, there is little consensus across the scholarship as to what those effects are (Bodet et al., 2016; Lay, 2009; Montjoy & Chervenak, 2020; Ramos & Sanz, 2020; Rubin, 2020; Rudolph & Kuhn, 2018; Sinclair et al., 2011). Specifically, in terms of social capital, this is also little consensus on the effects of disasters, such as hurricanes (Toya & Skidmore, 2014; Albrecht, 2018). Therefore, it is important to research this area as these storms become more intense.

This research is also important because as climate change increases the average global temperature, severe weather events, like hurricanes, are projected to worsen. It is clear that both the Earth's oceans and its atmosphere are warming (Buis, 2020). Warm water temperatures are ideal for creating hurricanes, as they need a minimum of 79 degrees Fahrenheit at the sea's surface to form (Buis, 2020). Additionally, warmer air temperatures raise the dew point,

allowing more water to accumulate before condensing and turning into precipitation. Research from NASA shows that climate driven temperature increases in tropical oceans may warm the surface by as much as 4.8 degrees Fahrenheit by 2100 (Smith, 2019). Such a scenario would result in a 60% increase in the incidence of extreme storms (Smith, 2019). Based on these expected changes, all communities in the American east and south will face increased risk from hurricanes, but this change will be most pronounced in the northeast (Pant & Cha, 2019). For this reason, it is important to understand the relationship between hurricanes and social capital.

METHODOLOGY

The core research strategy of this thesis involves comparison of trends in social capital development in areas affected by hurricanes with trends in areas unaffected by hurricanes. In that sense, this analysis uses a quasi-experimental design to detect any discernable impacts of hurricanes on behaviors and attitudes associated with social capital. The states affected by the storms in question serve as the treatment group and the unaffected states will be the control. The independent variable is the occurrence of the disaster, and the dependent variables are three dimensions of social capital. The data used to analyze this will come from the World Values Survey data, utilizing the surveys that occurred in the US in 2011 and 2017.[2] The timetable of the WVS' data allows me to investigate the effects of Hurricanes Irene, Sandy, and Matthew, which occurred between the survey rounds.

My analysis seeks to determine how various components of social capital evolved after experiencing these hurricanes and if this differed from the unaffected regions of the US. Looking

[2] For clarity, the WVS published its Wave 6 data in 2014 and its Wave 7 data in 2020, but the surveys were conducted prior to those dates in the US. Wave 6 interviews were conducted in June and July 2011, and Wave 7 interviews were conducted in April and May 2017.

at the differences- if any- that occurred provides insight into how experiencing a disaster affects an area. All of the disasters in question occurred after the first survey was completed in the US in 2011 and before the second survey began in 2017. This allows me to use the data provided by the WVS to evaluate the effect of these disasters on social capital in the affected area.

These changes are also tested for statistical significance with a difference of proportions test. By verifying that the results found are statistically significant, I am able to assess the probability of the observed results being the result of chance or truly resulting from the occurrence of the storms themselves.

My research includes a literature review to summarize documented trends in the disaster literature, with an emphasis on politically oriented research. The trends identified here are considered in the discussion and analysis of these hurricanes to highlight how usual or unusual my findings are. The literature informs my analysis of the WVS data and provides some potential explanations for the results observed there.

Following the data analysis, I investigate news sources in Hoboken, New Jersey as a case study to put my findings in context. I use this information to inform my discussion of the data analysis and attempt to figure out whether any of the potential explanations explored in that section actually played out in a specific case. This section is important since social capital and disasters are localized phenomena that are inseparable from their specific contexts.

CHAPTER 2. LITERATURE REVIEW: SOCIAL CAPITAL & DISASTERS

Democracy depends on what people do, as discussed earlier. One large component guiding how people act are norms, which are not necessarily codified and written into law. Social capital is one such important component of normative support for democracy. This makes it a pertinent political phenomenon to study, being tied to strong democratic societies and thriving economies (Putnam, 1993).

In the aftermath of disasters, many focus on the loss of life and economic damages that come from these extreme events. Another important aspect is the effect disasters have on long-term social and political processes within the affected communities. The literature on social capital and disasters does not indicate any one set way that disasters affect social capital. In some cases, it increases, and in others it decreases. Some studies indicate that disasters can activate existing networks, demonstrating how social capital appreciates through use. Others indicate that new networks form. And other studies indicate that networks are disrupted, resulting in diminishing social capital. There is no clear consensus on how long these changes last.

This ambiguity might be explained by the multiple effects of disasters on social capital, both disrupting existing social capital networks and providing opportunities for new networks to emerge. Moreover, whether social capital increases or decreases may depend on the context of the individual case. This ambiguity documented in the literature on disasters demonstrates the need for more research in this area, highlighting the significance of my research.

DEFINING SOCIAL CAPITAL

While there are multiple conceptions of social capital, it is by and large seen as a complementary form of capital to more traditional kinds of capital, such as human and physical.

Bourdieu (1986) defines it as an "actual or potential" resource that individuals can access within networks of "mutual acquaintance and recognition" (p.251). This definition lends itself to defining social capital as a private resource for individuals to use (Wang & Ganapati, 2018). In contrast, Coleman (1988) and Putnam (1993) view social capital as a public good in the form of a collective resource (Wang & Ganapati, 2018). Coleman defines it as a social structure that can facilitate the actions of various actors. Putnam defines it as consisting of voluntary cooperation perpetuated by norms of reciprocity and networks of civic engagement that appreciates with use (1993). Stolle and Hooghe (2004) combine these private and collective views of social capital in their structural and attitudinal framework, defining the structural components as civic networks- both formal and informal- and the attitudinal components as norms and values.

Social capital can further be broken down into three types: bonding, bridging, and linking. Bonding is an inward-looking bond based on a relationship of trust and cooperation within a homogeneous group, such as a family or an ethnic group (Sadeka et al., 2020; Torres et al. 2019). Bridging is defined as an outward looking connection between groups of people who are dissimilar in some way, such as between different ethnic groups (Sadeka et al., 2020; Torres et al., 2019). Linking social capital is the connection between individuals or groups to institutions or those in positions of authority (Sadeka et al., 2020; Torres et al., 2019).

The above dimensions of social capital aid in my understanding of different aspects of this phenomenon and will inform my research. As I explore the impact of hurricanes, I will work with a somewhat different framework. One issue that immediately presents itself when reviewing the literature on social capital is that both conceptualizations and operationalizations of social capital vary, with scholars emphasizing one or more different dimensions. Bourdieu, for instance, emphasizes individual recognition of others as potential or actual connections and

resources. Coleman emphasizes the functional aspect of social capital, focusing on the social structures that facilitate interactions. Finally, Putnam emphasizes civic participation in groups, like Coleman, but adds the importance of generalized trust to make these connection work. Whereas Bourdieu views social capital as being primarily private, Coleman and Putnam both view social capital as intrinsically connected to the public good.

These varying conceptualizations suggest that the macro-concept of social capital is multi-dimensional. In my study, I seek to capture those different dimensions, exploring both attitudinal and behavioral dimensions of this phenomenon. Attitudinal social capital pertains to beliefs and views about the individual's community. Behavioral social capital pertains to how people interact with that community. I attempt to capture these by operationalizing social capital in three different ways. The first two operationalize the attitudinal aspects of social capital, and the third references the behavioral dimension. First, I examine feelings of connection to the community. Second, I measure levels of trust. And third, I explore rates of membership in key organizations. Breaking down the dimensions of social capital in this way should provide some clarity into how hurricanes affect social capital. It is possible that some aspects will be affected differently from others. Examining social capital in this way should provide insight as to why the literature on the relationship between social capital and disasters remains ambiguous.

THE ROOTS OF SOCIAL CAPITAL

Social capital's root causes are varied, but they primarily rely on repeated interactions managing common pool resources beginning with close relations and eventually expanding outwards to broader swaths of society. Putnam (1993) argues that social capital theory provides a better response to the collective action problem in contrast to other explanations, such as game

theory, which he argues underpredicts voluntary cooperation. He also criticizes the Hobbesian leviathan and institutional answers as failing to explain how a society develops a trusted, neutral arbiter. He argues that such required trust is developed through repeated interactions dealing with common pool resources that allow norms and patterns of reciprocity to emerge, creating a belief that such rules will continue to be followed (Putnam, 1993). It is the voluntary nature of cooperation that creates the personal trust that is in turn leveraged into social trust (Putnam, 1993). These arrangements emerge easily in thick networks, such as those found amongst kin. In larger social contexts, once these norms are established and grown through continued use, it becomes easier to overcome shirking and exploitation risks (Putnam, 1993). The connections built from engaging in those norms with others create the connecting networks, such as bonding, bridging, and linking networks, that create social capital within a community.

The roots of social capital are not necessarily clear cut and linear but instead emerge from a path-dependent history that leads communities into either vicious or virtuous cycles that raise or degrade the of functioning institutions and social capital. Societies with strong social capital networks create a virtuous cycle that continually increases the stock of social capital through its continued use, reducing transaction costs and increasing cooperation (Putnam, 1993). This in turn creates stronger states and stronger economies (Putnam, 1993). In Italy, Putnam finds that the northern region during the 20th century proved to be more civic, having accumulated strong norms of trust and mutual reciprocity since 1100. In contrast, the southern region- long characterized by widespread distrust, crime, isolation, and vertical hierarchy- proved to be less civic during the 20th century, caught in a vicious cycle. Based on his analysis, Putnam (1993) argues that states and markets operate more effectively within a civic community and that the

seeds of such efficiency are path dependent, found in the past based on the slow-changing nature of norms and institutions that mutually influence one another.

SOCIAL & POLITICAL EFFECTS OF SOCIAL CAPITAL

Studies into participation in civic society confirm the path dependent nature of social capital, highlighting one effect of social capital on social and political processes. Research into the spontaneous volunteers in New York City on 9/11 finds that, even years later, those who volunteered expressed increased sentiments of connection with the community and increased involvement in community service organizations after the initial recovery from the disaster that sparked their engagement (Lowe & Fothergill, 2003; Steffen & Fothergill, 2009). This shows how prior use of behavioral social capital results in its continued use and appreciation over time, creating more community involvement.

In addition to civic participation, social capital is also associated with political participation. Theorists like Putnam view social capital as central to the strength of a civic society, underscoring how it might be intertwined with the level of participation in elections. Given the low probability of casting the decisive vote in an election and the personal cost associated with voting (Rudolph & Kuhn, 2017, p.3), motivation to overcome this disincentive might come from networks connecting individuals to voter registration and polling locations, for example. In a study of voter turnout in regions negatively affected by the 2011 Great East Japan Earthquake, those with larger social networks were more likely to turn out to vote after the disaster, suggesting a relationship between social capital and voter turnout rates (Jenkins, 2019). Other researchers have used voter turnout to measure social capital empirically (Wang &

Ganapati, 2018). These connections found in the literature underscore the importance of studying social capital.

Beyond civic and political participation, strong stocks of social capital can also promote better functioning states, economies, and democracies (Putnam, 1993). Because social capital emerges out of a cyclical process, it is not only affected by existing institutions but also transforms them. Social capital in turn promotes the creation of more social capital via continued trust in those institutions and others within the community. It is this trust that facilitates well-functioning economics and states (Putnam, 1993). Beyond its interactions with these institutions, social capital's promotion of community engagement also strengthens democracy. Civic engagement has long been thought to be central to functioning democracies (Tocqueville, 1841).

While social capital is largely seen as a social good, it can also contribute to social and economic inequality due to the way it builds in path-dependent virtuous or vicious cycles. Social capital is known to be unevenly distributed throughout a society and has been shown to be associated with certain social and economic groups. In the US, areas that are wealthier, more racially or ethnically homogenous, and older with higher employment rates and residential stability have been shown to possess more social capital (Zahnow et al., 2019; Wang & Ganapati, 2018). These trends suggest that socioeconomic status and being a part of certain social or identity groups can to some degree predict the level of social capital that individuals or groups can access. This is important to keep in mind, as my analysis of social capital following disasters does not examine subsets of the affected population. So, while I will not be able to draw conclusions about inequality in regards to social capital, that does not mean it is not playing a role in post-disaster levels of social capital.

HOW SOCIAL CAPITAL AFFECTS DISASTER RESPONSE

Social capital has been shown to have a positive, protective effect on communities in terms of preparation for and recovery after a disaster. Preparedness for a disaster includes an individual's access to early warnings, knowledge, resources, training, and networks related to a disaster (Sadeka et al., 2020). These traits clearly overlap with traits of social capital. Thus, groups that are less connected to such preemptive resources are more at risk of adverse outcomes following a disaster. This was seen in a study of an indigenous ethnic minority in Malaysia, the Orang Asli, whose comparative lack of linking and bridging social capital leaves them less prepared than other groups for disasters (Sadeka et al., 2020).

Generally, it is believed that preexisting social capital before a disaster is also beneficial to the recovery after the fact by facilitating more efficient emergency responses (Wang & Ganapati, 2018, p.298). Following Haiti's 2010 earthquake, those with strong social capital connections were better able to access shelters and other recovery-related resources (Rahill et al., 2014). Following Hurricane Katrina, small businesses that were affected in the area were better off if they had more access to social capital- particularly linking and bridging- before the disaster (Torres et al., 2019). Similarly, social capital-related networks of connections developed by local governments helped more efficiently implement disaster governance following the 2010-2011 Queensland floods in Australia (Melo Zurita et al., 2018). This research indicates a strong level of continuity in social capital before and after a disaster, with preexisting levels predicting preparedness and recovery, although other factors play a role as well (Wickes et al., 2017).

Some researchers are more tentative about how strong the impact of social capital is on post-disaster functioning. Wickes et al. (2015) concluded that social capital has a limited effect on the post-disaster environment, positing that structural conditions such as the strength of the

governmental and economic response to the disaster have more long-lasting effects on community resilience than pre-existing social capital. Zahnow et al. (2019) in studying the same Australian flooding event found that individual-level rather than community-level social capital had protective effects for social functioning and connection. This demonstrates that not all types of social capital provide equal benefits to a community after a disaster and that political and economic factors can influence post-disaster outcomes as well.

HOW DISASTERS AFFECT SOCIAL CAPITAL

Moving beyond looking at how social capital affects disaster response, the literature makes it clear that disasters themselves can influence social capital, which is critical for my research. One such effect is to diminish social capital immediately following a disaster, largely due to the disruptions to the pre-existing networks caused by the event. The community's need to band together to respond to a disaster can also lead to an increase in social capital. The drivers of these disparate outcomes are discussed below.

The first way that disasters can diminish social capital is by disrupting interpersonal networks through displacement caused by the storm. In a study of the 182 counties affected by Hurricane Katrina, social capital decreased directly following the disaster but over time experienced a gradual recovery (Wang & Ganapati, 2018). The recovery rate was slower than the pre-Katrina growth rate of social capital (Wang & Ganapati, 2018). The initial decrease was attributed to the loss of the community structure caused by the unprecedented storm that resulted in a massive evacuation (Wang & Ganapati, 2018). That loss in networks is what is used by Zahnow et al. (2019) to explain the lack of protective effect of neighborhood and community social capital after a flooding event in Australia.

Another way that disasters can decrease social capital is through long term disruptions of interpersonal networks caused by a post-disaster rent gap. This decrease in social capital following disasters can be explained by economic and social capital inequalities, disproportionately pushing low socioeconomic status (SES) groups out of the area. A longitudinal study of the Houston metropolitan area finds that over time large-scale disasters cause displacement of low SES communities via rent gaps that develop from investors using adversely affected property to rebuild and sell at a profit (Wyczalkowski et al., 2019). This trend, should it hold true elsewhere, may explain the decrease in social capital and the long-term slowing of growth of social capital seen by Wang & Ganapati (2018).

The severity of a disaster can also contribute to diminishing social capital, with more intense storms that pass critical thresholds resulting in less social capital. Albrecht (2018) uses 12 disasters in Europe to measure social trust, one form of social capital. Overall, this study finds that disasters with a death toll of nine or more are associated with decreasing social trust (Albrecht, 2018). The study also finds that eventually there is a return to pre-disaster levels of trust (Albrecht, 2018). This is similar to the trends seen by Wang & Ganapati (2018). Overall, social capital is found to decrease in the immediate aftermath of a disaster as a result of disruptions to existing social networks caused by the disaster, but this decrease may only be temporary.

Social capital can also be diminished by emergent anti-social behavior during a disaster. During Hurricane Katrina in 2005, there were “rumors about invading gangs of young black men,” in response to which some wealthy white neighborhoods armed themselves (Rodríguez et al., 2006, p.92). Other rumors of crime at the Superdome and the Convention Center led to some residents’ resistance to evacuate in the face of the storm (Rodríguez et al., 2006). Rumors of anti-

social behavior, in some cases utilizing racist stereotypes, spurred both anti-social behavior in arming a neighborhood against newcomers as well as delayed evacuations among other groups. The belief that there was widespread anti-social behavior led to a diminishment of bridging and linking social capital as groups became more insular, leaning into bonding social capital. It should be noted that the prevalence of anti-social behavior is often given outsized attention by the media following disasters (Rodríguez et al., 2006). Nonetheless, rumors of it as well as such actual behavior can diminish social capital.

While disasters can significantly disrupt preexisting social networks, they can also spur new identity groups around being affected by the disaster, which increase social capital. The sense of a common fate amongst those who experience a disaster can promote new group identities, as documented by Ntontis et al. (2018) following the 2015-2016 floods in York, UK. These new identities can lead to a sense of unity and mutual support, and they can even supersede preexisting group identities (Ntontis et al., 2018). This observation clearly demonstrates bonding and bridging social capital at work, as this emergent group identity facilitates access to resources and social support following the floods.

Social capital can also increase after a disaster by spurring emergent groups that work to address the disaster. Emergent pro-social behavior was documented following Hurricane Katrina by Rodríguez et al. (2006) in groups ranging from hotel & hospital workers, local neighborhoods, and search and rescue teams to a federal disaster response team. These groups ranged from informal to formal in their structure. Some were newly emergent during the storm while others were repurposed to address the ongoing disaster. While not all of the behavior documented following Katrina was pro-social, a large majority of the emergent behavior was pro-social in nature (Rodríquez et al., 2006, p.84).

Another way that disasters increase social capital is by reactivating dormant group networks. Schuenemann (2020) found that Hurricane Sandy led to the reactivation of former Occupy Wall Street activists during the disaster to help coordinate the distribution of resources during the storm. Activists organized in response to perceived shortcomings of the government's response to the hurricane (Schuenemann, 2020). This represents an increase in social capital by reviving formerly active community groups.

The last way a disaster can increase social capital is related to the intensity and type of disaster. Toya & Skidmore (2014) found that between 1985-2004 predictable disasters that affect wide swaths of the population increased social trust the most via bridging capital. This is also impacted by the strength of the disaster, as for each increase of one standard deviation of storm activity, social trust increased by 6.5% (Toya & Skidmore, 2014, p.273). Disasters that affected one specific group that lived in a single geographical location, such as flooding events, did not have this effect (Toya & Skidmore, 2014). This trend was attributed to the fact that floods primarily affect low-lying areas, which are frequently inhabited by low SES residents because flood risk lowers property value.

A CONTEXTUAL READING OF SOCIAL CAPITAL AND DISASTERS

What may determine whether there is a net growth or decrease in social capital depends on the individual context of the disaster and the community it affects. It is that context that might determine whether the new networks formed following the disaster outweigh the loss to existing networks of social capital. Additionally, not all changes occur immediately, and the level of social capital immediately following the disaster may not reflect the totality of effects the disaster will cause in relation to social capital. As demonstrated by Wyczalkowski et al. (2019),

long term economic forces may cause a rent gap that over time disrupts social capital networks as a result of the initial disaster. Reactivated or newly formed groups might disband following recovery, having lost the initial common purpose that united them. The trends outlined above occur following numerous disasters. While many disasters have that in common, the ultimate long-term effect on social capital is only determined by the individual context of that case, which might explain the divergence of outcomes noted in the literature.

As alluded to in the works of Toya & Skidmore (2014), Albrecht (2018), Rahill et al. (2014), and Sadeka (2020), the above effects are not necessarily consistent across all types of disasters, countries, and social groups. The major contextual factors that determine how social capital changes following a disaster are pre-existing levels of social capital, the role of the government, the locality's characteristics, the role of the media, and sub-population variations (Albrecht, 2018; Rahill et al., 2014; Toya & Skidmore, 2014; Wickes et al., 2015; Pyles et al., 2018; Rubin, 2020; Rodríguez et al., 2006; Hawkins & Maurer, 2010). Some examples that illustrate this include disasters in Haiti, Australia, and the US.

Since social capital is not evenly distributed across a population, those with more connections may be able to better access resources during and after a disaster if there is not a sufficient effort to equalize these inequalities. This may lead to diverging trends in social capital, with those already better connected increasing their stock while the under-connected do not fare as well. Following the 2010 earthquake in Haiti, those with higher pre-existing levels of social capital were better able to access resources in part due to government patrimonialism (Rahill et al., 2014).

The government can step in and mediate the predictive relationship between pre-disaster social capital and access to resources during and after a disaster, smoothing out the inequalities

noted above. Demonstrating this, government intervention mediated the relationship between neighborhood-level social capital and post-disaster outcomes following a flooding event in Australia (Wickes et al., 2015).

Beyond the role of the government, country size and regime type can have a contextual effect, with smaller and freer countries seeing larger growth of social capital after a disaster (Toya & Skidmore, 2014). One study of Haiti following the 2010 earthquake and the US after Hurricane Katrina provides an example of how social capital reacts differently depending on the country in question. Of the indicators to predict if individuals in each country participated in recovery efforts, less than half overlapped between the two countries (Pyles et al., 2018).

As mentioned earlier, media portrayal of pro-social and anti-social behavior can influence others' perception of a disaster (Wickes et al., 2017; Rodríguez et al., 2006). This can be accomplished by magnifying stories of pro-social or anti-social behavior, shaping individuals' perceptions and actions. Additionally, social media can help facilitate community connections (Cheng & Mitomo, 2018; Wilensky, 2014). Both of these may have some explanatory power over the relationship between disasters and social capital (Albrecht, 2018).

Lastly, social capital and disasters may not spur the same effects across all segments of a community. This was seen during Hurricane Katrina, where bonding social capital kept more black residents of New Orleans in the city rather than evacuating in order to stay with family members who refused to evacuate (Hawkins & Maurer, 2010). These examples highlight how many more factors than just social capital and disasters inform how social capital changes after disaster events.

These contextual factors are important to note because they are likely to not only play a role in changes in social capital following Hurricane Irene, Hurricane Sandy, and Hurricane

Matthew, but also because they may provide some explanation for the patterns observed in my analysis below. While I will not be measuring these factors specifically, they remain important to bear in mind as I proceed with my analysis.

CONCLUSION

Holding other factors constant, pre-existing social capital is a protective factor for disasters in terms of preparedness and recovery, but disasters themselves can influence levels of social capital by promoting new networks and disrupting old ones. Whether social capital in the affected area sees a net increase or net decrease may be dependent on local, contextual variables. Critically for my study, however, the relationship between disasters and social capital is both important and inconclusive.

Given that extreme weather events are projected to increase in intensity in the coming decades, it is even more important to understand that relationship. In the following section, I analyze the outcomes of social capital in the US following several notable hurricanes that occurred between 2011 and 2016. I analyze social capital development in the area affected by these hurricanes as compared to the rest of the US that was unaffected. I focus on three dimensions of social capital, which correspond to the interpretations of Bourdieu, Coleman, and Putnam. These three dimensions are connection, trust, and organizational membership. My findings suggest that social capital does not react uniformly to disasters across all three dimensions.

CHAPTER 3. EFFECTS OF DISASTERS ON SOCIAL CAPITAL

Based on the literature review, there is no clear consensus on how a disaster affects social capital. It is clear that pre-existing social capital mitigates the adverse effects of disasters (Sadeka et al., 2020; Torres et al., 2019; Melo Zurita et al., 2018). However, what reciprocal effect disasters have on social capital is less clear. There are case studies that indicate that they can diminish existing social capital networks (Albrecht, 2018; Zahnow et al., 2019). There are studies that indicate that disasters can reactive dormant networks (Rodríguez et al., 2006; Schuenemann, 2020). And there are studies that indicate that they can spark new networks (Rodríguez et al., 2006; Ntontis et al., 2018).

While much of this research draws from case studies, even studies using quantitative datasets are often in conflict with one another. Toya & Skidmore (2014) find that for each standard deviation increase in storm intensity, social trust increases by 6.5%. In contrast, Albrecht (2018) finds that once death tolls from a disaster surpass nine, social trust decreases. Wang & Ganapati (2018) studied a major disaster in the US and found that the rate of growth of social capital was higher pre-disaster than post-disaster, with a dip immediately post-disaster and a subsequent recovery.

In order to study how social capital reacts following a disaster, I look at three dimensions of social capital to gauge how each component changed following the hurricanes. I examine feelings of closeness to the local community, levels of trust, and membership rate in community organizations. These three dimensions capture attitudinal and behavioral aspects of social capital, illuminating changes in how individuals feel about the community and how they interact with the community after a disaster. I hope for this to provide some clarity in investigating the relationship between social capital and disasters.

Analysis of these three aspects of social capital shows that they did not react uniformly to the hurricanes. Between 2011 and 2017, attitudinal components of social capital generally increased or remained higher in the area affected by the hurricanes relative to the areas unaffected by the storms. In contrast, the behavioral component tended to decline in the affected region relative to the unaffected region. This seeming contradiction has several possible explanations, including the role of the government and emergent informal group behavior.

HYPOTHESES

The diversity of the findings from previous research make it difficult to predict any one direction for the effects of Hurricane Irene, Hurricane Sandy, and Hurricane Matthew on social capital. However, since the studies by Wang & Ganapati (2018), Rodríguez et al. (2006), and Schuenemann (2020) all studied the US, I expect to find similar patterns in my analysis despite the overall ambiguity of the literature.

Based on the literature discussing emerging local groups and identities following disasters, such as in the works of Rodríguez et al. (2006) and Ntontis et al. (2018), *I expect to see increases in feelings of connection with the local community*, since disasters require local communities to coordinate and respond to disasters. While the US government plays a role in funding the response and recovery, disasters primarily affect specific and limited geographic locations. I expected this will push local communities to feel a need to band together, creating a stronger sense of connection.

Based on the evidence of newly emergent and reactivated social networks documented by Rodríguez et al. (2006), Schuenemann (2020), and Wang & Ganapati (2018), *I expect to see an*

increase in the behavioral component of social capital, measured by membership in community organizations, following the disasters. While these studies have captured brief dips in the behavioral component of social capital, given the long time span between the disasters and the second WVS study, I do not expect that brief dip to play a significant role in the data studied here.

I expect to see increases in membership in all of the groups examined, which include religious, environmental, charitable, and mutual aid organizations. This is because these organizations perform important functions following disasters, including hurricanes. Due to the increased need for these organizations in the aftermath of a disaster, they are the most likely recipients of any increase in organizational participation. For this reason, I selected them to study in this thesis.

Charitable and mutual aid organizations' missions are directly linked to the needs of a community post disaster, which often requires medical, financial, and legal assistance both in the immediate aftermath and during recovery. Religious organizations often function in a similar capacity following disasters. Stout (2010) highlights the importance of religious organizing in New Orleans during the recovery following Hurricane Katrina.

Environmental organizations may see an increase due to a drive to combat climate change or to conserve wetlands. This concern about climate change may stem from the connection between climate change and these disasters made in the media (Smith, 2019; Pant & Cha, 2019; Kaplan, 2020). On the conservation end, preserving wetlands is important in preventing flooding, which is a major risk during hurricanes (EPA, 2018).

Moreover, *I expect to see social trust increase following the disasters.* My expectation is that trust will increase across its various measures following the disasters. General trust has been shown to increase following disasters, as they increase in intensity and in harm to the community especially in instances of predictable community-wide disasters (Toya & Skidmore, 2014). I expect this generalized trust to extend to trust in people generally and trust in those the respondents just met. Those who experience disasters often rely on close relations to provide housing, financial, and other kinds of assistance (Reid & Reczek, 2011; Lu et al., 2020). Because close relations, like neighbors and those the respondents know well, are important to disaster recovery, I expect to see trust in these areas increase as well.

METHODS

To investigate these predictions, I compare social capital development in regions of the US affected by hurricanes to the parts of the US that have not experienced those storms. By separating out the areas affected by the storms in question from the areas not affected, I am able to discern whether and to what extent different dimensions of social capital change in the aftermath of disasters.

Fig. 1

States affected by Hurricane Irene (2011)

Note. This map was made on the software at https://mapchart.net/usa.html

I chose Hurricane Irene, Hurricane Sandy, and Hurricane Matthew to study. Both Irene and Sandy were category 3 hurricanes, and Matthew was a category 5 (North Carolina Climate Office, 2020). Each of these hurricanes recorded the highest top windspeed and lowest pressure of any hurricanes or tropical storms that hit the mainland US in their respective years (North Carolina Climate Office, 2020). Hurricane Sandy (Oct. 2012) is the 4th costliest hurricane in the US on record, and Hurricanes Irene (Aug. 2011) and Matthew (Sept. 2016) rank 12th and 13th respectively (National Hurricane Center, 2018). From these metrics, these storms stand out as particularly impactful extreme weather events.

Fig. 2

States affected by Hurricane Sandy (2012)

Note. This map was made on the software at https://mapchart.net/usa.html

Fig. 3

States affected by Hurricane Matthew (2016)

Note. This map was made on the software at https://mapchart.net/usa.html

Critically for my study, these storms fell between the Wave 6 and Wave 7 survey from the World Values Survey (WVS), which collected data in the US in between June and July 2011 and between April and May 2017 on a variety of beliefs, values, and practices of the respondents (Inglehart et al., 2014; Haerpfer et al., 2020).[3] The dates of other surveys that might have been used, such as the National Election Survey, do not allow for comparisons of before and after any

[3] As stated earlier, the WVS Wave 6 and Wave 7 data were published online in 2014 and 2020 respectively, but the US data was collected in 2011 and 2017 for each wave.

of these storms. Additionally, given the time constrains on this work, I could not wait for a severe disaster to administer my own questionnaire to more carefully target affected areas.

While I have not encountered other research that has utilized the WVS, its emphasis on values and attitudes is what drew me to it to assess social capital. The WVS is a social survey administered worldwide to assess individuals' values and their impact on political and social spheres. Its focus on individual-level beliefs in connection to larger political trends makes it relevant for my study. It seeks to collect data over time to measure a range of socioeconomic and political phenomena, including social capital. Critically for my study, the WVS allows me to examine state-level data from the US, making it possible to compare unaffected and affected states.

To assess which states to collect data on from the WVS, I found which states had either emergency declarations or major disaster declarations, based on records from the Federal Emergency Management Agency (FEMA). Both Governors' orders and the President's orders were accepted. Based on this, the areas identified to study for the three hurricanes are: Connecticut, Delaware, Florida, Georgia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, South Carolina, Vermont, Virginia, Washington D.C., and West Virginia (FEMA, 2011; FEMA, 2012; FEMA, 2016). These areas make up what I term 'affected' areas. Using a rough experimental design, I intend to explore the development of social capital in these 'affected' areas, relative to its development in areas not affected by these hurricanes. All US states not affected by these storms make up what I term 'unaffected' areas. Notably, some of the affected states were affected by more than one

hurricane, which allows me to explore changes in social capital in areas hit especially hard by hurricanes.[4]

Evidently, hurricanes do not impact the entirety of every state included in the affected group, and not every state in the unaffected group is immune to hurricanes or other types of disasters. While I use gubernatorial and presidential disaster declarations to determine the states that were most at risk of significant impact, not all regions of states experienced the same effects, but all were included under those orders. This is one limitation of the data used here. To counteract this, I utilize a case study approach in a later section to provide more detail about a specific area significantly and directly affected by a disaster.

For this data, I used the online analysis available on the WVS' webpage to access the results for the US by the state, which are listed as percentages. I took the results for each state and weighted it by the number of respondents from that state in order to create a representative total for the affected area. This was done for all of the states and D.C. that were affected by a storm at least once. I repeated this with the states that were hit twice or more. The areas hit twice or more include Connecticut, Delaware, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, Virginia, and Washington D.C. I was unable to repeat this for the area hit by all three storms due to an insufficient sample size. Virginia was the only place affected by all three hurricanes as identified in my methodology and had only 55 respondents in 2011 and 68 in 2017. Similarly, I did not compare areas affected by only one storm because there was a relatively small sample size for states only affected by one

[4] In order to provide a more in-depth comparison of the affected and unaffected areas, I pulled out the data for gulf states unaffected by these hurricanes (Alabama, Louisiana, Mississippi, and Texas) and followed the same weighting procedure. The results of this comparison showed that these states aggregated together followed a pattern most similar to the larger unaffected regions. Due to this, information about these states is not analyzed here but can be found in the appendices.

storm. Like I did for the averages in the affected region, I aggregated each unaffected state's response to each question related to social capital by weighting it by the number of WVS participants in the state.

I chose to analyze areas affected by at least one storm and affected by two or more to be able to more closely examine the effect of storms compared to unaffected areas. Even though finding a relationship between the number of storms experienced and social capital is not my main objective, it is a useful way to draw out the relationship between disasters and social capital.

The sample size in the WVS allows me to access a large pool of respondents. Overall, the total respondents in the affected area hit by at least one storm in 2011 were 856 and in 2017 were 980 (Inglehart, 2014). For the areas hit by two or more storms there were 571 in 2011 and 692 in 2017. The total numbers in 2011 and 2017 for the unaffected regions of the US were 1,376 and 1,619 respectively (Haerpfer, 2020). Overall, the total number of respondents whose answers are analyzed here are 2,232 in 2011 and 2,596 in 2017.

My research incorporates divergent views of social capital in my attitudinal and behavioral framework by using WVS data to assess these dimensions of social capital. I capture notions of Bourdieu's idea of "actual or potential" resource in questions pertaining to how close the respondents feel to their local community.[5] I repeated a similar process for questions about closeness to their country and to the world to use as a comparison to the local community. Social

[5] The questions in this area change wording between the two waves of the survey. In 2011, the questions ask if the respondents feel like citizens or members of their local community. For this question I combined the percentages who selected agree or strongly agree. In 2017, the questions ask if the respondents feel close to the local community. For this question I combined the percentages who selected close or very close.

capital is a localized phenomenon, but by comparing how feelings of closeness change in different settings will show a clearer picture of the trends at play.

To measure the organizational membership component brought up by Coleman (1988) and Putnam (1993), I used questions from the WVS that pertained to membership in a variety of organizations, including religious, environmental, charitable/humanitarian, and self-help/mutual aid. I combined the percentage of active and inactive members. The WVS also collects data on how frequently the respondents attend religious services. I used their data to measure the percentage of respondents who attend once per month or more frequently.

Finally, I used questions from the WVS about how much the respondents trust their neighbors, those they know well, those they just met, and people generally. These questions capture Putnam's (1993) conception of social capital as trust that fuels norms of reciprocity. For these questions, I measured the percentage who completely or somewhat trust their neighbors, those they know well, and those they just met. For trust in people generally, I measured the percentage who responded that most people can be trusted.

My analysis examines whether and how social capital development, as measured by responses to questions about different dimensions of social capital, changed in both the affected and unaffected areas. The affected regions in effect represent a treatment group, while the unaffected region serves as a control group. Comparing patters of social capital development between the two will offer insight into how social capital changes as a result of disasters.

In addition to visually comparing trends for the different indices of social capital between the two regions, I ran difference of proportion tests between and within them. First, I used this test to assess whether there were statistically significant changes within each region between

2011 and 2017. This allowed me to discern whether the affected regions witnessed more dramatic changes in social capital development than the unaffected region. Second, I examined whether there were statistically significant differences between the affected regions and the unaffected regions both in 2011 and 2017. The premise here was that if hurricanes were affecting social capital development, differences between the affected and unaffected regions should be more apparent in 2017.

Given that the statistics in question are proportions and the variables being examined are two categorical variables (geographical location and agreement with the statement), using a difference of proportion makes the most sense.[6] I am able to use a normal distribution to approximate the spread of the responses since this data complies with the central limit theorem. This theorem states that $np \geq 10$ and $n(1 - p) \geq 10$, where n is the number of cases and p is the proportion in question (Lock et al., 2017). All responses included in this research satisfy the requirements of the central limit theorem, falling within the bounds identified by this theorem, seen in Appendix A.[7]

I tested the null hypothesis that there would be no difference between the two proportions being compared for each test. Given the ambiguity in the literature, I tested the alternative hypothesis that the proportions would not be equal, using a two-tailed test rather than assuming the results will go in one direction or the other. While my hypotheses more closely resemble a left tailed test, my initial analysis revealed interesting trends in the data that are both in line with the literature and unable to be captured in a left tailed test. Many highly unusual test statistics

[6] In the case of frequency of attendance at religious services, the variables remain categorical, as the respondents did not write in the number of times in a given period that they attend but rather selected "once per week," "once per month," "on important holidays," etc.

[7] Further information on the central limit theorem and the bounds for this research can be found in the appendices.

were present, but they can only be captured with a two tailed test due to falling at the extreme opposite of my initial hypotheses. When using a left tailed test, this led to p-values of 1.00 despite the statistics being extreme outliers. Having observed this, I concluded that my initial hypotheses were incorrect and pivoted to examine the interesting trends presented in the data. I felt this was more appropriate than deliberately ignoring clear and interesting results in favor of my incorrect initial hypotheses, particularly considering the well-documented ambiguity in the literature. An added benefit of the two tailed test is its increased rigor for statistical significance.

FINDINGS

CONNECTION WITH COMMUNITY

This section examines how close respondents reported feeling to their local community. It seems far more likely that a community affected by a disaster will feel an increased need to band together with others compared to an unaffected community, resulting in increased closeness in the affected community. For reference, I will also compare these findings to any changes in feelings of closeness to the US and to the world. The purpose of this is to explore if those affected by storms feel closer overall to different

Fig. 4

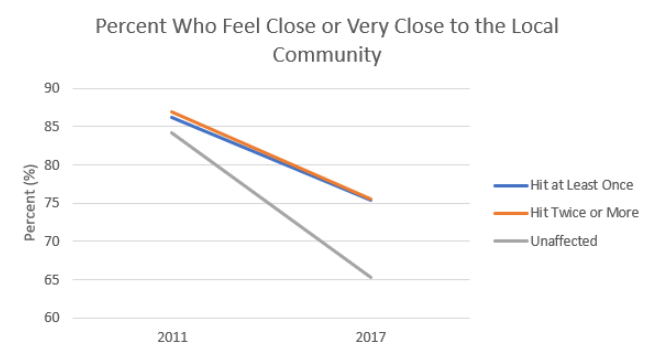


Table 1

Percent Reporting Feeling Close or Very Close to the Local Community

	2011	2017	Change
Hit at Least Once	86.26	75.47	-10.79**
Hit Twice or More	86.88	75.50	-11.38**
Unaffected	84.18	65.22	-18.96**
Difference of Hit Once or More Minus Unaffected	2.08	10.25**	
Difference of Hit Twice or More Minus Unaffected	2.70	10.28**	

*p-value < 0.05 **p-value<0.01

Note. Results based on difference of proportions test.

groups generally or if this trend can be attributed to the interaction between social capital, disasters, and the local community.[8]

While I expected to see increasing feelings of closeness with the local community in affected regions, as seen in Figure 4, such feelings decreased across all three groups: the unaffected regions of the US, states hit once or more by a storm, and states hit twice or more. However, the data shows that while feelings of closeness declined across the board, the areas affected by these hurricanes declined significantly less than the unaffected regions. The distance between the affected states and the unaffected states widened from around 2 to 3% in 2011 to more than 10% points of difference in 2017 (Table 1). This suggests that experiencing disasters creates a protective effect against decreasing feelings of closeness to the local community.

Table 2

Percent Reporting Feelings Close or Very Close to the US

	2011	2017	Change
Hit at Least Once	94.52	77.19	-17.33**
Hit Twice or More	96.15	78.79	-17.36**
Unaffected	92.72	72.79	-19.93**
Difference of Hit Once or More Minus Unaffected	1.80	4.40*	
Difference of Hit Twice or More Minus Unaffected	3.43	6.00**	

*p-value < 0.05 **p-value<0.01

Note. Results based on difference of proportions test.

Table 3

Percent Reporting Feeling Close or Very Close to the World

	2011	2017	Change
Hit at Least Once	68.90	44.60	-24.30**
Hit Twice or More	67.57	47.25	-20.32**
Unaffected	66.45	44.14	-21.31**
Difference of Hit Once or More Minus Unaffected	2.45	0.46	
Difference of Hit Twice or More Minus Unaffected	1.12	3.11	

*p-value < 0.05 **p-value<0.01

Note. Results based on difference of proportions test.

Notably, this buttressed feeling of closeness in the affected regions is not replicated to the same extent in responses to other questions about closeness to the US and to the world. As the

[8] The results for the comparison of the unaffected gulf states demonstrates that this area experienced a drop in feelings of closeness in between that of the affected and unaffected regions. This indicates some potential level of general protection for areas affected by hurricanes against declines in community closeness. See the appendices for more information.

scope of the area in question becomes more local- moving from world-wide to nation-wide to community-wide-, the larger the divergence in outcomes between the affected and unaffected areas becomes. In terms of how close the respondents felt to the world, there is no clear pattern amongst the three groups analyzed. States hit twice or more decrease the least, while states hit once or more decrease the most and the unaffected areas' magnitude of decline is in the middle (Table 3). For feelings about the US, the distance between the two affected groups and the US grew between 2011 and 2017, but not dramatically so (Table 2). While people in all regions reported decreases in closeness to different groups, the affected areas were more resistant to decreases in feelings of closeness to more localized groups.

The difference of proportions test supports this conclusion, indicating that the differences in closeness to the community are not the result of chance. At the 99% level, the two affected areas have statistically significant differences from the unaffected areas in 2017 whereas in 2011 this was not the case (Table 1).

It appears then that my third hypothesis is somewhat affirmed by this analysis. I predicted an outright increase in feelings of closeness, which did not happen. However, the data indicates that experiencing a disaster buttresses feelings of connection with local communities against forces that would otherwise undermine them. This may be a result of experiencing a need to rely on communities for aid following disasters. The strength of the effect of a disaster on closeness to local communities is evidence of a direct link to social capital, indicating a reduced rate of decreasing capital than the region would otherwise have experienced. As social capital is a localized phenomenon, the fact that this pattern is seen most prominently in the local context when compared to the national and international contexts supports that there is a protective effect of living in an area affected by a disaster on this aspect of social capital.

ORGANIZATIONAL MEMBERSHIP

Fig. 5

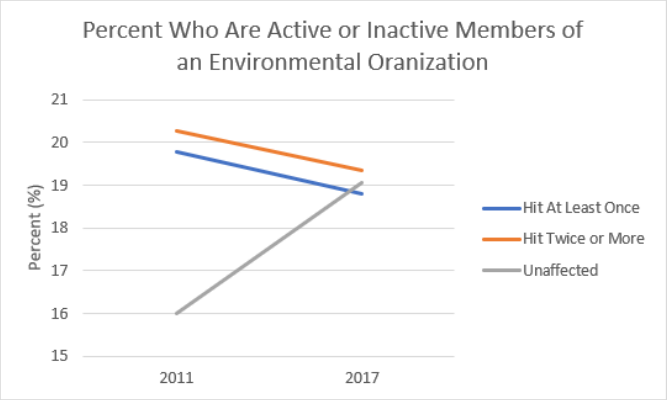


Fig. 6

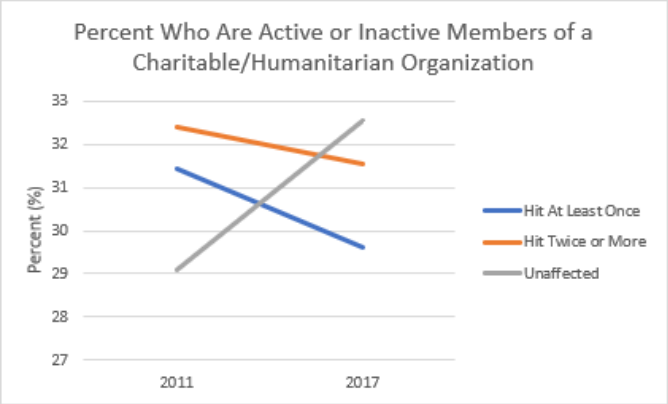
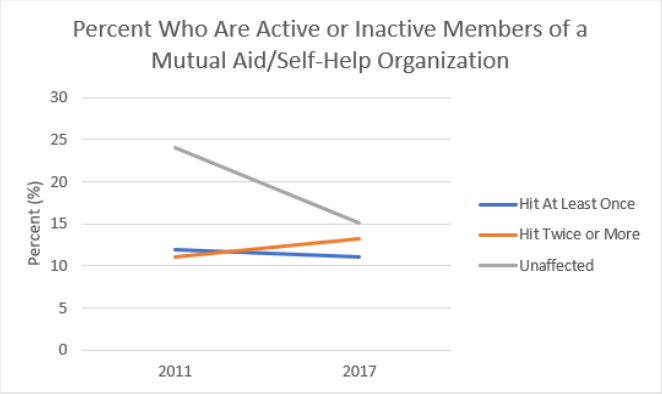


Fig. 7



The organizations I examined are religious, environmental, charitable/humanitarian, and self-help/mutual aid organizations. While I expected to see increases in membership in the affected regions, most of these organizations saw declines in membership. The organizations that saw consistent declines in membership from the affected regions are environmental organizations and charitable/humanitarian organizations. Both religious and mutual aid/self-help organizations displayed mixed results for the regions hit by one or more hurricanes and the regions hit by two or more.

While my expectations were overall incorrect, there still are multiple discernable patterns that shed light on the relationship between disasters and behavioral social capital in this data. The results for membership in environmental, charitable, and mutual aid organizations from the affected regions

demonstrate that there is a relationship between membership and experiencing disasters. The trends presented in the affected regions are distinct from the unaffected region's trends. Only the trends in membership in religious organizations did not provide evidence of a distinct relationship between membership and disasters.

Table 4

Percent Active or Inactive Member in an Environmental Organization

	2011	2017	Change
Hit at Least Once	19.79	18.81	-0.98
Hit Twice or More	20.28	19.35	-0.93
Unaffected	15.99	19.07	3.08*
Difference of Hit Once or More Minus Unaffected	3.80*	-0.26	
Difference of Hit Twice or More Minus Unaffected	4.29*	0.28	

*p-value < 0.05 **p-value<0.01

Note. Results based on difference of proportions test.

As Figure 5 reveals, membership in environmental organizations appears to be negatively related to experiencing hurricanes, a pattern that stands in opposition to my initial expectations (Fig. 5). While the unaffected region's membership rate grew 3.1%, the two areas affected by the storms saw membership declines of just under 1% each (Table 4). As both affected regions moved in the opposite direction from the US, there is evidence to suggest that experiencing hurricanes actually *decreases* participation in environmental organizations. This may be attributable to limited time and resources following a disaster.

While the small decrease in the affected regions is not statistically significant, the increase in the unaffected region is, affirming the divergent outcomes between these groups, again, in contrast to my expectations. While this does not conclusively say that the changes experienced by the affected region are not the product of chance alone, the statistical significance of the increased membership in the unaffected region suggests that there is a specific impetus causing its increase. In contrast, the affected region saw a slight decline, which despite being statistically insignificant suggests that it was not affected by this impetus. Taken together, this presents evidence that there is a relationship between *not* experiencing a disaster and

membership in environmental organizations. It is possible that this is a result of those not adversely affected by a disaster being able to invest time and money into increasingly visible and mainstream environmental causes in ways that those affected by a disaster may not.

Table 5

Percent Active or Inactive Member in a Charitable or Humanitarian Organization

	2011	2017	Change
Hit at Least Once	31.42	29.62	-1.80
Hit Twice or More	32.41	31.56	-0.85
Unaffected	29.10	32.53	3.43*
Difference of Hit Once or More Minus Unaffected	2.32	-2.91	
Difference of Hit Twice or More Minus Unaffected	3.31	-0.97	

*p-value < 0.05 **p-value<0.01

Note. Results based on difference of proportions test.

The comparative lack of participation among those in the affected group cannot be attributed to apathy towards the environment. Even though all three disasters were connected to climate change in the media (Nusca, 2011; Corell 2012; Sutter, 2016), this did not appear to spur a jump in participation like I had expected. This suggests that those affected by these storms feel less inclined to participate in such organizations. Notably, this is true despite citizens in the affected regions being concerned overall with climate change and the environment. Every county in the affected region reports at least 45% of adults being concerned about global warming, with many counties ranking as the most concerned in the US, at around 80% being concerned (Marlon et al., 2020). Consequently, this observed decrease in membership cannot be attributed to apathy towards the environment on the part of the residents of this area, making it seem more attributable to a depressive effect of disasters on social capital.

Also standing in contrast to my initial expectations are the findings with respect to membership in charitable and humanitarian organizations. Membership in these organizations appears to be negatively correlated to experiencing a disaster (Fig. 6). Both affected areas saw declines in membership while the unaffected area saw an increase of 3.4% (Table 5). This

suggests that behavioral social capital is decreasing as those affected may feel less inclined or less able to support others and share their resources.

Similar to environmental organizations' membership, only the unaffected region saw a statistically significant change in membership in charitable organizations following a difference of proportions test (Table 5). Again, while this test only provides more information about the unaffected region, the diverging trends in membership between the affected and unaffected regions combined with statistical significance only for the unaffected region points to a negative relationship between experiencing a disaster and membership in a charitable or humanitarian organization. At very least, the affected region is left out of the impetus generating more membership in the unaffected region.

Table 6

Percent Active or Inactive Member in a Mutual Aid or Self-Help Organization

	2011	2017	Change
Hit at Least Once	11.95	11.13	-0.82
Hit Twice or More	11.02	13.26	2.24
Unaffected	24.03	15.11	-8.92*
Difference of Hit Once or More Minus Unaffected	-12.08**	-3.98*	
Difference of Hit Twice or More Minus Unaffected	-13.01**	-1.85	

*p-value < 0.05 **p-value<0.01

Note. Results based on difference of proportions test.

Membership in mutual aid and self-help organizations follows a contrasting pattern to the one observed with charitable and humanitarian organizations. As Figure 7 indicates, membership in mutual aid and self-help organizations decreased markedly in the unaffected regions, but the affected areas did not see steep declines and even witnessed increases. While the unaffected areas saw a decline of 8.9% in membership, the area hit by one or more storms saw a decline of 0.8% and the area hit by two or more saw an increase of 2.2% (Table 6). This suggests an additive effect of experiencing multiple hurricanes and a protective effect of experiencing at least one.

A difference of proportions test affirms that the above trends are not the result of chance. Most significantly, only the unaffected region saw a statistically significant decrease in mutual aid and self-help membership between 2011 and 2017 (Table 6).[9] Meanwhile, the affected areas did not react in the way the unaffected areas did. This supports that experiencing a disaster likely mitigated the larger trends in the US from occurring in the affected area. As I suggest below, this makes sense given the importance of these organizations in the wake of disasters.[10]

Table 7

Percent Active or Inactive Member in a Religious Organization

	2011	2017	Change
Hit at Least Once	62.09	59.01	-3.08
Hit Twice or More	60.93	61.38	0.45
Unaffected	63.27	59.40	-3.87*
Difference of Hit Once or More Minus Unaffected	-1.18	-0.39	
Difference of Hit Twice or More Minus Unaffected	-2.34	1.98	

*p-value < 0.05 **p-value<0.01

Note. Results based on difference of proportions test.

Table 8

Percent Attending Religious Services Once Per Month or More Frequently

	2011	2017	Change
Hit at Least Once	41.62	38.00	-3.62
Hit Twice or More	42.76	36.85	-5.91*
Unaffected	44.53	38.69	-5.84**
Difference of Hit Once or More Minus Unaffected	-2.91	-0.69	
Difference of Hit Twice or More Minus Unaffected	-1.77	-1.84	

*p-value < 0.05 **p-value<0.01

Note. Results based on difference of proportions test.

Finally, looking at religious organizations' membership, the affected areas move in diverging directions. The areas hit by one or more storms decrease at a slightly less steep rate than the unaffected region, dropping 3.1%, whereas the area hit by two or more storms increased by almost 0.5% (Table 7). Between 2011 and 2017, the area hit by at least one storm and the area hit by two or more storms grew less similar. Given that the area hit by one or more storms and the unaffected areas saw membership decline a similar amount, there does not appear to be a

[9] Since the participation rates were dramatically different between the affected and unaffected areas in 2011, the difference between those rates is significant but does not inform this analysis. As the diverging changes brought the rates closer together in 2017, only the difference between the area hit by one or more storms and the unaffected areas is statistically significant.

[10] The larger aggregate numbers demonstrate diverging patterns based on experiencing or not experiencing a hurricane, but the data on the unaffected gulf states indicates that this increase in the affected regions is not necessarily more than within unaffected sub-groups in all individual cases. For example, the unaffected gulf states saw a larger increase in self-help/mutual aid membership than the affected areas. See more in the appendix.

relationship between experiencing a disaster and participation in religious organizations. There may be a small effect of experiencing multiple hurricanes, as the area hit by two or more storms saw a slight increase in membership.

Like many of the other organizations, only membership in religious organizations in the unaffected region saw a statistically significant decline (Table 7). However, unlike the other areas this does not sufficiently help to prove that there is a relationship between experiencing a hurricane and organizational membership. This is because the region hit by at least one storm saw a similar decline in membership even though it is not statistically significant, likely due to the smaller sample size. Tellingly, the difference between each affected area and the unaffected areas remains statistically insignificant in 2017 as it was in 2011. Taking all of this into account, there is no reason to believe that there is a distinct phenomenon at play in the unaffected regions, meaning there does not appear to be a relationship between experiencing a hurricane and religious organizational membership.

When looking at frequency of religious service attendance, there is no clear pattern here as well. All three groups saw declines in attendance rates, with the area hit by two or more storms and the unaffected region decreasing at almost the same rate (Table 8). Additionally, the are hit by at least one storm grew more like the unaffected region between 2011 and 2017. Taken together, there is little reason to believe there is a relationship here between experiencing a disaster and frequency of religious attendance. Given that the similar declines in attendance, this suggests that the declines in attendance are caused by the same factor, but this factor is not experiencing a disaster. The difference of proportions test confirms this lack of a connection. The area hit by two or more storms and the unaffected areas both have statistically significant decreases in attendance frequency between 2011 and 2017 (Table 8).

TRUST

Trust is a central component of social capital, creating norms of reciprocity that allow networks to function and create a civic and prosperous community (Putnam 1993; Putnam 2001). In order to measure the level of trust in the affected areas, I looked at how much the respondents to the WVS reported trusting people generally, those they know well, their neighbors, and those they just met. This attempts to get at multiple levels of trust from strangers to close relationships. I anticipated an increase in trust within the regions affected by the hurricanes.

Overall, this data confirms my expectations, with almost all of the types of trust in affected areas seeing increases much larger than the unaffected regions. This indicates a buttressing and bolstering of trust-related social capital within the affected region, which suggests that social capital is increasing in wake of the three hurricanes. This

Fig. 8

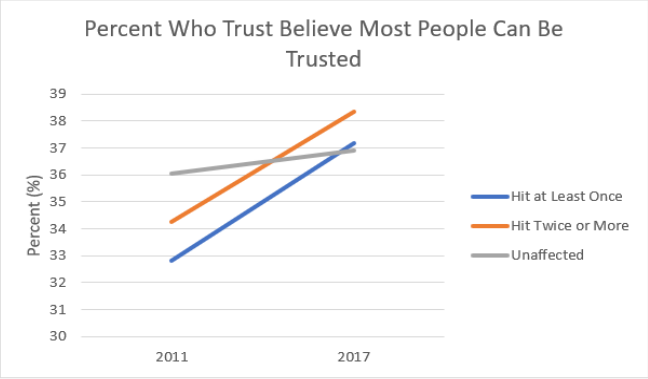


Fig. 9

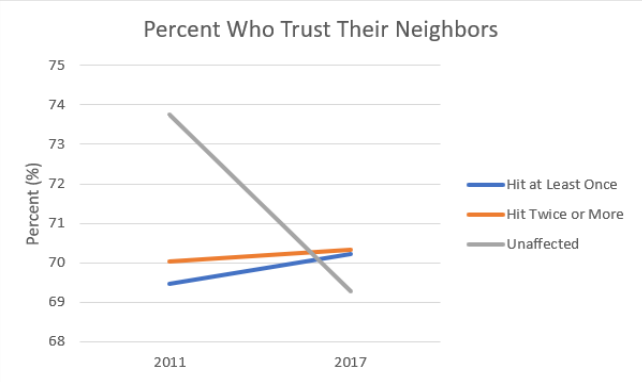
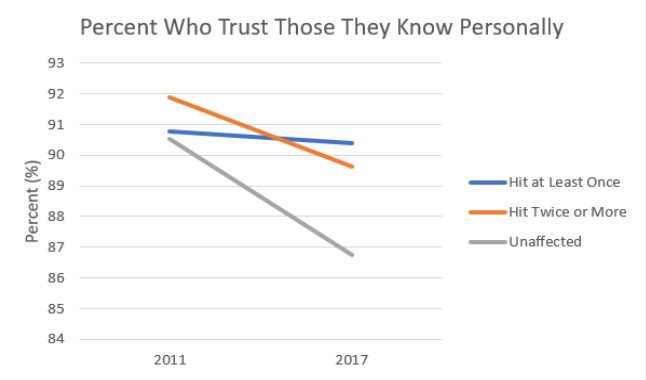
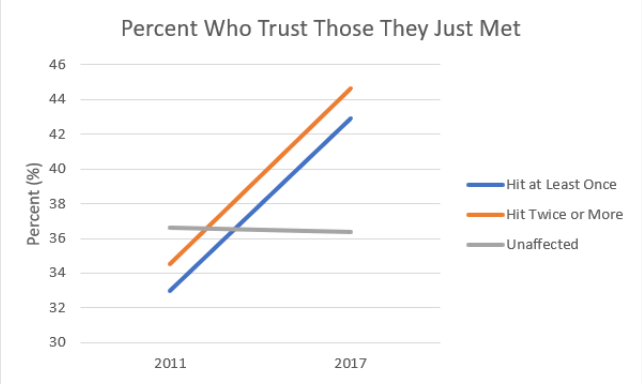


Fig. 10



allows trust in this region to weather factors causing a nation-wide fall and to grow more when the factors cause a national increase. Only trust in those the respondents know personally saw a slight decrease, which is a smaller decrease than the unaffected areas of the US saw.

Fig. 11



On the question of trust in people generally, there is a strong correlation between increasing trust and living in a region that experienced a hurricane (Fig. 8). While the non-affected regions of the US experienced a slight increase in general trust of 0.8%, both affected regions saw nearly identical increases that are significantly larger than the non-affected regions (Table 9). The area hit by at least one storm saw an increase of 4.3% and the area hit by two or more saw an increase of 4.1%.

Although the data suggests a link between increasing generalized trust and experiencing one or more hurricanes, a test for statistical significance reveals that chance cannot be ruled out as the root cause (Table 9). None of the differences in percentages yield a value that allows me to be more than 95% certain that the observed result is not the product of chance alone, although some are close to this threshold.

Consistent with the patterns detailed above, trust in neighbors saw slight increases in the affected region while it dropped off significantly in the unaffected areas (Fig. 9). The unaffected areas saw a decrease of 4.5%, while the area affected by at least one storm saw an increase of 0.8% and the area affected by two or more increased 0.3% (Table 10). This indicates that

experiencing a hurricane increases trust in neighbors and protects against forces within the country that may otherwise have reduced this kind of trust.

As only the unaffected region experienced a statistically significant change, this affirms that the affected and unaffected groups are experiencing different trends in regards to trust in neighbors. Even though the difference in 2017, unlike 2011, between the affected and unaffected groups is insignificant, this does not undermine this conclusion, as the groups are seeing

Table 9

Percent Reporting Trusting Most People

	2011	2017	Change
Hit at Least Once	32.82	37.20	4.38
Hit Twice or More	34.26	38.36	4.10
Unaffected	36.06	36.90	0.84
Difference of Hit Once or More Minus Unaffected	-3.24	0.30	
Difference of Hit Twice or More Minus Unaffected	-1.80	1.46	

*p-value < 0.05 **p-value<0.01

Note. Results based on difference of proportions test.

Table 10

Percent Reporting Trusting Neighbors Somewhat or Completely

	2011	2017	Change
Hit at Least Once	69.45	70.21	0.76
Hit Twice or More	70.03	70.31	0.28
Unaffected	73.76	69.28	-4.48**
Difference of Hit Once or More Minus Unaffected	-4.31*	0.93	
Difference of Hit Twice or More Minus Unaffected	-3.73	1.03	

*p-value < 0.05 **p-value<0.01

Note. Results based on difference of proportions test.

Table 11

Percent Reporting Trusting Those They Know Personally Somewhat or Completely

	2011	2017	Change
Hit at Least Once	90.77	90.38	-0.39
Hit Twice or More	91.88	89.65	-2.23
Unaffected	90.54	86.74	-3.80**
Difference of Hit Once or More Minus Unaffected	0.23	3.64**	
Difference of Hit Twice or More Minus Unaffected	1.34	2.91	

*p-value < 0.05 **p-value<0.01

Note. Results based on difference of proportions test.

Table 12

Percent Reporting Trusting Those They Just Met Somewhat or Completely

	2011	2017	Change
Hit at Least Once	32.99	42.90	9.91**
Hit Twice or More	34.50	44.63	10.13**
Unaffected	36.61	36.35	-0.26
Difference of Hit Once or More Minus Unaffected	-3.62	6.55**	
Difference of Hit Twice or More Minus Unaffected	-2.11	8.28**	

*p-value < 0.05 **p-value<0.01

Note. Results based on difference of proportions test.

opposing changes in levels of trust that bring their levels of trust closer together (Table 10). Based on this pattern, it appears likely that those who experienced these storms had positive experiences with their neighbors that resulted in a slightly higher level of trust and buttressed this against the forces that lowered the US' overall level of trust.

While trust in those the respondents know personally did see a decrease in the affected regions, this decline is much smaller than in the unaffected areas of the US (Fig. 10). This suggests a protective effect on this kind of trust from experiencing a hurricane. While the unaffected region saw a decline in reported trust of 3.8%, the area hit by at least one storm saw a decrease of 0.4% and the area hit by two or more saw a decline of 2.2% (Table 11). This suggests a u-shaped relationship between the number of storms experienced and trust. This indicates that the protective effect that held trust in close relations steady after one storm may break down after repeated storms. As individuals often rely on close connections to weather hard times, it is possible that these close relations become overly stressed after multiple large storms, potentially leading to unmet expectations that reduce trust after repeated strain. In contrast, those only experiencing one storm may not place as much strain on those relationships, preventing unmet expectations that may lower trust.

Based on the statistical significance for the change in trust in the unaffected region and the difference between 2011 and 2017, the above explanation makes sense (Table 11). This statistically significant change led to the area hit by one or more to differ in a statistically significant way in 2017 from the unaffected region. This further confirms that they are experiencing diverging phenomenon, driven by experiencing or not experiencing a disaster. The similar decline in trust in the area hit by two or more storms and its lack of statistically

significant difference from the unaffected region in 2017 suggests that the strain explanation may be accurate.

Finally, figure 11 indicates that trust in those the respondents just met has a strong relationship to experiencing a hurricane. Both the area affected by one or more storms and the area affected by two or more saw increases in such trust around 10% while the unaffected areas' level of trust remained relatively stable, declining 0.3% (Table 12). This suggests that experiencing at least one hurricane increases the level of trust in strangers significantly more than in areas not affected by a hurricane. During and after disasters, individuals often need to rely on the aid of strangers, through the National Guard and other governmental groups, various civic organizations, or through informal emergent groups. Positive experiences in this area may increase the baseline level of trust individuals have towards those they just met and explain this observed phenomenon. This suggests that those affected by the storms were not disappointed by their interactions with others during and after these disasters.

A test for statistical significance affirms that the change in trust in strangers is attributable to experiencing a disaster. Only the two affected groups experienced statistically significant changes in levels of trust between 2011 and 2017 (Table 12). Additionally, the difference between each affected group and the unaffected group in 2017 is statistically significant. This indicates that prior to the storms, there was no statistically significant difference in all three groups not attributable to chance alone. However, following these storms, the two affected groups saw statistically significant increases in trust, leading them to then diverge in a statistically significant way from the unaffected region.

DISCUSSION

Overall, there was a diversity of outcomes for the three measures of social capital studied here, which reflects the wide range of relationships between social capital and disasters documented in the literature. Attitudinal social capital, operationalized in this study by feelings of closeness and trust, was buttressed against the overall declines in those areas across the board in the US in some cases and in others saw outright increases not replicated elsewhere. Organizational membership did not display a clear pattern across all organizations considered, however the affected region saw more decreases in membership compared to the unaffected areas. The one exception was the slight increase in membership in mutual aid organizations. This indicates an overall weakening of behavioral social capital in the affected region relative to the unaffected region. Thus, attitudinal social capital increased or resisted declining while behavioral social capital decreased overall. This suggests that social capital does not react uniformly to disasters.

The observed increases in trust and feelings of closeness to the local community indicate a rise in social capital that is seemingly contradicted by the decline in the affected area's membership in community organizations. These disparate outcomes appear to be in conflict with Putnam's (1993) central tenant that generalized trust and civic participation go hand in hand, creating a mutually reinforcing virtuous cycle. How could individuals feel at once closer to and more trusting of the local community yet participate in it less? Particularly given the declines in charitable, humanitarian, and religious organizational membership, it seems odd that individuals would feel more trusting and closer to others and yet give less.

There are several possible explanations in the literature for this observed pattern. The first is the rent gap theory, where disasters exacerbate inequalities and open opportunities for disaster

capitalism that force those with low incomes out of areas affected by disasters (Derickson, 2013; Wyczalkowski et al., 2019). A longitudinal study of the Houston-Galveston area after hurricane damage supports the rent-gap theory of recovery, where low SES residents are displaced following the hurricane (Wyczalkowski et al., 2019). Following this logic, those who can easily meet their needs following a disaster are more likely to remain in the area and also face fewer incentives to become more involved in community organizations. In contrast, those who would rely on such organizations- and therefore have incentives to participate in them- are forced out.

While the rent gap explanation has been shown to be in effect following Hurricane Sandy (Chun, 2015), this does not explain the trends observed in this research. Even if this were at work, it would not prevent those pushed out of their local community from being captured in the WVS data given the large geographic area covered by the survey. It seems implausible that those forced out would relocate in large numbers to an entirely different region of the country rather than to a different neighborhood of their local area. To capture this data specifically, there needs to be analysis of neighborhood-level data, which is not analyzed here due to the limitations of the WVS data.

A second possible explanation is that spontaneous emergent group networks satisfy individuals' needs following a disaster, decreasing their reliance on formal organizations. In this case, individuals might not feel a need to band together to find ways to provision resources or aid as they would if they felt that was lacking. This would raise the collective efficacy of the community, decreasing the need to participate in traditional organizations while raising trust in others and feelings of closeness to the community due to the belief that the community can rise to the challenge of another disaster. Emergent group behavior and identities have been extensively documented following disasters, especially in the age of social media (Rodríguez et

al, 2006; Albris, 2018; Schuenemann, 2020; Cheng & Mitomo, 2018; Wilensky, 2014; Lowe & Fothergill, 2003). This may be what creates the belief in the community's ability to respond that facilitate higher levels of trust and connection with the community despite the decreasing participation in key formal organizations.

The emergent group behavior explanation appears to better explain the trend here than the rent gap theory and resolves the seeming conflict between my findings in part because of the increase in mutual aid membership. The spontaneous nature of emergent behavior makes it difficult to capture and study. However, based on the observed increase in membership in mutual aid organizations for the areas hit by two or more storms, there is some concrete evidence that this explanation is at work here. Mutual aid networks tend to be more informal in nature than charitable organizations, meaning the observed increase may be indicative of a larger reliance on emergent networks of aid following disasters. This might add dimension to the explanation for why there was not a larger increase in group membership. Many other types of groups are more unidirectional, making them potentially less attractive to those both in need of aid and looking to work with community members.

Diving further into the diverging outcomes for charitable and mutual aid organizations' membership, the reciprocal structure of mutual aid networks may explain why they are seeing increases in the affected area not found for charitable organizations. Whereas charitable organizations are unidirectional in terms of who is giving and receiving aid, mutual aid networks operate in a reciprocal fashion (Whitfield et al., 2020). Charitable and humanitarian organizations require there to be well-off givers who provide resources for those who are less well-off to use. This model may be less sustainable in a local context following intense, large-scale disasters where there are fewer individuals to give in this way.

One weakness of this argument is the research that suggests that many who spontaneously engage in pro-social behavior will continue to be involved in the long-term following the disaster (Lowe & Fothergill, 2003; Steffen & Fothergill, 2009). If this were to be the case, it seems less likely that emergent group behavior would remain undetected by the WVS in a way that explains the contradictions between the decreasing behavioral component and increasing attitudinal components of social capital. Alternatively, those who engage in informal pro-social group behavior may not report themselves as members, even if it does persist over a longer period, which would be consistent with my findings.

Other research suggests that the emergent groups formed during a disaster are susceptible to erosion once the event is over (Schuenemann, 2020), which makes sense given emergent group identities are framed around the shared sense of fate emerging from facing a new danger (Ntontis et al., 2018) and therefore may have little reason to persist in non-disaster times. Additionally, emergent group pro-social behavior may still be contingent on an individual's pre-existing stock of social capital (Cheng & Mitomo, 2018), meaning this observed trend may not be as uniform across the affected region as this data suggests. Despite these nuances, there is evidence to support an emergent behavior-based explanation of the seemingly contradictory findings on social capital in this paper.

Another factor which may be promoting high levels of trust and feelings of closeness to the local community without a corresponding rise in organizational participation may be the role of government aid and intervention. Wickes et al. (2015) found that social capital was not as important for community resilience following floods in Australia in part due to the robust governmental intervention. Given the high marks and relative bipartisanship of the responses to the three hurricanes studied here (Rasmussen Reports, 2011; Mali, 2012; Hart, 2014; Stein,

2016), it seems plausible that this explanation also plays a role in the observed pattern in this data. A strong government response may mitigate the extent to which individuals feel the need to get involved to promote effective responses to disasters while allowing their faith in a robust response from the community to remain high. In order to investigate this possible explanation further, there needs to be a study of the feelings of those affected by these disasters towards governmental institutions.

CONCLUSION

My findings align with the existing ambiguities in the literature on disasters and social capital. However, it also presents evidence that may help to make sense of these contrasting conclusions. My findings demonstrate the variety of outcomes documented in the literature on social capital, with some dimensions of social capital seeing increases while others decreased. The contraction between increasing attitudinal social capital with behavioral capital decreasing is potentially explained by two scenarios. In the first, emergent behavior is important in the response to the storms, leading to the corresponding behavioral social capital being unaccounted for in the organizational data used here. The second is that effective government intervention mitigated the need for organizational responses to the disasters, allowing this positive response to raise attitudinal social capital while avoiding a need for further organizational involvement. Both of these explanations have foundations in the literature on social capital and are plausible but require further research to confirm or discount.

My findings on mutual aid and self-help organizations suggest that this seeming contradiction may be explained by spontaneous emergent aid networks following disasters.

Putnam himself writes about the importance of mutual aid networks towards the creation of social capital (1993, p. 169). Regardless of the specific explanation for this divergence of outcomes for social capital following Hurricane Irene, Hurricane Sandy, and Hurricane Matthew, these findings affirm that social capital does not react uniformly to disasters. As a result, some types of social capital may increase following a disaster while others might decrease. For example, formal membership does not necessarily correlate to trust or closeness.

Both potential explanations listed above will be evaluated more in the next section through an analysis of news stories in a key affected city. I will seek to utilize a case study approach to situate this research in a specific context to determine if either explanation holds up.

CHAPTER 4. CASE STUDY OF HOBOKEN, NJ

This section will examine patterns and developments in Hoboken, NJ with two aims in mind. The first is to assess whether patterns of social capital development in the city were consistent with the findings from the earlier quantitative analysis and provide illustrations of those patterns. The second is to use the information from the case study of Hoboken to evaluate the potential explanations for one of the more striking findings from that quantitative analysis. As indicated in the previous section, attitudinal and behavioral social capital followed different patterns in affected areas. While attitudinal social capital saw either a buttressing effect following the storms or outright increases, behavioral social capital primarily saw declines. Through the case study of this city, I will evaluate these explanations. One focuses on the role of government intervention, and the other focuses on informal group behavior.

One advantage of this case study approach is that it allows me to focus specifically on an area that was significantly impacted by a hurricane. While the previous section focused on finding large-scale trends, this section does not seek to make broad claims. It instead aims to evaluate if the potential explanations posited in the previous section have any explanatory power in the context of a particular case.

In an attempt to counterbalance large generalizations of the previous section, I will use this qualitative section to narrowly focus in on key areas significantly impacted by the storms in question. The rough experimental design of the previous section separated all states in the US into either the affected or the unaffected group. However, clearly delineating areas impacted and not at all impacted by these storms is inherently imprecise, as there is a gradual decline in the severity of storms out from their epicenters. The state-wide areas included in the affected region were not uniformly impacted by these storms. Additionally, the areas that make up the

unaffected region are not uniformly unimpacted by hurricanes and natural disasters themselves, and they are not a homogenous group. Given that the data set I used measures state-level data, this presents one methodological limitation to my study that I will attempt to counterbalance with this case study.

REVISITING THE PUZZLE & EXPECTATIONS

While Putnam (1993) saw social capital as operating within virtuous or vicious cycles, where trust and group cooperation mutually inform one another, the data I analyzed from the WVS showed changes in behavioral social capital diverging from changes in attitudinal. Generally, feelings of trust in others increased. Feelings of closeness to the community did decrease, however they decreased significantly less than in the unaffected regions. This represents a buttressing of feelings of connection associated with experiencing a disaster. These two findings are in line with Putnam's theory. However, participation in most community organizations declined. It makes little sense to think that individuals could trust the local community more and feel closer to their local community than those in unaffected regions and yet also not participate in community efforts to rebuild after a disaster. But this was what the data in the previous section appeared to demonstrate. The only exception to the trend of declining participation in community organizations came from mutual aid/self-help organizations in areas affected by two or more hurricanes. This kind of organization saw a slight increase in membership.

There were two potential explanations for the seeming contradiction between the results in attitudinal and behavioral social capital: informal group behavior and government intervention. The first explanation is that there was an increase in participation, but it was in

informal groups. This possibility stems from the finding that the one type of organization that saw an increase in participation, mutual aid/self-help groups, is distinctly more informal than most other organizations. The rationale regarding the second explanation is that government intervention may provide the basis for increased trust and connection by adequately responding to a disaster without requiring organizational participation. These two potential explanations will be explored in this section in the case study of Hoboken, NJ.

Building from this first explanation, I anticipate that the analysis of developments in Hoboken following Hurricane Sandy *will reveal an increase in informal pro-social group behavior*. This would resolve the contradiction between my findings, since individuals would have participated more in the local community following the storm. This seems plausible, especially in light of the increase in membership in self-help organizations. But because this participation was informal, it might not have been recorded in the WVS' data, explaining the divergence between attitudinal and behavioral social capital in the data section.

For example, individuals who worked together to share and distribute resources within a neighborhood during a disaster may not consider themselves part of a group and therefore not report in a survey that they are members of an organization. Additionally, there is reason to believe that groups formed during a disaster might dissipate over time (Ntontis et al., 2018), so group behavior during a storm might not persist long enough for respondents to report themselves being part of a group during a survey some time later. Informal, potentially short-term group cooperation during a disaster might not be registering in questions about *membership* in organizations. Alternatively, feeling satisfied with the results of a recovery generated by informal group behavior would present little incentive for residents to become members in formal organizations.

My second hypothesis is derived from the government-centered explanation from the previous section. I anticipate that the analysis of developments in Hoboken will reveal that *government intervention, especially at the local level, will facilitate an effective response to the disaster that negates the need for increased formal membership in civil society organizations*. This would allow for individuals to feel more trusting of and closer to others via this effective response without requiring community members themselves to formally join organizations, resolving the contradiction noted above.

METHODOLOGY

This section utilizes a case study approach to closely examine how one city's response to a major hurricane played out. By using this approach, I can construct a narrative that will provide information that will confirm or disconfirm the potential explanations. In order to assess which, if any, of these possible explanations played out, I read local newspaper sources to understand what happened during and in the immediate aftermath of a major hurricane.

I had to first determine which city and which storm to study. Since displacement as a result of a natural disaster is one major contributor to changes in social capital, as discussed in the literature review, I chose to focus on areas where there was displacement. To operationalize this, I used FEMA data on housing aid per capita as an approximate measure of how much damage was done to residents' homes. This figure is the sum of the FEMA Individual Assistance and the Small Business Administration's Disaster Home Loans divided by the population of the state. As the cost per capita increases, the more damage there was. As damage increases, the likelihood of displacement increases. I did this for every state affected by Hurricane Irene, Hurricane Sandy, and Hurricane Matthew in each respective year, as identified in the data

section. One limitation of this approach is that FEMA replaces what was damaged or lost in a storm, frequently resulting in wealthier areas receiving disproportionate aide due to having had more property value to lose in the first place (Howell & Elliott, 2019). A second limitation is that the housing aid data provided is an aggregate of all the disasters in the year the storm occurred for each state.

Based on that methodology, I identified Hoboken, NJ following Hurricane Sandy as the case study. FEMA housing aid per capita was highest for NJ following Hurricane Sandy, at $119.96 per resident in 2012. In second place was NY in 2012, at $117.56 per resident in housing aid (Census Bureau, 2019a; FEMA, 2021). The damages that FEMA paid out in housing aid in NJ in 2012 included both Sandy and damage from a windstorm. In NY, FEMA only paid housing aid for the hurricane. Between NY and NJ, the most severely impacted areas ranged from the Jersey Shore to the New York City area, making up one large geographic region. Since New York City has an enormous population, it was difficult to narrow my scope effectively enough and still capture a whole community, leading me to settle on NJ even though some of its damage payments were for other events.

After identifying key states which sustained significant housing damage, I used data on private property damage listed on the state's webpage to determine the per capita cost to private property. This allowed me to identify which cities were affected particularly strongly by the hurricane. I placed several limitations on which types of cities I would study, restricting my search to areas with at least 50,000 residents but no more than 200,000. The purpose of this was to ensure there is a large enough population base for there to be independent, locality-focused groups and newspapers to allow me to focus on one city in particular, and also so that the city is not so large that it becomes difficult to effectively cover the whole community.

Within NJ, three of the cities that fit my population parameters that experienced the most per capita property damage include Brick, Elizabeth, and Hoboken, at $190.95, $376.17, and $1,999.80 in damage respectively (O'Dea, 2013). Based on this, Hoboken, NJ made the most sense as a case study.

Having identified a city to use as a case study, I identified three newspaper sources that have online archives from the period immediately following the disaster in question. The sources that I chose had to be local in focus, and I gave preference to city-specific publications. While selecting a source, I took note of any bias of the publication. I did include publications with evident bias for the reason that they are still representative of how some people in the community view the events following the storms. I do not take what is reported in a biased publication as fact but instead as descriptors of a sub-population's worldview, much in the way that a letter to the editor is not factual news reporting but remains informative about a person's perspective.

Due to the large volume of articles written, I chose to limit the timeframe to three months from the start of the storm in order to focus in closely on the events directly following the hurricane. By focusing on a narrower period of time, I can engage with events on a more detail-specific level. Since I intend this case study to complement the large-scale view of the previous data section, I view the detail gained from examining a limited time frame as beneficial to rounding out this research.

The three news sources selected for this case study are the following: The *Hudson Reporter*, *Hoboken411*, and *NJ.com*. The *Hudson Reporter* writes about the news events of Hoboken and the rest of Hudson County, with frequent online uploads throughout the week and weekly print publications. With its main office in Hoboken, in recent years it has expanded from primarily reporting on the city to the rest of the Hudson County as well. In addition to its news

reporting, it frequently publishes letters to the editor from local readers, frequently specifying the city where the writer resides.

Hoboken411 is a local Hoboken-specific online "alterative voice." This publication exhibits strong right-wing bias and anti-science sentiments. Much of the news stories published on the site contain extensive editorializing, and for this reason little of the content of this source was used to assess events following the storm. Instead, it was used to examine conservative individuals' viewpoints on and judgements of the community and government response.

As an example of bias in *Hoboken411,* when reporting about a boat that was washed ashore during Sandy and then graffitied to read "Global warming is real," the publication wrote of the anonymous individual responsible: "The person who wrote the original graffiti should have written 'I believe what's fed to me from the mainstream media, my idiot Facebook friends, and politicians…'" (Hoboken411, 2012c). When another anonymous person added to the graffiti so it then read "Global warming is real, and so is Santa Claus!" Hoboken411 wrote: "Bravo to whomever put the original idiot in their place" (Hoboken411, 2012c). As a result, I mainly used the opinion articles submitted by readers of the publication to provide insight into conservatives' perspectives in the Democratic-run city. In select instances, I used stories with no apparent bias that publicized fundraising events in the community.

The last news source I used was *NJ.com,* an online publication hub of multiple New Jersey-based news publications, including *The Jersey Journal*, *The Star-Ledger*, *NJ Advance Media for NJ.com,* and select stories about New Jersey from national publications, such as the *Associated Press*. Both *The Jersey Journal* and *The Star-Ledger* are not published elsewhere online but are popular publications in the state as well as in Hoboken. I called and spoke to a librarian at the Hoboken Public Library who recommended both publications for this research.

There are no opinion pieces or letters to the editor about Hurricane Sandy in Hoboken that were posted on the NJ.com site.

After identifying the news sources to analyze, I read every article that mentioned the case study city and the hurricane in question from the storm's date in late October 2012 to the end of January 2013, the third month after the storm. I used this to identify themes and patterns throughout the response to the hurricane. I used letters to the editor and opinion pieces to gauge how positively or negatively the residents of the city felt about various aspects of the response. The major actors that I looked for in the stories include the neighborhood groups, formal civil society groups, local government, the state government, and the federal government, which correspond to the areas covered by my hypotheses.

FINDINGS

BACKGROUND

Hoboken is a city just outside of New York City with a population of around 50,000 people and occupies an area of about one square mile (City of Hoboken, 2010). The city has a higher median income than the US as a whole, at $105,710 annually in 2009 compared to $51,729 (City of Hoboken, 2010; Noss, 2010). It is somewhat whiter than average in the US, with 82% of its population being white compared to 76% in the rest of the country (City of Hoboken, 2010; Census Bureau, 2019b). The city has a more middle-aged population than the US' overall demographics, with both children under 18 and adults over 65 underrepresented by around 10% each (City of Hoboken, 2010; Census Bureau, 2019b). Hoboken has a significantly higher proportion of renters than average, with 68% renting compared to 36% overall in the US (City of Hoboken, 2010; Census Bureau, 2019b).

Given the known trends in social capital distribution in the US, the more homogenous racial composition and the elevated income level of the city make it probable that it has an elevated pre-existing level of social capital relative to other US cities (Zahnow et al., 2019; Wang & Ganapati, 2018). However, the higher proportion of renters and the narrowed age range in the city likely detract somewhat from that, being predictors of somewhat lower social capital levels on average (Zahnow et al., 2019; Wang & Ganapati, 2018).

Taking these demographics into account, Hoboken is not representative of the US' population but appears to have a balance of positive and negative indicators of pre-existing social capital. Regardless of how representative or unrepresentative Hoboken is in terms of its demographic composition, this case study is not meant to make claims about other particular cases but only to evaluate if the potential explanations identified in the data section did in fact play out in a real case.

COMMUNITY RESPONSE

Following Hurricane Sandy, there was a significant level of informal volunteerism and participation in mutual aid throughout the city. This was generally facilitated by the city government, who organized and recruited volunteers. It also was organized on a smaller scale by civic groups and businesses. Individuals themselves, particularly during and immediately after the hurricane, also spontaneously organized neighborhood aid. Residents remained engaged in recovery efforts for the whole three months following Sandy, participating in clean-up efforts, supplies distribution, and recovery fundraising.

This strong showing of community aid generated nearly uniformly positive attitudes towards the city and its residents, as voiced in opinion articles in local papers. There was almost

no mention of anti-social behavior by individuals, groups, or businesses. What was mentioned received minimal attention and was often overshadowed by praise of the community, even in the same article.

Informal Support and Mutual Aid

Informal support was provided by individuals, neighborhoods, non-profits, civic groups, and businesses, and it continued for several months after the hurricane. This support provided supplies, assistance in repairing damage, and fundraising for the community.

One of the most notable occurrences immediately following Hurricane Sandy was the aid given between neighbors on an informal basis, which corresponds with my findings in the data section on self-help and mutual aid organizations. As many residents were left without power and ran low on food following the storm, there were numerous reports of neighbors offering their own food and electricity for others to use (Hack, 2012e). As nearly the whole city flooded and there were gas leaks and downed powerlines in the water, there were as many as 20,000 people trapped in their homes (Hudson Reporter, 2012e). Certain parts of Hoboken never lost power and offered free phone charging for anyone who came by; one family cooked eggs for anyone who was hungry (Hudson Reporter, 2012c; Hudson Reporter, 2012e). Some in areas that lost power but had their own generators also took part in sharing their electricity (Hudson Reporter, 2012ae). The blocks in one area “were lined” with tables offering coffee, water, some food, and power strips (Hudson Reporter, 2012ae).

Resident Phil Cohen lived in this area and participated in threading power cords for others to use alongside his neighbors (Hudson Reporter, 2012p). He attested that “someone even baked cookies” and another neighbor allowed others to watch the news on her TV (Hudson

Reporter, 2012p). Gary LaPelusa Sr. of the Gary LaPelusa Association hosted volunteer-provided hot meals at St. Vincent's basement during the storm (LaPelusa, 2012). Eleazar Reyes, a 17-year-old high school senior at Hoboken Charter School, described his family's experience without power, heat, or working phones. "Family members couldn't get in contact with you… we were running out of supplies," he said (Hack, 2012e). He reported through this experience, he and his family got to know their neighbors better, and they themselves shared water with families that did not have any (Hack, 2012e). A resident named Chris wrote in to *Hoboken411* to describe his experience of Sandy, saying when he left his apartment, he saw the tables set up in the area of 11th & Bloomfield with charging stations and free food and beverages (Hoboken411, 2012a). He described the scene as "one big block party and I think it's great how it symbolizes the feelings of community within Hoboken" (Hoboken411, 2012a). Chris noted some restaurants that provided free food to the community, such as Amanda's Restaurant, and criticized Molfetta Pizzeria for raising prices during the storm (Hoboken411, 2012a).

The informal aid continued after the flooding receded, as many residents donated to local supply drives. The *Hudson Reporter* reported on Nov. 8 that "there are now suddenly hundreds of people who feel compelled to do something- anything- to help their fellow neighbors who lost nearly everything" (Hudson Reporter, 2012m). The volume of calls to the city hall asking how, where, and when to donate time or supplies was so large it overwhelmed the city hall staffers (Hudson Reporter, 2012m). Volunteers not only came from year-round residents but also from the local Stevens Institute of Technology in the city to help (Hudson Reporter, 2012m). Volunteers largely went door to door bringing supplies to those who needed them (Hack, 2012b). Much, but not all, of the aid and volunteering was coordinated by the local government, which will be discussed in more detail later.

Residents also provided uncoordinated aide to local businesses and other groups. The Battaglia family, who owned a local store, wrote to the Hoboken Reported thanking "the amazing Hoboken community" after 50 friends, neighbors, and an "outpouring of help" came to assist them in repairing significant damage to their store (Battaglia et al., 2012). In a similar vein, the Hoboken Fire Department wrote a letter to the editor in the *Hudson Reporter* thanking and praising the community for the food that residents and businesses brought to them (Hoboken Fire Department, 2012). Additionally, the Hoboken Dual Language Charter School received loans of furniture, hours of volunteer cleaning, and donations of money and needed items following Sandy (Sargent, 2013).

Volunteering efforts persisted for several months after the storm. As many as 60 volunteers came to the Thanksgiving Day meal for the elderly, homeless, disabled, and those without others to spend the day with that was hosted by David Brudnicki, senior pastor of the Urban Mission (Hudson Reporter, 2012v). Not all volunteers were from Hoboken, with some coming from all across NJ (Hudson Reporter, 2012v). Professional groups also took part in volunteering services, as a group of local counselors began offering free counseling at a local bookshop in January 2013 to those affected by the hurricane (Hoboken411, 2013).

As a reflection of the activities just described, the *Hudson Reporter* called 2012 "the year of the volunteer" (Hudson Reporter, 2012ae). "The tragedies showed the creative ways in which people were willing to help- through grass-roots fundraising efforts, donating electricity to neighbors, and well-organized door-to-door volunteering" (Hudson Reporter, 2012ae). Hoboken Mayor Dawn Zimmer wrote in a letter to the editor in the *Hudson Reporter* of the general "outpouring of generosity that defined [the] response to Hurricane Sandy," calling Hoboken a

"wonderful community" that was "persevering because of [its'] shared strength and resolve" (Zimmer, 2012).

Businesses in the area also provided aid during the storm, such as Kevin Murray, owner of Paddle Out Kayak Club, who donated boats to the EMS service, aiding them in rescuing residents experiencing medical emergencies who were stuck in their homes by the floodwaters (Wichert, 2012). Murray explained that he "wanted to do something to get into action" (Wichert, 2012). Motorola donated generators for residents without power (Hack, 2012b). Local pizzeria Benny Tudino's used a gas stove and generator to serve pizzas (Hack, 2012d). "I stayed here to serve my people," owner Barry "Benny" Drishti said (Hack, 2012d). Other restaurants similarly provided free food through donations or by cooking for community members, such as Son Cubano, La Isla, Pilsner Haus, PintMeisters, and others (Hudson Reporter, 2012n; The Jersey Journal, 2012).

Other businesses donated supplies to groups and individuals in need. The Hoboken Medical Center donated 10,000 water bottles for city residents distributed at the emergency operation center at Hoboken High School, while the Riverside Pediatric Group donated $20,000 worth of formula, diapers, children's clothing, and other essential supplies to the Boys and Girls Club of Hoboken (Hudson Reporter, 2012d; Hudson Reporter, 2012w). Other examples of businesses donating to the recovery effort include North Face and Barnes & Noble (Hudson Reporter, 2012x; Hudson Reporter, 2012ab).

Coordinated civil group aide came from the Mason Civic League and the American Red Cross, which worked with the local government and FEMA (Hack, 2012b). The Mason Civic League, founded by Hoboken councilwoman Beth Mason, created the Hudson County Recovers non-profit to collect donations of food and supplies for those affected by Hurricane Sandy (Hack,

2012b). Mason Civic League volunteers also worked with AmeriCare to provide medication to senior citizens and disabled residents (Hack, 2012b). This demonstrates a connection between civic groups as actors responding during the disaster and long-term coordination of aid.

Non-profits also contributed financial donations to aid low-income residents. Better Education Institute, the non-profit arm of Better Education for Kids, donated gift cards to the Hoboken Housing Authority for the agency to distribute, totaling $1.2 million in donations helping 12,0000 public housing residents (Hack, 2013b).

The most prominent fundraising effort was the Rebuild Hoboken Relief Fund. This fund was founded shortly after Hurricane Sandy, and it worked closely with and was advertised by Mayor Zimmer (Hudson Reporter, 2012i). Many local fundraisers put on by other groups donated their funds here (Hudson Reporter, 2012r; Hack, 2013a). Three months after the storm the fund had amassed more than $750,000, which it dispersed to qualified applicants in February 2013 (Hudson Reporter, 2013b).

Many fundraising events were also hosted by local businesses and groups to benefit recovery efforts. A “Miracle on River Street” holiday celebration was hosted on Dec. 7 with scheduled speakers and sales of a new postage stamp in “support of the revitalization of Hoboken…and to bolster community spirit” (Hudson Reporter, 2012y). Other fundraisings events included a holiday jewelry sale, fitness group discounts, arts events, comedy events, a make-a-thon, cut-a-thons, shopping crawls, and restaurant events (Kane, 2012; Ferrer, 2012; Hack, 2013a; Hudson Reporter, 2012r; Hudson Reporter, 2012t; Hudson Reporter, 2013d; Hudson Reporter, 2012z; Hoboken411, 2012b). NJ Tech Meet Up launched the Heal Hoboken Initiative and fundraised with community-themed merchandise, reading “Hoboken Strong” and “Heal Hoboken, No Storm Can Sink Us” (Kane, 2012.) This group aimed to raise $100,000

(Hudson Reporter, 2012t). Several community events were attended by celebrities (Hudson Reporter, 2013a; Hudson Reporter, 2013b; Kuperinsky, 2012). The proceeds from many of these events went to the Rebuild Hoboken Relief Fund or other local community groups (Hudson Reporter, 2013c). Other businesses offered discounts to those affected by the storm. Robert Bazouzi of Robert Bazouzi Salon offered a 50% discount to hurricane victims (Hudson Reporter, 2012n). These events are representative of two functions of community fundraisers: generating money for recovery and boosting community spirit by theming the fundraisers around the city and its community.

It is worth noting that Hoboken also received donations from around the country after receiving national attention for the damage sustained during Sandy. This led to a not insignificant influx of outside aid, such as the Train of Hope, sent from areas of Louisiana affected by Hurricane Katrina (Hudson Reporter, 2012ae). This does not reflect social capital within the community, but instead provides some context for its recovery, as the city was not required to fully support itself after the storm.

Attitudes Toward the Community

Many residents noted strong feelings of pride, contentment, appreciation, and community towards other Hoboken residents following the hurricane. New Jersey Representative Rubin Ramos of Hoboken stated in a letter to the editor that the city always had a strong sense of community, but “still, nothing compares to the support [he has] seen between neighbors following the aftermath of Sandy. The commitment to volunteerism, pitching in, and watching out for your neighbor is why [he knows] the City of Hoboken will emerge stronger than before” (Ramos, 2012). He continued to say that “nothing can break this City’s spirit” (Ramos, 2012).

Hoboken resident Rose Orozco wrote to the *Hudson Reporter*: “The Community of Hoboken came alive, fed by the goodness, kindness, and generosity that was always there but unexpressed” (Orozco, 2012). Rev. Jody Lotito Levine described Sandy as taking down the “walls” between people, describing the “heart” shown by the community as “magical” (Levine, 2013). Freeholder Bill O’Dea, a county-level official, said that “what [he] saw in the days after the storm gave [him] hope… people looked each other in the eyes, said ‘hello’ to each other” (Sullivan, 2012b). One anonymous writer wrote to *Hoboken411*: “I candidly admit that I have never been a witness to this magnitude of compassion and camaraderie…No power, no television, no computers nor cell phone service, yet crowds and gatherings of complete strangers talking, laughing, and exchanging stores” (“Sandy’s flowers,” 2012).

Also contributing to feelings of community cohesion were two community organized projects dedicated to remembering the experiences of Hoboken residents during the storm. The first is the Hoboken Historical Museum’s project to document the experiences of local residents of the hurricane, launched shortly after the storm (Hudson Reporter, 2012ac). It gathered audio recordings of community members describing their recollection of the storm and of the community (Hudson Reporter, 2012ac). The second was created by the local Hoboken Charter High School. The school created a ‘healing wall’ of 1,200 bricks of students’ stories, launched by Mira Septimus, art teacher and service-learning coordinator, to share students’ stories of the storm, and it encouraged other school to take part as well (Hack, 2012e). Septimus told *The Jersey Journal* that she wanted “to do something for the whole city… this project helps make the students realize how everyone of us was affected and helped them learn that through unity we all can learn how to heal” (Hack, 2012e).

There was very little anti-social behavior during and after the storm, which indicates what anti-social behavior did occur had a limited effect on feelings of trust in the community or community cohesion. There was a small number of low-level crimes reported (Hudson Reporter, 2012q). *Hoboken411* alleged some theft of electricity during the storm, which was not reported elsewhere (Hoboken411, 2012a). Overall, "officials in several towns said all was quiet regarding crime, except for a few fights over gas" during the gas shortage (Hudson Reporter, 2012q). After these initial accounts, no real mention of crime during or directly after Hurricane Sandy was found in the local papers analyzed here. Additionally, there were few other negative accusations at people of groups. Some criticism was levied at PSE&G, the local power supplier, for inadequate preparation for the storm (Sullivan, 2012b).

GOVERNMENT RESPONSE

The government was involved in three ways during the response to and recovery from Hurricane Sandy. One was providing aid and rescue during the storm. This was provided by the local, state, and federal government. The second was organizing the community to facilitate volunteer and fundraising efforts both during and after the hurricane, which was primarily provided by the local government. And the third was providing financial resources to the community, which was primarily provided by the state and federal government.

City Leadership, Community Volunteering, and Mutual Aid

During the storm, the local government was involved with coordinating aid with the local community. Leading up to the storm, the city government had been recruiting volunteers, and it continued to coordinate and recruit them with an updated bulletin board in the town hall and

online postings throughout the storm (Hudson Reporter, 2012a; Hudson Reporter, 2012b; Hudson Reporter, 2012f). The volunteers primarily went around checking on the elderly, distributing medications, and operating supply distribution points for many days after the hurricane (Hudson Reporter, 2012f). The volunteers persisted through Nov. 5, over a week after the disaster, with 250 volunteers at the high school (Hudson Reporter, 2012h). Mayor Zimmer was also seen assisting volunteers, police officers, and members of the National Guard aiding stranded and distressed residents (Weichert & Star-Ledger, 2012).

The city was also involved with providing information to the community throughout the storm. Zimmer appeared on TV asking for supplies to be sent to the city (Hudson Reporter, 2012e). The city released maps of where to find supplies for residents to use, and a press release from the city implored residents to check on their neighbors (City of Hoboken, 2012a).

Government Provision of Help

During the hurricane, the local, state, and federal governments played roles in providing and financing aid and supplies. The city itself was also involved in distributing food to local shelters and individuals in need. The Hoboken Housing Authority received 2,500 meals from town officials, and a shelter on Bloomfield Street received 300 meals from town officials (Weichert & Star-Ledger). The state-level government activated the National Guard, who in addition to providing rescues of stranded residents also aided volunteer organizations to provide food at six points of distribution throughout the city during and immediately after the hurricane, distributing 25,000 meals and 10 tons of supplies for shelters (Hack, 2012a). The federal government's response during the hurricane primarily consisted of declaring a state of emergency and activating FEMA aid (FEMA, 2012; Villanova, 2012).

Directly following the storm, the local government remained heavily involved in the local community and its recovery efforts. The city also sent out a press release advertising the Rebuild Hoboken Relief Fund as the place to donate money to help the city recover (City of Hoboken, 2012b). It also directed donations to the local high school to be distributed there by the ongoing volunteer efforts of the local residents (City of Hoboken, 2012b). The city remained active in organizing volunteer recovery events, including a city-wide clean up on Nov. 17, several weeks after the hurricane (Hudson Reporter, 2012s).

After the storm subsided, the local government began providing aid to residents to apply for federal loans, grants, and other disaster-related aid. There were two informational meetings for Hoboken residents to learn how to apply for federal aid hosted by the city (Hudson Reporter, 2012o). Two local chambers of commerce held relief seminars for local businesses, attended by FEMA and other organizations (Hack, 2012c). Shortly after this, the city began meeting to draw up plans to be more prepared for the next hurricane (Hudson Reporter, 2012u). Later, Mayor Zimmer testified in front of the US Senate Committee on Small Business and Entrepreneurship, pushing for increased aid for "basement" apartments, who were unable to recoup insurance claims from their flood insurance due to loopholes in the plans (Hudson Reporter, 2012aa). She remained engaged in the progress of the recovery and continued to raise awareness of this loophole afterwards, saying the people of Hoboken were trapped in an "insurance gauntlet" (Hudson Reporter, 20121; Hudson Reporter, 2012ad).

Immediately following the storm, the state government took a more distant role in helping the community recovery, focusing on maintaining access to resources and voting in the upcoming presidential election. Due to the gas shortage, the state government ordered gas rationing, which precipitated some of the gas fights mentioned in the previous section (Hudson

Reporter, 2012j). The state government extended voting to accommodate the effects of the storm (Hudson Reporter, 2012k). In more direct interaction with the community, Gov. Chris Christie toured Hoboken (Hudson Reporter, 2012g).

Following the hurricane, the federal government continued to play a role in opening funds for hurricane survivors but received both vocal criticism and praise from prominent state officials. Immediately following the hurricane, the federal government sent a team of FEMA and AmeriCorps personnel to Hoboken to enroll city residents in disaster aid programs (Villanova, 2012). The EPA expedited fuel delivery to New Jersey to help resolve its fuel shortage resulting in gas rationing, drawing praise from US Senators Frank Lautenberg (D-NJ) and Robert Menendez (D-NJ) (Hudson Reporter, 2012l). In Jan. 2013, Speaker John Boehner temporarily blocked a vote on Hurricane Sandy relief, drawing criticism from Gov. Christie, describing the Speaker as having played "our people…as a pawn" (DeChiaro, 2013). In more direct contact with the residents, then-Vice President Joe Biden visited the city shortly after the hurricane (Hack, 2012d). Altogether, the federal government played a relatively distant role vis a vis the community through its provision of aid and was vocally criticized by a key state-level politician.

Reception of Government Aid by the Public

The Mayor received praise and electoral rewards from the community following Hurricane Sandy, indicating approval of her job as Mayor, even as conservatives voiced their discontent with her actions in *Hoboken411* (O'Brien, 2012; "Never forget", 2012). Nonetheless, all of her backed proposals and candidates won in the 2012 election, demonstrating a resounding success for Zimmer and that those who disapproved of her and her policies were in the minority (Sullivan, 2012a). Resident Margaret O'Brien had approached Zimmer during the storm,

suggesting the medication delivery that Zimmer organized, and in a later letter to the editor, she thanked Zimmer and the community "who rose to the occasion… a simple thank you for my life doesn't seem to be enough" (O'Brien, 2012).

Some conservatives did argue that Zimmer was using Sandy for her own political profile, appearing too frequently on television, using her time out with first responders on rescue missions during the hurricane as a photo-op, and taking more credit than was her due for Rebuild Hoboken, among other criticisms (Hoboken411, 2012d; P., 2012; "Hoboken botches," 2012). Nonetheless, she was regarded more widely as having consolidated her popularity thanks to her actions during and after the hurricane (Sullivan, 2012a).

A few other officials received praise from the public in opinion pieces following the hurricane. Several other Hoboken elected officials received from praise, as well as Gov. Chris Christie (Wentworth, 2012). Councilman Tim Occhipinti received praise in an opinion article for his regular updates to his constituents throughout the hurricane ("Post Sandy," 2012). No federal-level officials were praised publicly in these publications by Hoboken residents.

DISCUSSION

Taken together, Hoboken's experience of Hurricane Sandy appears to corroborate many of my findings from the data section. The results of the findings section demonstrate that both of my proposed explanations for the trends noted in the data section did play out in Hoboken, NJ following Hurricane Sandy. The community and government responses worked in tandem to facilitate volunteer-based distribution of aid and supplies during the storm as well as clean-up afterwards. Businesses and formal civic organizations also played a role in the provisioning of

aid during the storm. Afterwards, these groups primarily functioned as facilitators of fundraising efforts.

In summation, it appears that Hoboken saw an outpouring of informal volunteerism that was directed in part by the government to promote an effective community response to the disaster without necessitating long-term formal institutional membership or participation. The focal point for organizing individual impulses to volunteer was the local government, as seen in Mayor Zimmer's efforts to recruit volunteers prior to the storm as well as the centralized distribution of information through the city hall's bulletin board. There is little reason to feel compelled to join long-term organizations when there was a successful volunteer-based community response, in part managed by the local government. Neither the community nor the local government are likely to disappear by the next disaster, presenting little incentive to become more involved in formal organizations as a member. This explanation differs somewhat from the ones that I proposed, as I did not anticipate the community and government working in such close tandem.

The findings that communities feel more confident in their ability to respond to natural disasters after a significant disaster has been found elsewhere. Studies of collective efficacy in relation to social capital have found that activated social capital networks can result in increasing faith in community response after the disaster (Wickes et al., 2017; Benight, 2004). Successfully leveraging bonding, bridging, and linking social capital can raise collective efficacy and by extension faith in the community's ability to respond to the next disaster. In light of this, it makes sense that a community might not feel a need to become formal members of organizations or might not maintain formal membership in organizations.

While the government played an important role in the response to Hurricane Sandy, there was significant activity outside of it. Informal volunteerism occurred outside of the context of government intervention, as seen in the pop-up neighborhood food and power distribution sites, which draws parallels between Hoboken's experience and the findings on trust and mutual aid organizations in the data section. The bidirectional aid provided at these pop-up sites resembles the format of mutual aid groups. Compared to the findings on the measures of trust, the experiences of the residents of Hoboken also closely reflect the data section's findings. Trust in others generally, trust in neighbors, and trust in strangers increased the most relative to unaffected regions, while trust in close contacts had less drastic findings. Considering this community aid occurred primarily between strangers and neighbors while family members remained unreachable due to the power outages and flooding in the city, this closely resembles the positive experience reported by many in Hoboken.

The findings on sense of community align somewhat less between the WVS data and the experience of residents of Hoboken. In the city, there was repeated, strong praise of the community voiced in local papers. Additionally, there were multiple events meant to commemorate the community's experiences, and many of the fundraisers put on by local businesses were framed around the community specifically. This appears to indicate a higher level of a sense of community compared to before the storm. In contrast, the WVS data revealed generally decreasing senses of community, with a key caveat being that the areas affected by hurricanes felt considerably more connected than the unaffected regions. It seems possible given the long time span that Hoboken is not actually an exception, but instead it received only a temporary bump in community cohesion as a result of the storm, and in the long run it more

closely resembles the findings of other affected areas. It may be this possible temporary bump that resulted in the higher feelings of connection in the 2017 survey than in the unaffected areas.

These findings on the role of the government somewhat corroborate the findings of Wickes et al. (2015) and Melo Zurita et al. (2018) but contrasts with the relationship found between social capital and governments in the research of Rahill et al. (2014). Wickes et al. (2015) found that strong government intervention mitigated the predictive effect for social capital on disaster response and recovery. Similarly, following Hurricane Sandy, Hoboken's city government acted as an equalizer of social capital, connecting with those cut off from community resources. This disrupts a direct predictive relationship between pre-existing social capital and outcomes following the hurricane. However, this was in part facilitated by the government proactively cultivating linking social capital between itself and residents, which was not part of the findings of Wickes et al. (2015) but was emphasized by Melo Zurita et al. (2018). Rahill et al. (2014) found that the patrimonial functioning of Haiti's government following the 2010 earthquake exacerbated inequalities in social capital, providing better benefits to those with more connections. By not being patrimonial but instead actively reach out to under-connected residents, Hoboken's response exhibited the opposite tendency as the one documented there.

The local government's actions and direct communication and coordination with residents represents a strong usage of linking social capital, reducing the need for bonding or bridging capital to respond to the disaster. Through its organizing actions, the local government served as an equalizer of unequal social capital access. It provided wide-ranging, easily accessible information on aid and volunteer opportunities, allowing anyone regardless of prior connections to become involved and receive aid. Additionally, it targeted volunteer services towards aiding those stranded at home, particularly the elderly, providing them with medications

they otherwise would have been unlikely to have received. This particular facet of the response to the storm was spurred by the suggestion of an individual resident. The well-coordinated response facilitated by the local government allowed this idea to be implemented successfully, amplifying the reach of one individual's ideas by extending linking social capital to connect residents directly to the centralized power of the local government.

CONCLUSION

The findings of the case study demonstrate that the two explanations I identified in the data section did play a role in the response to and recovery from Hurricane Sandy in Hoboken. It demonstrates that effective government response and community volunteerism can work in tandem to promote a strong sense of community and trust in others. This supports my findings that organizational membership generally did not increase in the data section, except for mutual aid organizations, who most resemble the informal networks of aid observed in Hoboken. The implications of this in terms of social capital more broadly is not only that informal volunteerism can serve as a form of behavioral social capital to complement attitudinal social capital but also that government intervention can play a role in facilitating this phenomenon.

CHAPTER 5. CONCLUSION

The findings of this research indicate that social capital generally increased following the hurricanes studied here, facilitated by government intervention and informal group coordination. These findings affirm Putnam's (1993) tenant that social capital works in virtuous or vicious cycles, however it also highlights that not all types of social capital are affected equally or in the same way. For example, formal membership did not generally increase in the areas studied, but as found in the case study of Hoboken, there was significant informal group behavior. Changes in social capital can also be mediated by outside factors, such as government intervention. The close relationship between government intervention and community-generated informal volunteerism also stands out, highlighting the intertwining relationship between social capital and its sociopolitical context.

These findings are important especially in light of the general ambiguity in the literature on social capital and disasters. In the context of increasing intensity of hurricanes, there is a pathway towards increasing social capital should individual and governmental aid successfully intervene post-disaster. However, there is no assurance that this will happen after every disaster, highlighting the importance of keeping social capital in mind while planning for and rebuilding from disasters.

What remains less clear if to what extent these trends would hold true in other contexts. More research is needed to flesh out the role of government after a disaster in relation to social capital. For example, patrimonial governments or highly isolated communities might not exhibit the same use of linking and bridging social capital that was observed in Hoboken. In a different scenario, a highly criticized government response, such as the one after Hurricane Katrina in the US, might yield different results as well.

It should be noted that there are several limitations on the applicability of this research. The data section divides states based on gubernatorial and presidential disaster declarations, and as a result it generalized the experiences of states. One advantage of this is that it includes residents who may have been displaced as a result post-disaster rent gaps, but nonetheless is a key point to note when interpreting this data. A second limitation is that this research does not draw conclusions about sub-population groups' levels of social capital and community involvement. A third limitation is that as social capital is path dependent, the trends noted here may not be applicable in places with different pre-existing levels of social capital. What can be concluded is that areas with effective non-patrimonial governments and moderate pre-existing levels of social capital, such as in Hoboken, are likely to see increases in social capital following a community-wide disaster.

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Appendix A

Bounds of the Central Limit Theorem for the WVS Data

Table A

	2011		2017	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound
Hit At Least Once	1.17%	98.83%	1.02%	98.98%
Hit Twice or More	1.75%	98.25%	1.44%	98.56%
Unaffected	0.73%	99.27%	0.67%	99.38%

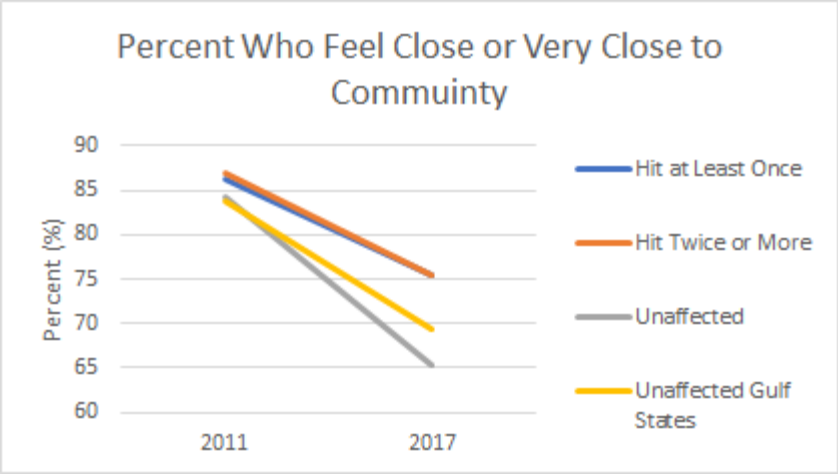
Note. These are the bounds identified by the central limit theorem for the percentages able to be tested in a difference of proportions test. These bounds are inclusive.

Appendix B

Association Between Unaffected Gulf States and Community Closeness

This graph represents the same data as Fig. 4 with the addition of the results for the unaffected gulf states, which are comprised of Alabama, Louisiana, Mississippi, and Texas. This is one of only two measures where the unaffected gulf states' results are notably distinct from the rest of the unaffected states. As mentioned in the findings section of the third chapter, this is indicative of a general protection against decreasing closeness in the unaffected gulf states, which are frequently affected by hurricanes. It is important to note that this effect is weaker than the one found for the states affected by Hurricane Irene, Hurricane Sandy, and Hurricane Matthew.

Figure B1.

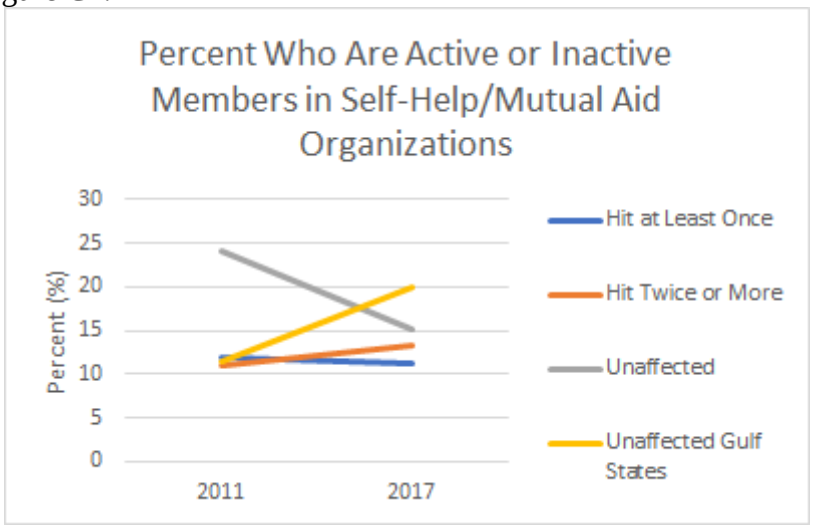


Appendix C

Association Between Unaffected Gulf States and Self-Help/Mutual Aid

This graph represents the same data as Fig. 7 with the addition of the results or the unaffected gulf states, which are comprised of Alabama, Louisiana, Mississippi, and Texas. This is the second of the two measures where the unaffected gulf states' results are notably distinct from the rest of the unaffected states. As seen in the figure below, the unaffected gulf states do not follow the patterns seen in the other unaffected states or in the affected states. This may be driven by factors not studied here but might also speak to an association between membership in this type of organization and living in an area generally affected by hurricanes. Both potential explanations cannot be proven or disproven here and will require further research.

Figure C1.



Appendix D

No Association Between Unaffected Gulf States and Other Social Capital Measures

Appendix D contains all of the graphs not already shown in a previous appendix that contain the results for the affected areas affected by one or more hurricanes as well as two or more hurricanes and both the general unaffected area and the unaffected gulf states. This section includes every question analyzed in the data section except for the results for mutual aid/self-help organizations and the results for closeness to the local community.

These figures demonstrate that the unaffected gulf states most resemble the general unaffected area, and the only two measures where this does not hold true are showcased above and discussed in the findings section of the third chapter. Overall, this affirms that the connections found between experiencing one or more hurricanes and social capital are likely related to experiencing the specific hurricanes in question rather than the result of being located in an area typically affected by hurricanes. This is demonstrated by the gulf states, which are often affected by hurricanes along with much of the East Coast but was not affected by the specific hurricanes analyzed here. These results help to round out the generalizations made by sorting all states into the affected and unaffected group and further provide support for the findings of this research.

Figure D1.

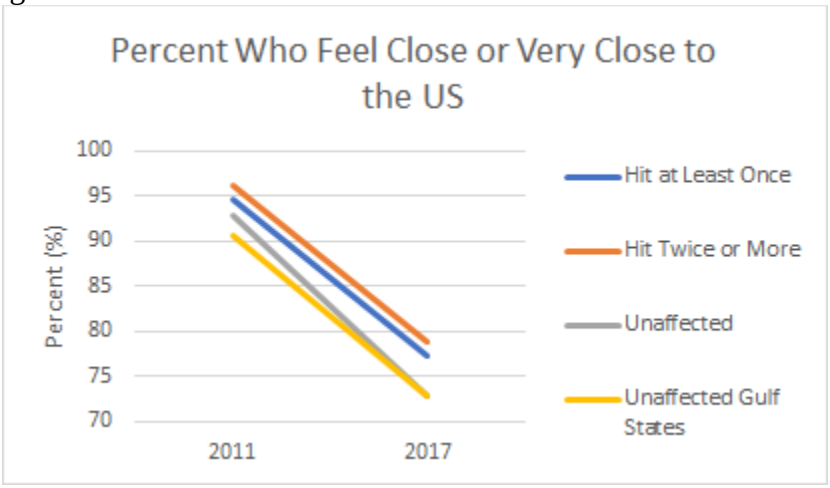


Figure D2.

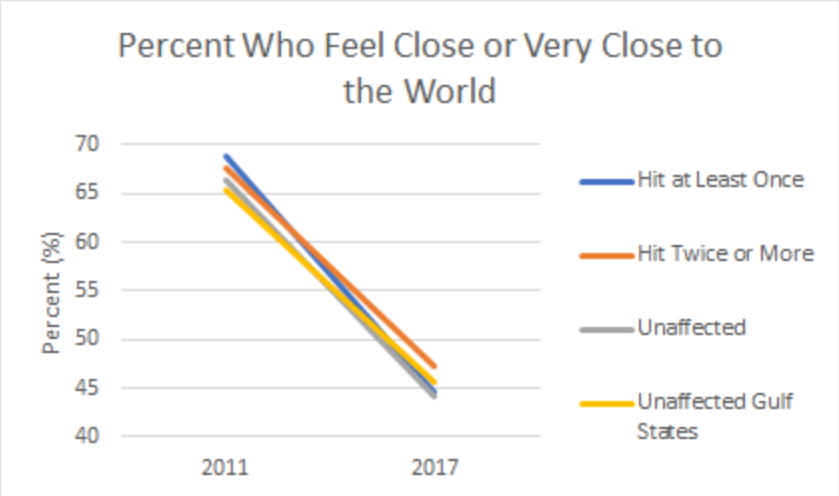


Figure D3.

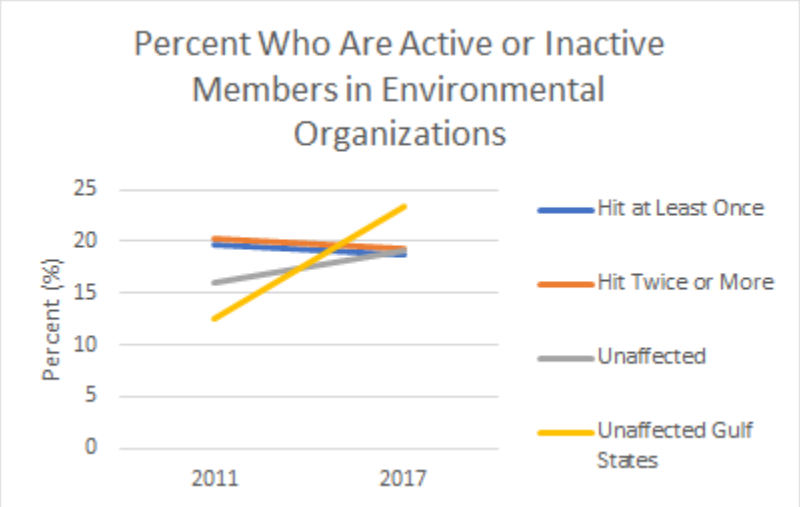


Figure D4.

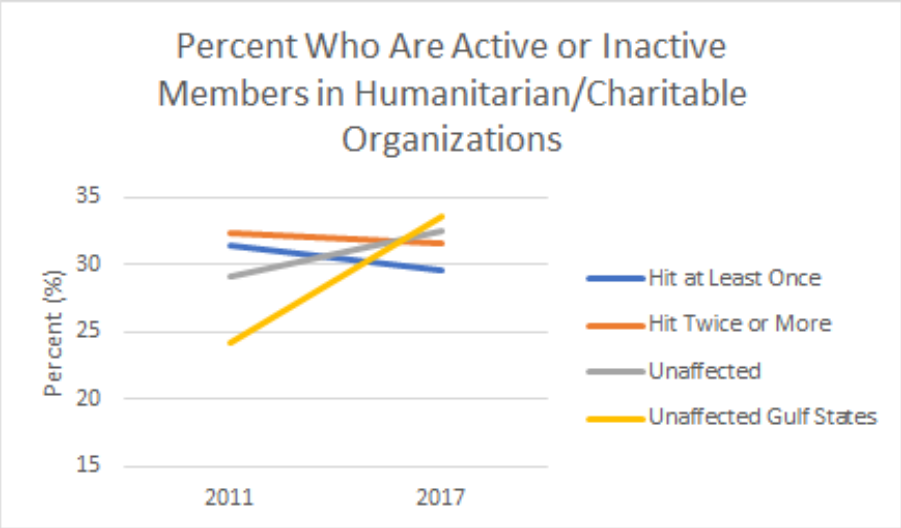


Figure D5.

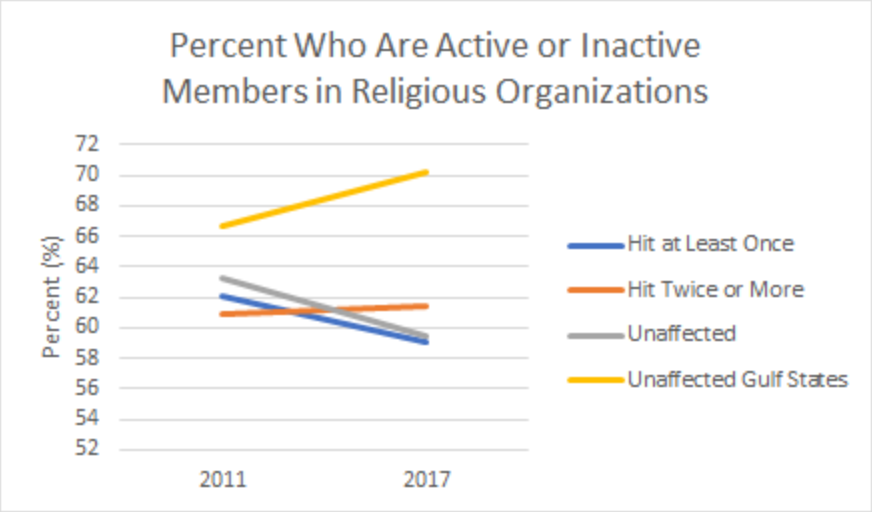


Figure D6.

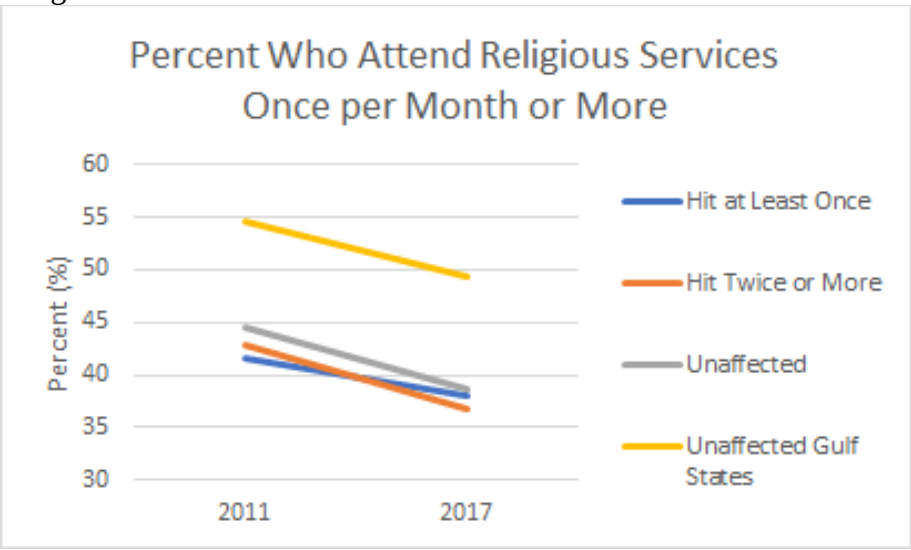


Figure D7.

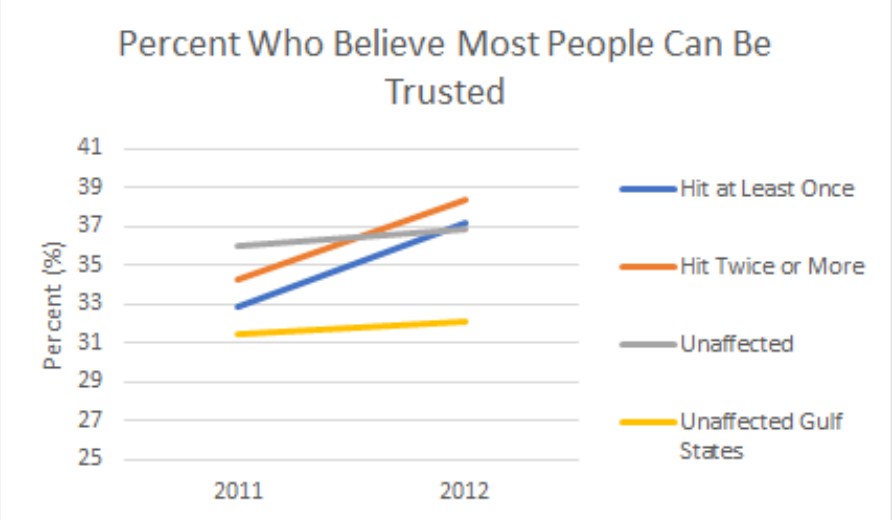


Figure D8.

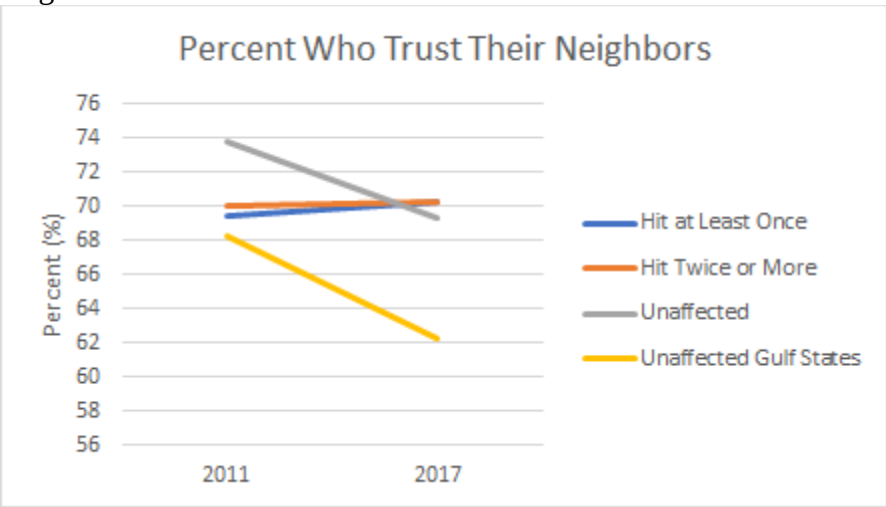


Figure D9.

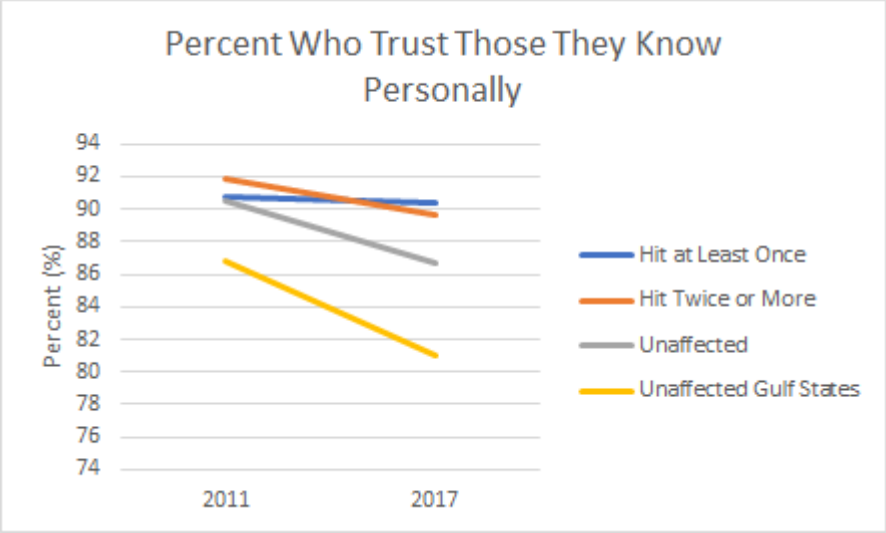
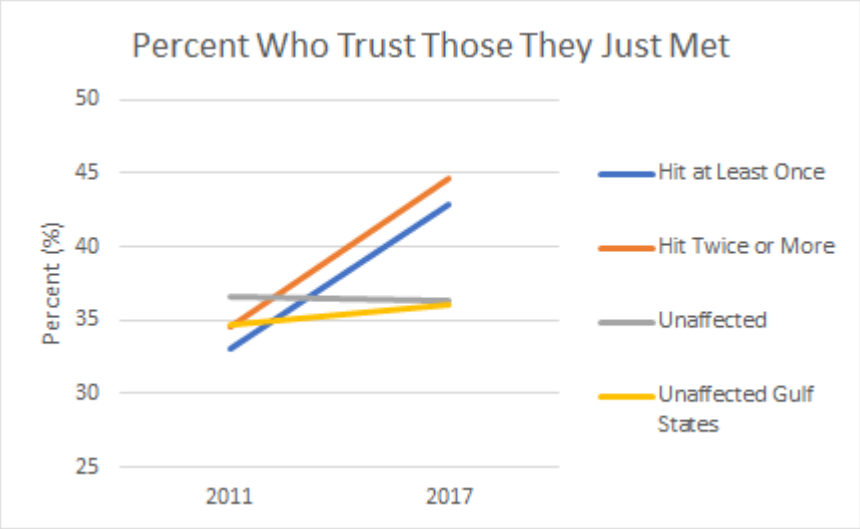


Figure D10.


Percent Who Trust Those They Just Met
50
45
40
35
30
25
Percent (%)
2011
2017
Hit at Least Once
Hit Twice or More
Unaffected
Unaffected Gulf States