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Does time heal all wounds? Community attachment, natural resource employment, and health impacts in the wake of the BP Deepwater Horizon disaster

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ABSTRACT

On April 20, 2010, the BP-leased Deepwater Horizon (BP-DH) oil rig exploded, resulting in the largest marine oil spill in history. In this paper we utilize one-of-a-kind household survey data—the Louisiana Community Oil Spill Survey—to examine the impacts of the BP-DH disaster on the mental and physical health of spill affected residents in coastal Louisiana, with a special focus on the influence of community attachment and natural resource employment. We find that levels of both negative mental and physical health were significantly more pronounced at baseline compared to later time points. We show that greater community attachment is linked to lower levels of negative health impacts in the wake of the oil spill and that the disaster had a uniquely negative impact on households involved in the fishing industry. Further, we find evidence that the relationship between community attachment and mental health is more pronounced at later points in time, and that the negative health impacts on fishers have worsened over time. Implications for research and policy are discussed.

1. Introduction

On April 20, 2010, the BP-leased Deepwater Horizon (BP-DH) oil rig exploded about 50 miles offshore of Southeast Louisiana. The explosion killed 11 workers on the platform and the subsequent sinking of the structure led to a well leak that spewed crude oil unabated into the Gulf of Mexico at a rate of 50,000 barrels a day for nearly 3 months. It is estimated that close to 5 million barrels of oil gushed from the BP-DH well before it was finally capped, resulting in the largest marine oil spill in history (Robertson and Krauss, 2010).

The coastal region affected by this disaster is made up of small towns and rural areas whose residents rely on the Gulf of Mexico and its bounties for their livelihoods. Of special importance in this regard are the seafood and energy industries. Louisiana is the largest producer of domestic seafood in the continental US (Louisiana State University Agricultural Center, 2009), and, inclusive of oil production within the federal Outer Continental Shelf (OCS), it is also the nation's top producer of crude oil (Energy Information Administration, 2011). Together these two industries play a dominant role in defining the livelihoods and economic identity of the residents of the region. Both industries were also directly impacted by the BP-DH disaster, with those in the fishing industry having to contend with the long-term environmental threat to fishing grounds and public perceptions of seafood safety, and oil and gas workers being subjected to a 4 and a half month federal moratorium on OCS drilling following the spill and a stricter regulatory environment for their industry once the moratorium had been lifted.

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A critical task for social scientists in the wake of the BP-DH disaster is to identify how the spill has impacted people who live in the coastal region and to determine the contours of differential impacts across the social landscape. To date, a great deal of research has focused on the negative impacts of disasters on population well-being (see Norris et al., 2002). In addition, a long tradition of scholarship has shown that community attachment is associated with elevated levels of well-being (see O'Brien et al., 1994). In this paper we join these two literatures to assess how community attachment influences mental and physical health impacts from the BP-DH disaster over time. The consideration of impacts over time is a critical contribution because it more properly frames the BP-DH disaster as an unfolding process, rather than an event that occurred at a singular point in time. Further, given the direct impact of the disaster on those employed in fishing and oil occupations, and the vital role of each sector for the livelihoods and economic identity of residents of the region, we pay special attention to the health impacts of those connected to each industry. Taken together, this study helps to extend the literature on the sociology of disasters (e.g., Erikson, 1976; Gill et al., 2012; Lee and Blanchard, 2012; Picou et al., 2004; Quarantelli, 1989; Quarantelli and Dynes, 1977) and contributes to a greater understanding of disaster vulnerability and resilience in particular (e.g., Cutter, 1996; Cutter et al., 2003; Norris et al., 2008).

2. Conceptualizing disasters and their social impacts

Southeast Louisiana is not a new venue for large-scale disasters. Just 5 years prior to the BP-DH spill, in August 2005, Hurricane Katrina made landfall near the Louisiana–Mississippi state border. Katrina created a storm surge that breached the levee system protecting New Orleans, leading to widespread flooding in the city, and now ranking among the most devastating disasters in the nation's history (Knabb et al., 2005). While much of the media attention related to Katrina understandably focused on the tragedy in New Orleans, less recognition was paid to the thousands of storm affected inhabitants of small towns and rural areas (Saenz and Peacock, 2006), including those residing in the rural parishes of Louisiana directly impacted by the BP-DH disaster.

Media images in the aftermath of Katrina made the social dimensions of disaster abundantly clear. Indeed, many disaster analysts argue that disasters are inherently social processes (Bolin and Stanford, 1998; Perry and Quarantelli, 2005; Quarantelli, 1989; Quarantelli and Dynes, 1977; Smith, 2006). Smith (2006) captures this in stating "there is no such thing as a natural disaster. In every phase and aspect of a disaster—causes, vulnerability, preparedness, results and response, and reconstruction—the contours of disaster and the difference between who lives and who dies is to a greater or lesser extent a social calculus." Hurricane Katrina highlighted how the contours of social and economic inequality create a human landscape that is differentially susceptible to disasters, a notion referred to as social vulnerability (Cutter, 1996; Cutter et al., 2003; Hewitt, 1998; Myers et al., 2008; Oliver-Smith, 1996; Oliver-Smith and Hoffman, 1999; Tierney, 2006). Social vulnerability puts an "emphasis on the various ways in which social systems operate to generate disasters by making people vulnerable" by influencing "their capacity to anticipate, cope with, resist, and recover from the impact" of a hazard (Wisner et al., 2004:11).

The consideration of social vulnerability encourages the framing of disasters as social phenomena influenced by the existing social structure. Factors often associated with social vulnerability to disasters include gender, education, race, ethnicity, religion, occupation, age, and the types and extent of existing social networks (Adger, 2006; Bolin, 2007; Cutter, 1996; Myers et al., 2008; Wisner et al., 2004). The net result is a spectrum along which disaster impacts on the more socially disadvantaged (i.e., vulnerable) can be contrasted with the more socially advantaged (i.e., resilient).

A critical point in conceptualizing disasters is that they are not singular events, but rather social processes that play out over time. There are a wide range of agents that can act as catalysts for disasters: environmental degradation, such as drought and desertification; biological hazards, such as insect infestation and disease epidemics; geophysical hazards, such as hurricanes and tsunamis; and technological hazards, such as oil spills and other pollutants (Dynes and Drabek, 1994; McGuire et al., 2002; Picou et al., 2004). Chotray and Few (2012: 696) point out that such processes are fundamentally linked to long-term antecedents as well as long-term consequences in terms of social disruption, "which in turn may lead to still greater vulnerability should another hazard strike" (see also Morrow 1999; Pelling, 2003). In sum, understanding how the cumulative impacts of a disaster evolve over time is a critical consideration (see also Freudenburg, 2000, 1997, 1993; Freudenburg and Jones, 1991; Kroll-Smith and Couch, 1990).

Existing literature on communities affected by oil spills is emblematic of the processes discussed above (e.g., Arata et al., 2000; Exxon Valdez Oil Spill Trustee Council, 2010; Gill and Picou, 1998; Picou et al., 2009, 1992). Prior to the BP-DH disaster, the most severe and well-publicized oil related disaster in the United States was the Exxon Valdez oil spill (EVOS). In the two decades since the oil tanker Exxon Valdez struck Bligh Reef in Prince William Sound, the ecological and social research conducted have culminated in a matchless literature for understanding the impacts oil spills (e.g., Gill and Picou, 1998; Gill et al., 2010; Palinkas et al., 1993; Picou and Gill, 1997; Ritchie, 2004). One unique type of vulnerability highlighted in this literature focuses attention on individuals, groups, and communities which maintain high levels of economic, social, and cultural attachment to threatened, damaged, and/or depleted resources (Arata et al., 2000; Dyer et al., 1992; Gill and Picou, 1997; Ritchie and Gill, 2010). Employing Hobfoll's (1991, 1989, 1988) conservation-of-resources (CORs) stress model, this research has identified, for example, that the EVOS was linked to heightened psychological stress among those employed in the fishing industry because of the unique threat the EVOS posed to their livelihoods (e.g., Arata et al., 2000; Picou and Gill 1997; Picou et al., 1992). In addition, the research amassed on the EVOS underscores the importance of monitoring how the social impacts from disasters evolve over time (Gill et al., 2012).

3. Community attachment

A significant amount of literature has been dedicated to theorizing the nature of community attachment and its influence on both individuals and the communities in which they reside. In the wake of 19th Century urbanization and industrialization, social theorists set out to better understand disruptions to social relations incumbent with the onset of modernity (e.g. Durkheim, 1883/1997; Heidegger, 1927/2008; Marx, 1859/1979; Nietzsche, 1882/1974; Weber, 1922/1968). Such theorists frequently contrasted the social life of isolated preindustrial rural communities from that of emergent urban industrial populations (e.g. Durkheim, 1883/1997; Tönnies, 1887/2002). Based on this early work, a linear model of community change emerged where modern social relations were seen as transitioning away from the primary ties and tight social cohesion of traditional community life to a multi-faceted and transient construction of community predicated on the shifting nature of secondary relationships (e.g., Durkheim, 1914/1973; Simmel, 1903/1969; Tönnies, 1887/2002). The 20th Century witnessed continued concern with modernity's impact on community relationships, with scholars such as Wirth (1938) and Park (1915) indicating that modernistic urbanization was leading to a decreased sense of community due to shifts in the social order, shifts which inhibited the formation of effectual social bonds. This standpoint was later dubbed the "community lost" perspective (Wellman, 1979).

By the mid-20th Century, the "community lost" perspective of modern urban life was challenged by numerous scholars (e.g., Axelrod, 1956; Gans, 1962; Janowitz, 1967), eventually culminating in the "community saved" perspective (Wellman, 1979). In brief, the community-saved perspective argued that a strong sense of community and close social bonds persist in modern social life by means of smaller—often homogeneous—neighborhoods/communities embedded within larger social settings (e.g., cities). As such, behavior and sentiment are seen as the result of an ongoing process where community residents continually (re)form formal and informal associational networks. By way of the community-saved perspective, the theoretical assertions of scholars such as Tönnies (1887/2002), Durkheim (1883/1997), Simmel (1903/1969), and Wirth (1938) regarding an individual's sense of community came to be known more succinctly as "community attachment" (see Brown, 1993; England and Albrecht, 1984; Flaherty and Brown, 2010; Hunter, 1975; Kasarda and Janowitz, 1974; Smith et al., 2001).

Community attachment is related to the density of established kinship, friendship and acquaintanceship networks (Flaherty and Brown, 2010). As such, there is a similarity between the concept of community attachment and social capital (e.g., Bourdieu, 1983; Coleman, 1988; Putnam, 2000). The concept of social capital refers to the ability of people to mobilize resources through social networks and associational memberships, relationships that are underpinned by norms of trust and reciprocity. Disaster scholars have emphasized both the role of social capital in shaping recovery and resilience in disaster contexts as well as the impact that disasters can have on social capital (especially in contexts where disaster-related social disruption undermines norms of trust and reciprocity) (Ritchie, 2004; Ritchie and Gill, 2007). Despite the utility of the social capital framework for studying disasters, however, analysts need to be cautious about conflating the concept with community attachment; the former refers to network structures, while the later emphasizes sentiments about place.

A great deal of research has demonstrated significant linkages between community attachment and individual well-being across diverse contexts (e.g., Davidson and Cotter, 1991; Grzeskowiak et al., 2003; Kimweli and Stilwell, 2002; St. John et al., 1986; Theodori, 2001), including positive impacts on mental and physical health outcomes (e.g., Mak et al., 2009; Morita et al., 2010; O'Brien et al., 1994; Prezza et al., 2001; Young et al., 2004). However, research has also demonstrated that the influence of community attachment on well-being is not uniformly positive (Weil et al., 2012). Importantly, Lee and Blanchard (2012) examined the first wave of the survey we utilize in the analysis that follows—collected while the BP-DH oil was still flowing—to show that community attachment was associated with higher levels of negative affect during that period. In this paper we extend Lee and Blanchard's (2012) analysis by examining how these relationships change over time.

4. Research questions

Given the literature outlined above, we ask the following research questions in relation to the BP-DH oil spill: (1) Has the level of negative mental and physical health impacts among residents of the spill affected region changed over time; (2) Does community attachment have an influence on the level of negative mental and physical health impacts people experience; (3) Have the level of negative mental and physical health impacts differed for those employed in the fishing and oil industries versus other occupations; and (4) Do relationships between community attachment, natural resource occupations, and negative health impacts change over time?

5. Data and methods

In order to address our research questions, we draw on data from the Louisiana Community Oil Spill Survey (COSS). The COSS is a one-of-a-kind study that provides multiple waves of cross-sectional trend data on the characteristics of and disaster impacts on residents living in the areas of coastal Louisiana directly affected by the BP-DH spill. Conducted by Louisiana State University's Public Policy Research Laboratory, the COSS is a telephone survey of households randomly drawn from a listed sample of the approximately 6000 households living in the coastal zip codes of Plaquemines, Lafourche, and Terrebonne Parishes. The areas sampled for the COSS were selected because of their direct geographic proximity to the BP-DH spill. The baseline data was collected in June 2010, while the oil was still flowing (the well achieved a "static condition"

in August 2010); a second wave of data was collected four months out from baseline (October 2010); and a third wave of data was collected 1 year out from the initial rig explosion (April 2011). The repeated cross-sections of data available from the COSS provide a unique opportunity to assess disaster impacts and recovery over time, and thus allow us to measure the disaster as a process rather than as a singular event. The response rates for each wave were 20%, 24%, and 25%, respectively. These rates of response are within the range typically obtained by leading survey organizations (e.g., Pew Research Center) and research has shown little threat to the quality of survey estimates from nonresponse bias within this range (Keeter et al., 2006). Moreover, it should be noted that these response rates were obtained in a disaster context, not under normal conditions.

5.1. Measures

The dependent variables in our analysis are an index of negative mental health symptoms and an index of negative physical health symptoms. In terms of negative mental health, respondents were asked: "In the last week, how often have you experienced the following feelings because of the oil spill?" (Responses included almost constantly, some of the time, almost never, and never). The list of feelings included worry, sadness, nervousness, fear, depression, anxiety, and anger. Each item ranged from 0 to 3 where 0 = never and 3 = almost constantly. We created an index by summing the scores across all seven indicators, resulting in a measure that ranges from 0 to 21. The Cronbach's alpha for this measure is .90. The negative physical health index was created using a similar approach. Respondents were asked: "In the last week, how often have you experienced the following physical symptoms because of your worries about the oil spill?" (Again, responses included almost constantly, some of the time, almost never, and never). The list of physical symptoms included sick stomach, shortness of breath, loss of appetite, joint pain, headaches, diarrhea, and chest pain. We created an index by summing the scores across all seven indicators, resulting in a measure that ranges from 0 to 21. The Cronbach's alpha for this measure is .87.

One of the key independent variables in our analysis is time. We measure time by pooling the three waves of survey data and then creating dummy variables for the second and third waves (the baseline wave is the reference).

A second key independent variable is community attachment. We measure community attachment with a five-item index. These items are drawn from the Knight Soul of the Community project, a research partnership between Gallup and the Knight Foundation (2012), and were used by Lee and Blanchard (2012) in their study on the BP-DH spill. The measures are also very comparable to those used in previous studies assessing the relationship between community attachment and the mental and physical health outcomes (e.g., Grzeskowiak et al., 2003; Kimweli and Stilwell, 2002; O'Brien et al., 1994; St. John et al., 1986). The items include the following:

(1) Taking everything into account, how satisfied are you with [name of community residence] as a place to live? (0 = *very dissatisfied*, 1 = *fairly dissatisfied*, 2 = *neither dissatisfied nor satisfied*, 3 = *fairly satisfied*, and 4 = *very satisfied*).
(2) How likely are you to recommend [name of community residence] as a place to live? (0 = *extremely unlikely*, 1 = *somewhat unlikely*, 2 = *neither likely nor unlikely*, 3 = *somewhat likely*, and 4 = *extremely likely*).
(3) Please indicate your agreement following statement: I am proud to say that I live in [name of community residence]. (0 = *strongly disagree*, 1 = *disagree*, 2 = *neither disagree nor agree*, 3 = *agree*, and 4 = *strongly agree*).
(4) Please indicate your agreement with the following statement: [Name of community residence] is the perfect place for people like me. (0 = *strongly disagree*, 1 = *disagree*, 2 = *neither disagree nor agree*, 3 = *agree*, and 4 = *strongly agree*)
(5) Overall, how would you rate your community is a place to live – excellent, good, only fair, or poor? (0 = *poor*, 1 = *fair*, 2 = *good*, and 3 = *excellent*).

Drawing on these five items we created a summative index that ranges from 0 to 19. The Cronbach's alpha for this measure is .81. It is important to note that due to skew in the distribution of community attachment in the first wave to the COSS, Lee and Blanchard (2012) dichotomized their community attachment measure. Because this variable is not subject to substantial skew in the pooled dataset, we elected to use a continuous measure in our analysis so as not to lose information unnecessarily. Ancillary analysis shows that whether we use a continuous or dichotomous measure of community attachment, the substantive results remain the same.

A third set of key independent variables taps whether or not a respondent's household includes members employed in natural resource occupations. Specifically, dummy variables were created based on answers to the following questions (yes = 1): "Do you or any member of your immediate family currently work in the fishing or seafood industries?" and "Do you or any member of your immediate family currently work in the oil industry?" Importantly, these are not mutually exclusive categories, given the possibility that a household could have members employed in the fishing and the oil industries. We elected to operationalize our natural resource employment variables in this manner in order to replicate and extend Lee and Blanchard's (2012) earlier research.

In addition, our models include a range of control variables. We measure proximity to the coast using an 8-point ordinal scale where higher numbers indicate greater distance from the coast. We measure length of residence using a 5-point ordinal scale where larger values represent longer residence. Employment status is measured by a series of dummy variables (yes = 1) for employed full-time, employed part-time, unemployed, and retired (not in the labor force is the reference). Likewise, educational attainment is measured with a series of dummies (yes = 1) for less than high school, high school, and some college/associates degree (bachelor's degree or more is the reference). Dummy variables are also included for ethnicity

Table 1
Descriptive statistics.

Variables	Wave 1		Wave 2		Wave 3	
	M	SD	M	SD	M	SD
Negative mental health index	12.62	5.96	9.17	6.14	9.49	6.60
Negative physical health index	5.06	5.16	4.22	5.17	4.83	5.46
Community attachment	15.45	3.67	15.02	3.92	15.01	3.96
Oil and gas employment	0.71	0.46	0.59	0.49	0.64	0.48
Fishing and seafood employment	0.63	0.48	0.53	0.50	0.57	0.50
Proximity to the coast	5.46	1.93	5.34	1.95	5.32	1.98
Length of residence	4.63	0.79	4.55	0.97	4.70	0.72
Employment status						
Full-time	0.51	0.50	0.52	0.50	0.46	0.50
Part-time	0.07	0.26	0.10	0.29	0.09	0.29
Retired	0.17	0.38	0.14	0.35	0.19	0.39
Unemployed	0.09	0.29	0.11	0.31	0.09	0.29
Not in the labor force	0.15	0.36	0.13	0.34	0.17	0.37
Educational attainment						
Less than high school	0.21	0.40	0.23	0.42	0.23	0.42
High school	0.42	0.49	0.41	0.49	0.43	0.50
Some college/associate's degree	0.20	0.40	0.22	0.41	0.20	0.40
Bachelor's degree or more	0.18	0.38	0.14	0.35	0.14	0.35
Cajun	0.27	0.45	0.33	0.47	0.50	0.50
White	0.58	0.49	0.51	0.50	0.36	0.48
Catholic	0.72	0.45	0.70	0.46	0.71	0.45
Female	0.54	0.50	0.47	0.50	0.43	0.50
Age	46.47	17.18	46.31	16.58	47.85	16.44
N	807		946		864	

(Cajun = 1), race (white = 1), religious affiliation (Catholic = 1) and sex (female = 1). Last, age is a continuous variable measured in years. Descriptive statistics for all variables used in our models are displayed in Table 1.

5.2. Analytic strategy

To address our research questions, we specify ordinary least squares (OLSs) regression models that predict our negative mental and physical health indexes. To account for differential probabilities of selection attributable to higher levels of nonresponse among some segments of the population, the data are weighted by age and sex on the basis of the ratio of the distributions for these groups in our data versus data from the relevant zip codes based on the 2005–2009 American Community Survey.

6. Results

The results in Table 1 show that the levels of negative mental and physical health impacts from the disaster are greatest at baseline. This makes sense given that first wave of data was collected while the BP-DH was still actively spewing oil into the Gulf and it was unclear whether engineers would be able to successfully devise a method to stop the flow. Also important to note for our purposes is the high level of household involvement in the fishing and oil industries. Across all three waves more than half of those surveyed report having members of their household employed in these industries.

OLS regression estimates predicting negative mental health impacts are reported in Table 2. Model 1 includes our key independent variables—time, community attachment, and natural resource employment—and the full range of control variables. The results show that negative mental health impacts from the disaster are significantly lower in waves 2 and 3 compared to baseline, net of other factors. That is, relative to the period when the oil was actively gushing into the Gulf, respondents' report better mental health at later time points. The results also show that higher levels of community attachment are associated with significantly lower negative mental health impacts. This provides support for the notion that community attachment acts as a dimension of resilience in a disaster context. Notably, this finding stands in contrast to the results reported by Lee and Blanchard (2012) based on the first wave of the COSS. Last, Model 1 demonstrates that fishing households exhibit significantly higher levels of negative mental health impacts compared to others. This finding is consistent with the EVOS literature which showed long-term impacts of that disaster on the psychological health of fishers (e.g., Arata et al., 2000; Picou and Gill 1997; Picou et al., 1992).

With regard to other variables in Model 1, we find that those living further from the coastline, those with full time work, and those who have retired exhibit significantly lower negative mental health impacts from the disaster. In contrast, we show that length of residence, the unemployed, those with less than a high school education or some college, Cajuns, and women exhibit significantly greater negative mental health impacts from the BP-DH disaster.

Table 2
OLS regression model predicting negative mental health impacts.

Independent variables	Model 1		Model 2	
	β	SE	β	SE
Time				
Wave 1 (reference)	–	–	–	–
Wave 2	−3.369***	0.199	−3.576***	0.522
Wave 3	−3.196***	0.209	−0.615	0.846
Community attachment	−0.224***	0.021	−0.152***	0.040
Oil and gas employment	0.047	0.176	0.908***	0.215
Fishing and seafood employment	2.664***	0.172	2.082***	0.192
Proximity to coast	−0.296***	0.042	−0.288***	0.042
Length of residence	0.339**	0.104	0.271**	0.104
Employment status				
Full-time	−0.681**	0.253	−0.580*	0.251
Part-time	−0.397	0.347	−0.349	0.345
Retired	−2.085***	0.328	−1.909***	0.326
Unemployed	2.057***	0.339	2.178***	0.337
Not in labor force (reference)	–	–	–	–
Educational attainment				
Less than high school	1.546***	0.282	1.459***	0.280
High school	0.304	0.245	0.237	0.244
Some college/associate's degree	0.681*	0.274	0.644*	0.272
Bachelor's degree or more (reference)	–	–	–	–
Cajun	1.195***	0.266	1.205***	0.265
White	0.497*	0.250	0.430	0.250
Catholic	−0.047	0.189	0.041	0.188
Female	1.071***	0.171	1.084***	0.170
Age	0.002	0.006	0.002	0.006
Wave 2 × community attachment	–	–	−0.005	0.052
Wave 3 × community attachment	–	–	−0.207***	0.052
Wave 2 × fishing household	–	–	1.769***	0.395
Wave 3 × fishing household	–	–	2.827***	0.416
Intercept	13.069***	0.695	11.962***	0.857
Adjusted R^2	0.190		0.200	

N = 2,617.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

In Model 2 we examine interaction effects between time and community attachment and time and fishing employment on negative mental health impacts. The intent of the interaction terms is to establish whether the effects of community attachment and fishing employment on mental health differ over time. The interaction between wave 3 and community attachment shows a significant negative relationship with mental health impacts. This suggests that while negative mental health impacts during the BP-DH disaster were initially greater among those with higher levels of community attachment (Lee and Blanchard, 2012), more attached people were better off psychologically one year out from the disaster. The interaction effects for fishing households show a significant positive relationship with negative mental health impacts, and the strength of this effect grows somewhat stronger over time. This finding provides further evidence that the impacts of the BP-DH disaster for fishing households were unique and especially unfavorable.

OLS regression estimates predicting negative physical health impacts are reported in Table 3. We follow a modeling strategy that parallels the approach taken in the previous table: Model 1 includes our key independent variables—time, community attachment, and natural resource employment—and the full range of control variables, while Model 2 shows interaction effects between time and significant key independent variables. The results in Model 1 show the same pattern of effects among our key independent variables as we observed for negative mental health impacts. Negative physical health impacts from the disaster are significantly lower in waves 2 and 3 compared to baseline, net of other factors. In other words, relative to the period when the oil was still gushing into the Gulf, respondent's report better physical health at later points in time. The results also show that higher levels of community attachment are associated with significantly lower negative physical health impacts. Again, this provides support for the notion that community attachment acts as an important dimension of resilience in a disaster context. Last, Model 1 shows that households involved in fishing exhibit significantly higher levels of negative physical health impacts compared to those without fishers. This provides further support for the notion that fishing households suffered disproportionately negative health impacts in the wake of the BP-DH spill.

With regard to other variables in Model 1, we find that those living further from the coastline, those with full time work, and those who have retired exhibit significantly lower negative physical health impacts from the disaster. On the other hand, we show the unemployed, those with less education, women, and older people exhibit significantly greater negative physical health impacts in the context of the disaster.

Table 3
OLS regression model predicting negative physical health impacts.

Independent variables	Model 1		Model 2	
	β	SE	β	SE
Time				
Wave 1 (reference)	–	–	–	–
Wave 2	−0.893***	0.166	−1.478*	0.689
Wave 3	−0.387*	0.175	−0.304	0.709
Community attachment	−0.173***	0.018	−0.176***	0.033
Oil and gas employment	−0.115	0.146	0.393*	0.181
Fishing and seafood employment	1.906***	0.144	1.567***	0.161
Proximity to coast	−0.240***	0.035	−0.236***	0.035
Length of residence	0.048	0.087	0.026	0.087
Employment status				
Full-time	−0.755***	0.211	−0.710**	0.211
Part-time	−0.293	0.290	−0.233	0.289
Retired	−1.916***	0.273	−1.821***	0.273
Unemployed	2.078***	0.283	2.148***	0.283
Not in labor force (reference)	–	–	–	–
Educational attainment				
Less than high school	2.699***	0.235	2.636***	0.235
High school	0.853***	0.204	0.792***	0.204
Some college/associate's degree	0.918***	0.229	0.888***	0.228
Bachelor's degree or more (reference)	–	–	–	–
Cajun	0.133	0.222	0.142	0.222
White	−0.352	0.209	−0.384	0.209
Catholic	−0.120	0.158	−0.107	0.158
Female	0.445**	0.143	0.460**	0.143
Age	0.018**	0.005	0.017**	0.005
Wave 2 × community attachment	–	–	0.030	0.043
Wave 3 × community attachment	–	–	−0.031	0.045
Wave 2 × fishing household	–	–	0.791*	0.331
Wave 3 × fishing household	–	–	1.890***	0.349
Intercept	6.347***	0.580	6.323***	0.719
Adjusted R^2	0.162		0.167	

N = 2,617.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

Model 2 shows interaction effects between time and community attachment and time and fishing employment on negative physical health impacts. In this case the intent of the interaction terms is to establish whether the effects of community attachment and fishing employment on physical health change over time. The interaction terms between time and community attachment show no significant effects. This suggests that while higher levels of community attachment may help to shield people from negative physical health impacts in a disaster context (i.e., Model 1), this relationship does not change substantially over time. In contrast, the interaction effects for fishing households show a significant positive relationship with negative physical health impacts, and, again, the strength of this effect grows somewhat stronger over time. This finding further reinforces the notion that the negative health impacts of the BP-DH disaster have been unique and especially unfavorable for those connected to the fishing industry.

7. Discussion

In this study we set out to meet four main objectives related to the impacts of the BP-DH oil spill. The first was to establish how the level of negative mental and physical health impacts among residents of the spill affected region changed over time. We find that levels of both negative mental and physical health were significantly more pronounced during our baseline survey compared to later points in time. This is understandable given that a unique aspect of the COSS is that the baseline data was collected while the disaster catalyst was still in motion (i.e., oil was still actively gushing into the Gulf), while later time points captured periods after the well was static, media attention had died down, and the environmental and economic impacts were slowly unfolding unevenly across people and places.

Our second objective was to assess the influence of community attachment on negative mental and physical health impacts from the disaster. Our data show that greater levels of community attachment are linked to lower levels of negative health impacts in the wake of the oil spill. This provides support for the notion that community attachment represents an important dimension of disaster resiliency.

A third objective was to establish if households with members in the fishing and oil industries—two key industries in the region with direct impacts from the spill—differed in the level of negative health impacts they experienced compared to others. We show clearly that the disaster had especially negative health impacts on fishing households. In contrast, we find no evidence that oil and gas households experienced health impacts that differed from others in a significant way. The ongoing threat to fisheries from the spill makes the uniquely negative impact on fishers quite understandable. Not only will fishers in the region have to deal with the long term uncertainties related to the environmental impact of the spill, they will also have to contend with public perceptions about whether their product is safe for consumption for some time to come.

Our final objective was to determine whether existing relationships between community attachment, natural resource employment, and negative health impacts change over time. On this score we find mixed results. In terms of mental health, community attachment seems to provide more of a shielding effect from negative impacts as time passes. This suggests that community attachment may help people recover to healthier psychological states more quickly as disaster processes unfold. Further, the results show the particular negative psychological impacts on fishers became most pronounced a year out from the rig explosion, suggesting especially acute impacts on this group relative to others. In terms of negative physical health, we find no evidence that the impact of community attachment changes over time, but do show that the physical health of fishing households became increasingly poor as time passed.

This study contributes to the extant literature on the sociology of disasters (e.g., Erikson, 1976; Quarantelli, 1989; Quarantelli and Dynes, 1977), and the literature on the social impacts of oil spills (e.g., Gill et al., 2012; Picou et al., 2004), social vulnerability and resilience (e.g., Cutter et al., 2003; Norris et al., 2008) and community attachment in disaster contexts (e.g., Berkman et al., 2000; Lee and Blanchard, 2012) in particular. Our research dovetails with findings from the EVOS literature which demonstrates that community residents with ties to renewable resource industries were uniquely susceptible to stress and adverse impacts following that disaster (e.g., Arata et al., 2000; Picou and Gill 1997; Picou et al., 1992). Moreover, we directly extend the work of Lee and Blanchard (2012) who used the first wave of the COSS to show that community attachment amplified negative mental health impacts in the initial stages of the BP-DH disaster. We build on this finding by showing that community attachment is linked to better psychological and physical health outcomes when a longer period of time is considered, and the beneficial impact of community attachment on psychological health grows more pronounced over time.

Despite these contributions, our study is limited in a number of important respects. For example, our analysis did not include measures of social networks, trust, or associational memberships (i.e., social capital), which has been shown to be an important resource in disaster contexts (Ritchie, 2004; Ritchie and Gill, 2007). Future research should aim to parse out the unique contributions of social capital and community attachment to enhancing disaster resilience. Relatedly, our attention to community attachment only sheds light on a small aspect of the multifaceted nature of community sentiment. Future research into the social impacts of disasters should consider including additional measures to more holistically capture people's psychological sense of community. And, finally, while our study is based on cross-sectional trend data, a panel design that follows the same group of respondents over time would allow researchers to better track the dynamics of vulnerability and resilience to disaster impacts over time.

Our research holds a range of implications for public policy. First, it underscores the notion that disaster vulnerability and resilience are shaped by the social attributes that characterize people and places. Disaster mitigation planning has disproportionately focused on biophysical issues (e.g., offsetting the risk of a storm surge by building more fortified sea walls and levees). But given that definition of risk, costs, and impacts of disasters—indeed what even qualifies as a disaster—is socially constructed, our study adds to the chorus of social scientists who have long argued that people and their communities have to be a central consideration in disaster planning. Disaster planners need to recognize that different types of disasters are likely to have especially negative and long term consequences for certain types of people in affected areas. Specifically, planners should focus increased attention on the mental and physical health needs of populations who maintain unique ties to damaged or threatened resources. Further, community development efforts aimed at facilitating attributes that help to shield people from negative disaster impacts, like community attachment, should be viewed as key component of disaster mitigation strategies. Finally, our research highlights the need for planners to recognize disasters as processes that play out over time, rather than as events that occur at a single time point.

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