COLLECTIVE EFFICACY AND FEAR OF CRIME
IN THE CONTEXT OF NATURAL GAS DEVELOPMENT

A Thesis in
Rural Sociology
by
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ABSTRACT

In previous studies natural resource development has been linked to social disruption and increased fear of crime (Freudenburg & Jones, 1991; Covey & Menard, 1983). Outside of the realm of natural resource development, social researchers have identified perceptions of collective efficacy as a social combatant to fear of crime and violence. Sampson et al. (1997: 919) defined collective efficacy as “social cohesion among neighbors combined with their willingness to intervene on behalf of the common good.” This work seeks to investigate the amounts and interactions of both collective efficacy and fear of crime within the context of natural gas development in Pennsylvania. There is an overarching belief held by many local rural Pennsylvanians that the out of state workers that have come to Pennsylvania are ne’er-do-wells or even potential criminals (Filteau, 2012). Due to the relatively short length of time the natural gas industry has been in Pennsylvania, little social research has been done in this area, with even less investigation into fear of crime. This work measures survey respondents’ perceived collective efficacy, its effects on fear of crime, and any mediating effects that natural gas well density (thus possible interactions with workers) may have on that interaction. The study finds that increased collective efficacy is associated with decreased feelings of fear of crime; it does not find any influence on this correlation by the number of gas wells around respondents. This study contributes to the collective efficacy literature as well as natural resource development literature by bringing the two together within the context of natural gas in Pennsylvania. Specifically, this work improves the discussion of social disruption by hypothesizing a more concrete measurement of social cohesion.
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For Lauren,

I would have never finished this without your support.
Chapter 1

Introduction

Marcellus Shale in Pennsylvania

The Marcellus Shale is a geological formation that contains natural gas located below parts of West Virginia, Ohio, New York, and much of Pennsylvania. Natural gas extraction began in Pennsylvania around 2005 (see figure 1) through the improvement and combination of hydraulic fracturing and horizontal drilling technologies. Previously, drilling for natural resources was done by vertically drilling straight down to the resource. With modern technologies, “directional drilling” is possible; the well begins vertically but then can be turned in a horizontal direction. In the Marcellus Shale, when the desired area is reached a mix of water, chemicals, and sand is forced, at extremely high pressures, into the shale to fracture it and extract the gas and oil. This latter process is termed hydraulic fracturing.

Figure 1-1. Cumulative Number of Unconventional Wells Drilled in Pennsylvania.
Source: PA Department of Environmental Protection. Office of Oil and Gas Management.
http://www.depreportingservices.state.pa.us/ReportServer/Pages/ReportViewer.aspx/?Oil_Gas/OG_Well_Inventory
The industry requires many employees that are highly skilled and trained in the use of those specific technologies and machinery utilized for drilling and hydraulic fracturing. According to the Marcellus Shale Education and Training Center (2011) it takes 420 individuals across 150 different occupations to bring a single Marcellus Shale well online. Most rural communities in the Northeast region do not have the labor force, in terms of both skill and size, to meet these needs. This allows for many out-of-state workers to find employment in Pennsylvania. The case of Marcellus Shale in Pennsylvania does not fit the exact Boomtown model often cited by Freudenburg’s 1991 study. However, “there are also a large number of key similarities as the equipment, workforces, organization, and process used in the extraction of the natural gas remain nearly identical across the industry, and many communities in the Marcellus Shale region are sufficiently small and rural in that nearby large scale development would likely produce a number of similar effects as have be documented in other areas (Jacquet, 2009: 3).” Furthermore, in discussing the entire body of boomtown literature Shaft and colleagues concluded that the represents an unprecedented job opportunities and economic growth while also allowing for increased likelihood of social stresses, potential inequality, and strains on local infrastructure (Shaft et al., 2013: 146). This is congruous with the case of Marcellus Shale in Pennsylvania.

Motivation and Importance

The original motivation for this study was rooted in anecdotal observations, by this researcher, of rural Pennsylvanians’ negative perceptions of migrant natural gas workers. Negative stories of interactions with these “frackers” were commonplace, even if they were second or third hand tellings. For example, it seems as if everyone in Montoursville (a town in Lycoming County) has been, or knows someone who has been, nearly run off a country back
road by a worker driving a large truck. There also seem to be plenty of discussions of young, male gas industry workers going to bars and causing fights or getting DUls. There seems to be a generalized opinion of industry workers that they are ne’er-do-wells and outsiders. These observations are corroborated in the 2011 work of Brasier et al. They are also in alignment with the findings of O’Connor (2015) concerning key informants in a similar case in Alberta, Canada.

Most problems associated with natural resource development in rural areas are attributed to the social disruption hypothesis. The social disruption hypothesis postulates that boomtown communities often “enter into a period of generalized crisis and loss of traditional routines and attitudes (England & Albrecht, 1984: 231).” This crisis occurs because of rapid population growth which causes communities to become “less cohesive and more socially disorganized (O’Connor, 2015: 221).” There exists a body of work that endeavors to understand the potential for increased crime rates as well as fear of crime to arise out of this disorder. One of the most recognized works in this area is that of Freudenburg and Jones (1991), wherein it was found that crime increased by nearly three times as much as the population increased in twenty-three towns affected by natural resource development. The potential for increased crime, as well as the fear of it, is an important issue worthy of study because of its ability to inform the public and policy makers to save individuals from property and personal harm.

In a broader sense social disruption leads to a disintegration of norms and social cohesion. Chief among these is a community’s “density of acquaintanceship,” or the proportion of a community's residents who know one another (Freudenburg, 1986). The simple inflation of a community’s population means it is more difficult to intimately know community members. Freudenburg postulated this social dynamic as a main driving force in the more tangible negative outcomes of social disruption; one such outcome being fear of crime.
Another social dynamic, with the potential to be involved in social disruption is collective efficacy. Sampson, Raudenbush and Earls (1997: 919) defined collective efficacy as “social cohesion among neighbors combined with their willingness to intervene on behalf of the common good.” Collective efficacy is a community dynamic that as of yet has not been discussed within the boomtown and social disruption literature; however, it has been shown to be related to fear of crime in other studies (Gibson et al., 2002: 552).

The purpose of this work is to investigate the relationship between collective efficacy and fear of crime in the context of Marcellus Shale in Pennsylvania. Collective efficacy is a social mechanism which may help explain why fear of crime results from social disorder that has not been previously researched within the context of natural resource development. This is important not only in extending the literature with regards to boomtowns and the social disruption hypothesis, but also in shedding light on the relatively new development of natural gas extraction in rural Pennsylvania and a potential problem it may be causing for local residents.

To this end, I analyzed data from a survey sent to households in four Pennsylvanian counties, yielding 1,289 responses. Through logistic regression analysis a statistically significant correlation was found between increased collective efficacy and decreased fear of crime. I then analyzed the effects of the density of the number of surrounding natural gas unconventional wells on this interaction (wells were used as a proxy for potential interaction with migrant workers). It is the conclusion of this work that collective efficacy, as measured in this work, has an inverse relationship to fear of crime. Furthermore, this relationship is unaffected by potential interaction with natural gas workers. In the larger context of boomtowns this indicates that a practical way for policy makers and community members to lessen fear of crime would be through community engagement programs to increase collective efficacy. Additionally, further
investigation of collective efficacy, as an important factor concerning social disruption, is vital in understanding the social disruption hypothesis within the boomtown literature.
Natural Resource Boomtowns

Natural resource boomtowns have been defined in a variety of ways throughout social science literature. Most would consider William R. Freudenburg to be a leading authority on the matter. Freudenburg (1991: 620) originally defined boomtowns, in a general sense, as a community that is not only small (under 10,000 persons), but also isolated, situated well over a hundred miles from the nearest metropolitan area and perhaps 30-80 miles from the nearest community of any size. In most of the notorious booms, a community with a history of population stability or even decline has become the host location for energy development (oil or uranium extraction, the construction of dams or power plants, etc.) requiring thousands of workers-most of whom move into a single community, leading to a doubling (or more) of the population within a period of two-to-four years.

A more succinct definition can be found in the 1983 work of Covey and Mannard. A boomtown was operationally defined in their study as a community which,

(1) exceeded a population growth rate of 8 percent in one year (the figure most often used by federal agencies as indicating boom growth), (2) was isolated from major metropolitan areas (there was none in the county or in neighboring counties), and (3) was identified by state or other documents as being affected by energy resource development (Covey and Mannard, 1983: 116).

However, as Jacquet (2009) pointed out, the classical definitions of natural resource boomtowns differ in many critical aspects. Chiefly, the acute location of more traditional natural resource extraction sights, such as coal mines for example; as opposed to the vast number of wells that are spread across Pennsylvania counties in the present case of Marcellus Shale. Nevertheless, he pointed out:

“there are also a large number of key similarities as the equipment, workforces, organization, and process used in the extraction of the natural gas remain nearly identical across the industry, and many communities in the Marcellus Shale region are sufficiently small and rural in that nearby large scale development would likely produce a number of similar effects as have be documented in other areas (Jacquet, 2009: 3).”
Population booms have previously been theorized to cause a period of general turmoil, characterized by a loss of traditional routines and attitudes by individuals in the local community. According to England & Albrecht (1984) this turmoil mostly affects individuals whose mental health, world view, and/or social networks may be disrupted; at the community level, the homogeneous culture is disrupted by the rapid increase of outsiders. This theory has come to be known as the social disruption hypothesis (England & Albrecht, 1984). The seminal work which most contributes to the formation of this hypothesis is that of Kohrs (1974).


> a housewife, after fighting mud, wind, inaccurate water and disposal systems, a crowded mobile home and muddy children all day, snaps at her husband as he returns from a 16-hour shift. He responds by heading downtown and spending the night at a bar drinking and trading stories with men from similar circumstances. This typical occurrence came to be called the 'Gillette Syndrome'.

Campbell County, Wyoming experienced a population and economic boom in the 1960s due to natural resource development. Kohrs found that this great influx in population overwhelmed many forms of infrastructure: housing, education, medical facilities, law enforcement, and corrections. Additionally, the lengthy shifts the men often worked caused drastic decreases of morale in homes. Kohrs found rate increases in dollar sales of liquor, emergency room visits, divorces, DWIs, male adults and juveniles on probation, and arrests.

These effects were felt the most in the town of Gillette. Kohrs contributed all these negativities to aspects of resource development (including population increase, long hours, and tensions between old and new comers). In 1976, Gilmore also investigated rapid population
growth overwhelming small communities. He outlined an instance wherein rapid growth seemingly caused the breakdown of the labor market, housing market, and public services.

One year later, Cortese & Jones’ (1977) study had very similar findings as Gilmore’s. Cortese and Jones’ study of nine western communities found evidence of rapid population increase, strain on municipal services, and mental health problems; however, they concluded that their most important finding was “the underlying changes in the social structure and cultural systems that are, and [would] continue to be, precipitated by energy-related boomtown developments.” These three studies by Kohrs, Gilmore, and Cortese and Jones together form the basis of the social disruption hypothesis (England & Albrecht, 1984).

**Social Disruption**

As previously stated, the social disruption hypothesis postulates that boomtown communities often “enter into a period of generalized crisis and loss of traditional routines and attitudes (England & Albrecht, 1984: 231).” This crisis occurs because of rapid population growth which causes communities to become “less cohesive and more socially disorganized (O’Connor, 2015: 221).” The core of this hypothesis is that the social ties within the given community are weakened by the number of outsiders that are drawn into the community, creating anomie. Freudenburg’s idea of “density of acquaintanceship” is looked to throughout existing literature to shed light on this weakening of social ties. Freudenburg (1986) coined the term “density of acquaintanceship” to describe the proportion of a community's residents who know one another. Density of acquaintanceship is proposed to have an inverse relationship with social disorder. Stated plainly, as the population rapidly increases, individuals lose the ability to establish intimate connections with others in the community because there is a smaller density of the population with which they are acquainted.
The boomtown literature contains many studies of negative impacts associated with both the social disruption hypothesis and the influx of workers that causes it. The immigrant workers are either discussed as a negativity due to their sheer number or to the tendency of them to be young, transient males. One of the earliest correlations found was that the influx in population of small rural towns caused many local organizations, community services, and even town infrastructure to be overloaded (Cortese and Jones, 1977). Cortese and Jones did discuss the economic benefits of such business coming to small towns; however, they also highlighted instances wherein small business owners were overloaded by the demands of larger population and closed their doors. They used the example of a pharmacist who ran his business out of his home and a movie theater owner closing do to the inability to deal with the large amount of youths who were coming to his theater. Cortese and Jones (1977) also discussed the added pressure on town infrastructures designed for small populations. They emphasized this point with the town of Langdon, North Dakota wherein their water main broke over 100 times in a single winter. Freudenburg (1986) discusses the disruption of informal social controls such as church groups and neighborhood associations. Additionally, in a study done by Camasso and Wilkinson (1990) which involved interviews with human services professionals in Utah, it was found that there were dramatic increases in child abuse and neglect in boomtown communities. Another area of boomtown literature, and of particular interest to this study, is that concerning fear of crime as well as actual crime rates.

**Crime and Fear in Natural Resource Communities**

Freudenburg and Jones (1991) is perhaps the most well-known study concerning natural resource development and crime rates. The authors conducted a meta-analysis with data from
multiple boom town and crime studies which covered 23 separate towns. In a simple linear regression containing all 23 sets of findings, an average increase in crimes that was more than 2.9 times as great as the increase in population was found. The researchers attributed this rate increase to a lessening in “density of acquaintanceship,” as coined in Freudenburg’s aforementioned work.

Covey & Menard (1983) reported crime rates in areas of Colorado affected by energy resource development as compared with rates in areas not affected by such development. Part 1 offenses from the Uniform Crime Report were analyzed from 1970-1979 concerning ten boomtown counties and 52 non-boomtown counties. Covey & Menard's findings indicated that crime rates had increased more dramatically and at faster rates in boom areas than in non-boom areas. Population growth was deemed insufficient to explain the rise in the rates of criminal activity. The authors attributed the difference to two possible changes. First, an increase in formal reporting of crimes due to the increased number of newcomers in the community, i.e. in the previously small communities, disputes and crimes were more likely dealt with outside the formal criminal justice system. Second, they proposed changes in demographic characteristics that may be more crime conductive; namely, the immigration of young single males. Notice that this study had essentially the same findings as Freudenburg and Jones’, yet they attributed the cause to different factors.

Jacquet (2005) published a report of crime rates in Sublette County, Wyoming in 2005. This report analyzed growth trends in the number of index crimes, arrests, and services provided by the Sublette County Sheriff’s Department during years 1995 to 2004. The trends were analyzed in comparison to population growth, gas-field activity, labor force data, and the history of increases over time; the increases in crimes, arrests, and services had grown at rates that
outpaced the growing population. Jacquet found that the best indicator of increases in crimes reported as well as crime rates was oil rig activity. These results were attributed to an influx in young adults similarly to Covey and Menard (1983), however Jacquet also stated that the findings could be due to oil workers not living in permanent residences, thus not actually appearing in the census data that was used and inflating the rates.

Seydlitz, Laska, Spain, Triche, & Bishop (1993) was a study done with a more narrowed look at two particular crimes. Seydlitz and colleagues compared oil activity with homicide and suicide rates in Louisiana over a thirty-year period. Data were analyzed at the county level from 1956-1986. National price per barrel of oil and number of wells was used to measure industry activity. Counties were split into “highly” and “minimally” involved categories based on percentage of individuals who worked in the industry as well as percentage of total income derived from the industry. It was hypothesized that when the oil industry is more active or rapidly changing, social problems such as suicide and homicide would be higher, especially in communities more involved in the oil industry. The researchers found that when price per barrel and the number of wells were at higher levels, the means of homicide and suicide were higher in both classifications of counties as well. Seydlitz and colleagues attributed these findings to young transient males once again. They blamed the increase in homicide and suicide on the isolation these individuals might feel moving into a new community where they do not know anyone (having zero density of acquaintanceship so to speak).

Within the context of the Marcellus Shale and Pennsylvania, only two studies regarding crime and/or social disruption have been conducted. The first was that of Kowalski and Zajac (2012: 1) the expressed purpose of which was to “explore the issue of whether there is any association between Marcellus Shale drilling activity in Pennsylvania and several measures of
crime in the Marcellus Shale drilling regions.” The two authors examined crime statistics in Pennsylvania for the years 2006-2010. They found that while there has been a steady decline in Pennsylvania State Police calls for service in non-Marcellus areas after the natural gas industry took off (2008), there was a more variable pattern of calls for service as well as UCR reported arrests in Marcellus areas. However, these findings were not statistically significant enough for Kowalski and Zajac (2012) to conclude that there was a clear association between Marcellus shale drilling activity and criminal activity. They did note multiple times, however, that their analysis was greatly limited by their very short time frame.

The second study was that of Brasier et al. (2014). This study used data from the same sources as Kowalski and Zajac (2012), but with a wider scope: 2001-2010. The authors still noted, however, that there simply wasn’t drilling activity for a long enough time to do a proper longitudinal study. Brasier et al. (2014) focused on four study counties, all with high drilling activity; these counties were Bradford, Lycoming, Greene, and Washington. The two main findings of this work were an increase in calls for service in the four study counties during the period of Marcellus development (2007-2010), and an increase in rates of arrest for DUI in Bradford and Lycoming counties during the same period.

Although tangible aspects of crime within the context of natural resource boomtowns have been studied at length, individuals’ perceptions of safety and fear of crime have received less attention. In one of the first quantitative studies on the matter, Freudenburg (1986) found increased fear for personal safety among those in a boomtown as opposed to those in comparison communities. This study involved 597 survey respondents; it was found that long-term residents in the study boomtown communities were nearly three times more likely to fear for their personal safety than those respondents outside of boomtowns.
In a similar matched community study done by Krannich, Greider, and Little (1985), heightened fear of crime was found among boombtown residents. Krannich et al analyzed survey data from three communities in the intermountain west which were in various stages of population booms due to natural resources development, they also included one non-boom community as a control. They found among the 441 participants that the mean scores for fear of crime varied linearly with level of resource boom. It is also worth noting that no correlation between fear of crime and previous victimization was found. The authors concluded that “residents’ perceptions of community change and problems that are linked to boom growth may give rise to a unique and powerful social reality, which leads [community members] to the conclusion that boomb town life is stressful, dangerous, and disorganized (Krannich et al, 1985: 206).”

In another of Krannich’s works, individuals' fear of crime in relation to their migration status was studied. Hunter, Krannich, and Smith (2002) found increased fear of crime in boombtown migrants more so than long term residents or post-boom migrants. While the authors do give partial credit for their results to Freudenburg’s (1986) density of acquaintanceship concerning the study’s long term residents, they attribute the heightened fear of crime found among boom migrants to their transition into the community during a time of upheaval and unpredictability. Finally, in a study of boombtown youth and adult key informants in Fort McMurry, Alberta it was found by O’Connor (2015) that local residents perceived outsiders as committers of crime and creators of general disorder. Outsiders were generally understood to be those individuals who came to Fort McMurry solely to work and did not make it a home or contribute to the community in anyway. In these studies it can be seen that there is evidence of
fear of crime among residents because of the presence of outsiders, as well as outsiders experiencing fear of crime because of their displacement to a new community.

Outside the specific context of a boomtown, Drakulich (2013), found a substantial correlation between perceptions of social disorder, as well as physical disorder, with individuals’ fear of crime in their community. In this large survey, physical and social disorder were indicated by neighborhood problems such as graffiti, rundown buildings, and troublesome neighbors.

**Collective Efficacy**

Another facet of social disruption which has not seen much discussion within the boomtown literature is the simple one that disruption of this kind, along with the negative feelings it engenders, may be, in part, a result of individuals’ sense that their environment is changing. As was just discussed, increased fear of crime among residents is often attributed to the influx of outsiders and resulting feelings of residents that they lack control over their community. Herein lies the concept of collective efficacy and its potential to combat fear of crime.

Efficacy is the ability of an agent to cause a desired effect. Within the realm of social science there are two main types of efficacy: personal efficacy and collective efficacy. Personal efficacy is defined by Bandura (1997) as the “human capacity to exercise control.” Collective efficacy is the ability of a group, such as those in a given town or neighborhood, to exercise control. An example would be the ability of a group of neighbors to come together and influence the actions of delinquent youth in the community.

For the purposes of social research, it is difficult to accurately measure the actual efficacy of an individual or a group. The body of research currently has put forth a pattern of asking
survey respondents about their perceptions of their own collective efficacy. Sampson et al. (1997: 919) defined collective efficacy within their study as “social cohesion among neighbors combined with their willingness to intervene on behalf of the common good.” They conceptualized this by asking survey respondents their perceptions about their neighbors’ willingness to intervene if they observed delinquent behavior (e.g. children spray painting graffiti on a local building). They also asked questions concerning social cohesion and trust (e.g. level of agreement with the statement “people around here are willing to help their neighbors” (pg. 920). In a later work, Gibson et al. (2002) borrowed Sampson et al.’s (1997) definition of collective efficacy as well as their conceptualization. Gibson et al. (2002) used a five item index measuring survey respondents’ perceptions of informal social control as well as social cohesion and trust within their community.

Previous literature has indicated that individuals’ perceptions of collective efficacy are grounded in social structural contexts (Gibson et al., 2002; Morenoff, Sampson, & Raudenbush, 2001; Sampson et al., 1997). Sampson et al. found that the residential stability of an area was positively correlated with perceptions of collective efficacy. The same study found that home ownership and residential tenure, both of which are factors indicating a higher vested interest in one’s community, were positively correlated as well. Conversely (and of particular value to the present study concerning immigrant workers), Sampson et al. found that immigrant concentration was significantly negatively associated with perceptions of collective efficacy. It is noteworthy that Sampson et al. concluded that neighborhood disorder and income level may also be contributing factors in individuals’ perceptions of collective efficacy. All of these factors can be summed up under the broader conclusion of Gibson et al.’s (2002) finding: social integration into a neighborhood was strongly correlated with increased perceptions of collective efficacy.
In a meta-analysis of works on collective efficacy perceptions, Bandura (2000: 73) made the conclusion that as a whole, the body of thought indicated that increased collective efficacy bolstered motivational investment and staying power in spite of obstacles. This conclusion involved a number of vastly different social spheres: educational systems (Bandura, 1997), business organizations (Earley, 1994; Hodges & Carron, 1992; Little & Madigan, 1994), sports teams (Carron, 1984; Feltz & Lirgg, 1998; Mullen & Cooper, 1994; Spink, 1990), combat teams (Jex & Bliese, 1999; Lindsley, Mathieu, Heffner, & Brass, 1994), and urban neighborhoods (Sampson, Raudenbush, & Earls, 1997).

Most importantly to the present study are the effects perceptions of collective efficacy have on neighborhoods. Once again, the two works of notable relevance are Gibson et al. (2002) and Sampson et al. (1997). When measuring the mediation of collective efficacy perception between social integration and fear of crime Gibson et al. (2002: 552) found that "perceptions of collective efficacy had a negative and significant direct effect on fear of crime, indicating that residents who perceived their neighbors as more trustworthy and as informal agents of social control, who were willing to intervene, were significantly less likely to fear crime." Sampson et al. (1997) found that perceptions of collective efficacy were inversely related to the amount of crime individuals perceived to occur in their neighborhood.

**Importance of Studying Collective Efficacy in the Context of Natural Gas in Pennsylvania**

Pennsylvanians’ concerns regarding immigrant natural gas workers are found in the works of Brasier et al. (2011) and Filteau (2012). Key informants reported to Brasier et al. (2011) that they were concerned that gas workers might increase demands on law enforcement, social services, schools, and emergency services. Interviewees within Bradford County law enforcement said they were encountering increased traffic violations and even detained three out-
of-state natural gas workers for misdemeanor offenses. Brasier et al. (2011) also found that many informants within Lycoming and Bradford counties were concerned that incoming workers would not value “their way of life.”

Filteau (2012) took the unique approach of conducting interviews with employees of a natural gas contract drilling company. Although Magna-Drill (a pseudo name used in the study) workers did not identify as such, they stated that it was common for natural gas workers in Pennsylvania to embrace the “roughneck” natural resource worker stereotype. In many of his interviews, Filteau discussed public perceptions with the workers. It was the general perception of Magna-Drill employees that the public did not differentiate between companies, workers, or phases of development; they believed all gas workers were the same stereotypical “roughneck” or “oilfield trash.” This idea of immigrant workers not valuing locals’ way of life or perceiving them as “trash” can be related back to Freudenburg (1986), Krannich, Greider, and Little (1985), Hunter, Krannich, and Smith (2002), and O’Connor (2015) studies attributing heightened fear of crime to presence of outsiders.

As was previously stated with the social disruption hypothesis, increased fear of crime was found in correlation with community change caused by natural resource extraction (Freudenburg, 1997; Krannich et al, 1985). Additionally, outside of the natural resource extraction literature it was found that collective efficacy is inversely correlated with perceived crime (Gibson et al, 2002) and fear of crime (Sampson et al, 1997). The present study seeks to investigate these two areas of study. Building upon this foundation, the moderating effects of well development will be assessed. I will investigate two hypotheses: (1) higher levels of collective efficacy are correlated with decreased fear of crime. (2) The relationship between
collective efficacy and fear of crime will be influenced by exposure to migrant natural gas workers.

Collective efficacy $\rightarrow$ Fear of crime

Exposure to well development

Figure 2-1. Hypotheses Concept Map.
Chapter 3
Methods

The Survey

The survey used was designed by Kathryn Brasier, Shannon Monnet, Leland Glenna, Timothy Kelsey, Mark Suchyta, and Joshua Perchinski with funding provided by The Center for Rural Pennsylvania. The Pennsylvania State University’s Survey Research Center (SRC) was asked to administer surveys to 4,000 households across four Pennsylvania counties of Bradford, Greene, Lycoming, and Washington. Participants were asked for information on their experiences with the Marcellus Shale development in their respective communities. The specific topics within the survey included participants’ views on community impacts, views on community life and values, home and property, natural gas rights, and basic demographics. Surveys were distributed via mail, in paper and pencil form, with the option to submit a web version of the survey if preferred.

Sample Description

The sample consisted of randomly selected households living in one of four counties in Pennsylvania (Bradford, Lycoming, Washington, and Greene). Being that the primary focus of the survey was impacts of Marcellus Shale, strata were chosen based on number of wells per square mile. Accordingly, the strata were 0 wells/square mile; >0 and <1 wells/square mile; and >1 well/square mile. Households were randomly selected from census block groups which fell into one of the three strata. For each of the four counties 500 households were randomly selected within the >1 well/square mile group and 250 households were selected in the remaining two groups, for a total of 4,000 households. The larger sample size given to the highest well density groups was done to ensure that the sample contained enough households with direct experiences with the industry to accommodate statistical analysis.
<table>
<thead>
<tr>
<th>County</th>
<th>Block/Cluster Description</th>
<th>0 wells/sq.mi.</th>
<th>&gt;0 and &lt;1 wells/sq. mi.</th>
<th>&gt;1 well/sq.mi</th>
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<td>N</td>
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<td>Washington</td>
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<tr>
<td>Greene</td>
<td></td>
<td>250</td>
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<td>500</td>
</tr>
</tbody>
</table>

Table 3-1. Block/Cluster Description

Survey Administration and Response

The survey was administered through 5 successive mailings from December 3, 2014 to February 9, 2015. A pre-notification letter was sent first, informing residents that they would soon receive a survey in the mail. Survey packets were then sent which contained a cover letter and the 8-page survey along with a business envelope (postage paid) to return the completed survey. The cover letter invited individuals to take the survey attached or to follow an online link to participate via the web. One week later a reminder postcard was mailed. Next a replacement survey pack was sent to those who had not yet responded. Finally, a follow-up letter was sent reminding those who had not yet taken the survey to please do so.

Of the 4,000 randomly selected households the very first correspondence was sent to, 489 never reached their intended recipient for reasons such as they had moved, were deceased, or the address could not be found. Consequently, the survey was successfully delivered to 3,511 households, of that number 1,289 completed the survey for a response rate of 36.7%. Of those who completed the survey, 381 individuals responded in Bradford County, 389 in Lycoming, 280 in Washington, and 241 in Greene.
Hypothesis, Measurement, and Analysis

Once again, this study has two hypotheses: (1) higher levels of collective efficacy are correlated with decreased fear of crime as has previously been found. (2) The relationship between collective efficacy and fear of crime will be influenced by exposure to immigrant natural gas workers.

Collective efficacy \rightarrow \text{Fear of crime}

\Updownarrow

? \Updownarrow

\text{Exposure to well development}

Figure 3-1. Hypotheses Concept Map.

All variables (see figure 3-1) were taken from items asked on the survey. The independent variable, collective efficacy, was measured using a four item index based on respondents’ perceptions of social cohesion and informal social control in their community. The present study uses level of agreement with following statements:

Because of Marcellus Shale development…

- (Cohesion) "I trust people in the community less."
- (Cohesion) “People act with less courtesy to each other in public spaces."
- (Control) "It is harder to get help from people who live here."
- (Control) "People are more likely to call the police if someone is acting suspiciously."

These questions were answered using a five point Likert scale indicating level of agreement; respondents could choose between “strongly disagree,” “disagree,” “neutral,” “agree,” and “strongly agree” with each statement. Responses for the trust, courtesy, and help
items were recoded so that higher scores indicated a more positive perception. In this manner, when the four were combined to form the collective efficacy measure a higher score (the max score being 20) indicated the perception of higher collective efficacy. A Cronbach’s Alpha test showed that the four items had good covariance, with a scale reliability coefficient of .79.

The dependent variable, fear of crime, was measured using the Likert scale response to the statement, “Because of Marcellus Shale… I feel more vulnerable to crime and violence.” The responses were recoded into a dummy variable for the regression analysis, wherein the responses “strongly agree” and “agree” were “felt vulnerable” and the responses of “strongly disagree” and “disagree” as well as “neutral” were “did not feel vulnerable.” The “neutral” responses were coded in with the two disagree choices for two reasons. First, this format allows the use of binary regression for analysis. Secondly, it allows for the discussion of findings to be framed in a “yes, respondents felt more vulnerable” versus “no, respondents did not feel more vulnerable.” It is notable that no statistically substantial differences were observed when analyses were done with “neutral” coded with the agreement responses.

The second independent variable, well density, was used as a proxy for possible contact with natural gas workers, i.e. the more wells around an individual’s home, the more likely they are to interact with workers. Wells were geospatially coded in relation to each respondent’s address. Analyses were originally conducted using number of wells within 1 mile, 2 miles, and 5 mile radii of the home, both as interval measures and categorically, but no appreciable differences were found. Number of wells within one mile, as an interval, was used for the following univariate and bivariate analyses. Number of wells in one mile, as a categorical variable, was used for regression analysis. The categories 0 wells (51.26% of sample), 1-4 wells
(24.64%), and 5-29 wells (24.10%) within 1 mile were used. Categories were used because in its interval form, the variable is not normally distributed.

The control variables included the demographic variables of county, age, sex, race, yearly household income, education, number of children in the home, and number of adults in the home. Sex, race, and number of children were transformed into male or not, white or not, and have children in the home or not, respectfully. Age and adults in home were left as an interval ratio variables. Income, education, and county were categorical variables that were recoded into separate dummy variables for the regression analysis; this was done because in their categorical state the odds ratio values of the logistic regression would make less interpretive sense. Additionally, when income was analyzed as an ordinal variable a statistical relationship was not shown, when specific categories were analyzed separately they did, indicating a non-linear relationship. County, income, and education were used as categorical variables. The categories Lycoming County, income of $50,000 to $99,999, and attending or obtaining a four year college degree were used as the reference categories. These reference groups were determined based on recommendations within Hardy (1993): income and education reference groups contained the majority of respondents and were the ordinal middle group. Lycoming County was chosen because it was one of two that contained the highest number of respondents (281) as well as the lowest well density.

The control variables are necessary because previous studies have found a correlation between age, sex, race, and income with increased fear of crime. Box, Hale, and Andrews (1988) compared the effects of age, sex, and race on fear of crime; it was found that being elderly, female, or a minority all increased fear of crime; the strongest correlations were concerning sex
and fear. In other studies, correlations between increased fear of crime and low income have been found (Baumer, 1985; Taylor and Hale, 1986).

Analysis weights were provided along with the data from the Survey Research Center. During preliminary analysis these weights were used in univariate and bivariate analysis and compared to unweighted results. Reported in the following section are unweighted results simply because no tangible differences were found. Concerning the regression analysis, no weight was needed because the variables well density, county, gender, and number of adults in household were included. This recommendation was made by the Survey Research Center based on the findings of Christopher Winship and Larry Radbill (1994).

Four separate binary logistic regression analyses were utilized to investigate these hypotheses using the statistical software STATA mp®. The first tested the direct effect of collective efficacy on fear of crime. The second analysis tested the influence of the control variables on this relationship. The third looked at the influence of wells within one mile on the collective efficacy/fear relationship. The final regression analyzed the influences of wells within one mile on the collective efficacy/fear relationship with control variables included.
Chapter 4

Findings

Of the 1,289 completed and partially completed surveys, 913 cases were used for this analysis due to case wise deletion based on missing values for the selected survey items. By county that is 281 respondents in Bradford, 281 in Lycoming, 191 in Washington, and 160 respondents in Greene.

Sample Characteristics

Table 4-1 describes the univariate descriptive statistics for all respondents. As can be seen in the table, the sample was 68.9% male and 97.4% were non-Hispanic whites. The largest percent of respondents fell into the yearly household income bracket of $50,000 to $99,999 dollars at 39.4% (36.5% had less than $50,000 and 24.1% equal to, or more than $100,000). The average age was 56.8 years and correspondingly only 27.4% of respondents said they had kids at home. The mean number of adults in the home was 1.9. Concerning Education, the largest number of individuals had up to a high school diploma (40.4%), 46.2% attended or graduated from college, and 13.4% had additional degrees.
Concerning the main variables: the average score for the collective efficacy index was 13.1 (12 was the midpoint value) and the mean value for the question “Because of Marcellus Shale… I feel more vulnerable to crime and violence” was 2.8 which is slightly below the midpoint value of 3. Finally, the average number of wells within one mile of respondents’ homes was 2.8 across all four counties. See table 4-1 for more detail on all variables used in this analysis.

In comparison to the general population of the four study counties, the sample is slightly older, more educated, wealthier, and is composed of more males. Of respondents, 68.9% were male compared to the 49.2% in the population. Of the sample respondents, 31.3% were 65 and older; this corresponds to only 21.9% in the larger population. Survey respondents showed higher numbers in both categories of education after high school. The sample had a slightly
higher household income in categories beyond 50,000 dollars annually. Finally, both the sample and the population are overwhelmingly composed of non-Hispanic whites, 97.4% and 94.1% respectively (U.S. Census Bureau’s ACS 2013 (5-year estimates), 2013).

**Differences by County**

Concerning differences across counties, the mean value of the independent variable, fear of crime, varied from Lycoming County at 2.577 and Green County with 3.088. Additionally, the average collective efficacy score ranged from 12.381-13.555; again, a score of 12 being the midpoint response. It can be seen in table 4-2 that from highest to lowest on average fear of crime the counties are ranked Greene, Bradford, Washington, and Lycoming. In ranked order from highest to lowest on average collective efficacy the counties are Washington, Lycoming, Bradford, and Greene. Excluding the exception of Lycoming and Washington being switched (with an average difference in collective efficacy being just over 0.1 on the 20 point scale) the four counties mirror each other in ranked order concerning feelings of fear of crime and collective efficacy. Concerning well density, Washington County had the highest number of wells per square mile at 3.745; Greene County had the second highest, at 3.147. Bradford and Lycoming had lower well density within the one mile range at 2.387 and 2.289 on average, respectively.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Bradford N=281</th>
<th>Lycoming N=281</th>
<th>Washington N=191</th>
<th>Green N=160</th>
<th>Total N=913</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean Values</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear of Crime</td>
<td>3.018</td>
<td>2.577</td>
<td>2.769</td>
<td>3.088</td>
<td>2.840</td>
</tr>
<tr>
<td>Wells in 1 Mile</td>
<td>2.387</td>
<td>2.289</td>
<td>3.745</td>
<td>3.147</td>
<td>2.774</td>
</tr>
<tr>
<td>Number adults at home</td>
<td>1.918</td>
<td>1.854</td>
<td>1.890</td>
<td>1.888</td>
<td>1.887</td>
</tr>
<tr>
<td>Age</td>
<td>56.227</td>
<td>57.137</td>
<td>57.786</td>
<td>56.049</td>
<td>56.801</td>
</tr>
<tr>
<td><strong>Percentages</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>70.6%</td>
<td>70.4%</td>
<td>64.6%</td>
<td>67.5%</td>
<td>68.7%</td>
</tr>
<tr>
<td>White</td>
<td>97.5%</td>
<td>97.9%</td>
<td>96.9%</td>
<td>96.9%</td>
<td>97.4%</td>
</tr>
<tr>
<td>Have Kids at Home</td>
<td>30.9%</td>
<td>25.4%</td>
<td>25.5%</td>
<td>27.0%</td>
<td>27.4%</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $49,999</td>
<td>41.6%</td>
<td>37.4%</td>
<td>31.4%</td>
<td>31.9%</td>
<td>36.5%</td>
</tr>
<tr>
<td>Between $50,000-$99,999</td>
<td>39.1%</td>
<td>40.2%</td>
<td>42.4%</td>
<td>35.0%</td>
<td>39.4%</td>
</tr>
<tr>
<td>More than $100,000</td>
<td>19.2%</td>
<td>22.4%</td>
<td>26.2%</td>
<td>33.1%</td>
<td>24.1%</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to High School Degree</td>
<td>43.1%</td>
<td>37.7%</td>
<td>41.9%</td>
<td>40.6%</td>
<td>40.4%</td>
</tr>
<tr>
<td>Attended or Graduated</td>
<td>45.2%</td>
<td>52.0%</td>
<td>43.5%</td>
<td>41.3%</td>
<td>46.2%</td>
</tr>
<tr>
<td>College</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate Degree</td>
<td>11.7%</td>
<td>11.4%</td>
<td>14.7%</td>
<td>18.1%</td>
<td>13.4%</td>
</tr>
</tbody>
</table>

Table 4-2. Average Differences by County.

**Bivariate differences**

Before moving onto regression analysis it is important to look at bivariate comparisons to get a sense of individual interactions among variables. Tables 4-3 and 4-4 use Spearman’s correlations as well as T-tests to assess the bivariate relationships in all variables used during this analysis. Spearman’s correlations were used to assess the direction and magnitude of relationships between variables. Spearman’s correlation was used over Pearson’s because it is
more appropriate to use with ordinal variables in assessing the direction and magnitude of relationships while also capable of comparing interval variables. Analyses were also done using Spearman’s and Pearson’s correlations separately for ordinal and interval variables respectfully, the results were the virtually the same.

### Table 4-3. Bivariate Descriptive Statistics- Spearman’s Correlations

<table>
<thead>
<tr>
<th>Variable</th>
<th>Spearman’s Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fear of Crime</td>
</tr>
<tr>
<td>Collective Efficacy</td>
<td>-0.621***</td>
</tr>
<tr>
<td>Wells in 1 Mile</td>
<td>-0.019</td>
</tr>
<tr>
<td>Age</td>
<td>0.114***</td>
</tr>
<tr>
<td>Number Adults at home</td>
<td>-0.083*</td>
</tr>
<tr>
<td>Income</td>
<td>-0.140***</td>
</tr>
<tr>
<td>Education Level</td>
<td>-0.027</td>
</tr>
</tbody>
</table>

*Table 4-3. Bivariate Descriptive Statistics- Spearman’s Correlations

*p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001.

### Table 4-4. Bivariate Descriptive Statistics- T-test Mean Differences

<table>
<thead>
<tr>
<th>Variable</th>
<th>T-test Mean Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fear of Crime</td>
</tr>
<tr>
<td>Male</td>
<td>0.304***</td>
</tr>
<tr>
<td>White</td>
<td>0.121</td>
</tr>
<tr>
<td>Have Kids at Home</td>
<td>0.193*</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
</tr>
<tr>
<td>Less than $49,999</td>
<td>-0.323***</td>
</tr>
<tr>
<td>Between $50,000-$99,999</td>
<td>0.126</td>
</tr>
<tr>
<td>More than $100,000</td>
<td>0.244**</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>Up to High School Degree</td>
<td>-0.036</td>
</tr>
<tr>
<td>Attended or Graduated College</td>
<td>0.121</td>
</tr>
<tr>
<td>Graduate Degree</td>
<td>-0.185</td>
</tr>
<tr>
<td><strong>County</strong></td>
<td></td>
</tr>
<tr>
<td>Bradford</td>
<td>-0.257**</td>
</tr>
<tr>
<td>Lycoming</td>
<td>0.381***</td>
</tr>
<tr>
<td>Washington</td>
<td>0.102</td>
</tr>
<tr>
<td>Greene</td>
<td>-0.300**</td>
</tr>
</tbody>
</table>

*Table 4-4. Bivariate Descriptive Statistics- T-test Mean Differences

*p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001.

Collective efficacy, age, and income all had statistically significant correlations with fear of crime. Among these independent variables, the collective efficacy measure showed the
strongest correlation with fear of crime; the negative value of -0.621 (p≤ 0.001) indicates a moderately strong and inverse correlation between the two; i.e. as collective efficacy increases fear decreases. Income also appears to have statistically significant negative correlations with fear of crime with a value of -0.140 (p≤ 0.001). Increased number of adults in the home was associated with decreased fear with a value of -0.083 (p ≤ 0.05). Age was the only variable to have a positive correlation with fear of crime with a value of 0.114 (p≤ 0.001); meaning that as age increase so does fear of crime. Income was the only variable to have a statistically significant correlation with collective efficacy with a value of 0.114 (p≤ 0.001). Substantively, higher levels of fear of crime were associated with lower levels of collective efficacy, lower income, and higher age. These findings concerning the control variables were consistent with the previous research by Baumer (1985), Taylor and Hale (1986), and Box, Hale, and Andrews (1988).

T-tests were used to assess nominal variables. Most of the variables were found to have a difference of means that was different from zero and statistically significant. For example, women’s fear of crime mean value was 3.049 while men’s was slightly less at 2.745, resulting in a difference of 0.304. Substantively, the t-tests showed that on average, males felt less fear of crime (p≤ 0.001) and perceived more collective efficacy (p≤ 0.001) in their community as compared to females. Those with kids at home felt less fear of crime (p ≤ 0.05). Finally, the differences by county in table 4-4 reflect the same findings as the univariate results in table 4-2: Green County respondents felt the most fear of crime (p≤0.01) while those in Lycoming County felt the least (p≤ 0.001). Greene County had the lowest perceived collective efficacy (p≤ 0.001) and Washington had the highest (p≤0.01).

The initial univariate and bivariate exploration of the data revealed a few key things. In addition to the light shed on the demographic composition of the sample by the univariate data, it
was found that the mean value for fear of crime was slightly below a neutral response (less fear) while collective efficacy was slightly above a neutral response (more collective efficacy). The bivariate data revealed an initial inverse relationship between collective efficacy and fear of crime as was hypothesized. Additionally, the bivariate data indicated some demographic factors which influence collective efficacy and fear of crime. Namely, higher levels of fear of crime were associated with increased age, lower income, less adults in the home, and not having kids at home. The statistically significant influencers of fear of crime were sex, having kids at home, and county. The statistically significant influencers of collective efficacy were sex and county.

**Logistic Regression**

The first logistic regression model’s purpose was to ascertain the relationship between the independent variable, collective efficacy, and the dependent variable of fear of crime. It is important to reiterate, for all logistic regression analysis respondents answers were collapsed into just two categories: “more vulnerable” versus “not more vulnerable.” It can be seen in table 4-5 that the odds ratio value for the first model was 0.564 (p<.001). This means that every 1 unit increase on the collective efficacy scale is associated with a 43.7% reduction in odds of feeling fear of crime. Substantively, respondents who had heightened perceptions of their collective efficacy felt less fear of crime.
Table 4.5. Logistic Regression Analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collective Efficacy</td>
<td>0.564***</td>
<td>0.548***</td>
<td>0.564***</td>
<td>0.546***</td>
</tr>
<tr>
<td>1-4 Wells in 1 Mile</td>
<td></td>
<td>0.907</td>
<td>0.715</td>
<td></td>
</tr>
<tr>
<td>5-29 Wells in 1 Mile</td>
<td></td>
<td>0.766</td>
<td>0.661</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>1.034***</td>
<td>1.036***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>0.952</td>
<td>0.944</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>0.934</td>
<td>0.904</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have Kids at Home</td>
<td>1.410</td>
<td>1.469</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number Adults at Home</td>
<td>0.895</td>
<td>0.904</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than $50,000</td>
<td>0.893</td>
<td>0.876</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than $99,999</td>
<td>0.581*</td>
<td>0.594*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to High School Degree</td>
<td>1.045</td>
<td>1.054</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate Degree</td>
<td>1.845*</td>
<td>1.835*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>County</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bradford</td>
<td>2.476***</td>
<td>2.731***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washington</td>
<td>2.243**</td>
<td>2.411***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greene</td>
<td>1.704*</td>
<td>1.821*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LR chi²</td>
<td>257.850</td>
<td>307.170</td>
<td>259.490</td>
<td>31.660</td>
</tr>
<tr>
<td>Prob &gt; chi²</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.227</td>
<td>0.271</td>
<td>0.229</td>
<td>0.275</td>
</tr>
</tbody>
</table>

The second model was used to investigate any confounding effects of other variables on the relationship between collective efficacy and fear of crime. The control variables included in this model were sex, race, income, education, age, and whether the respondent has children at home or not. When these variables were controlled for the odds ratio value for collective efficacy slightly decreased to 0.548 (p<.001). Meaning that every 1 unit increase on the collective efficacy scale is associated with a 45.2% reduction in odds of feeling fear of crime. Of particular note among the control variables was age with an odds ratio value of 1.034 (p<.001), meaning that every 1 year increase in a respondents’ age was associated with a 3.4% increase in the
chances of feeling fear of crime. This was consistent with the findings of Box, Hale, and Andrews (1988).

The three categorical variables all showed statistically significant results for at least one category. Concerning income, an odds ratio of 0.581 (p<0.05) was found for those in the income bracket of more than $99,999. This means that as compared to those in the $50,000-$99,000 reference group (the majority), a 41.9% reduction in odds of feeling fear of crime was found. Only one category of education was significant as well. It was found that those with a graduate degree had an odds ratio of 1.845 (P<0.05), thus a 84.5% increase in the odds of feeling fear of crime as compared to respondents who attended or graduated from college (the majority). Finally, all counties showed statistically significant results as compared to the reference group Lycoming County. Those respondents from Bradford, Washington, and Greene counties were more likely to express fear of crime as compared to those individuals from Lycoming County; this finding is consistent with the univariate analysis.

The third model’s purpose was to examine if there was any influence of well density on the relationship between collective efficacy and fear of crime. The odds ratio for collective efficacy remained the same as in the first model, 0.564 (p<0.001). Number of wells within one mile was found not to have a statistically significant relationship in any category with fear of crime. Respondents within the 1-4 well category had an odds ratio of 0.907 (p>.05), as compared to those with zero wells in one mile. Respondents within the 5-29 well category had an odds ratio of 0.766 (p>.05), as compared to those with zero wells in one mile. The lack of change concerning collective efficacy with the inclusion of well density in this model indicates that well density does not change the relationship between collective efficacy and fear of crime.
In the fourth model when the well density variable was added in with all the control variables, little overall change occurred. The final logistic regression model, which contained all variables, had a pseudo $R^2$ value of 0.2731. This means that approximately 27.31% of the variance observed in the fear of crime measure could be explained by the included variables.
Chapter 5
Conclusions and Implications

As previously mentioned, this study has two hypotheses: (1) higher levels of collective efficacy are correlated with decreased fear of crime. (2) The relationship between collective efficacy and fear of crime will be influenced by exposure to natural gas workers. The analysis conducted agreed with the first hypothesis only. It was found that the inverse relationship between perceived collective efficacy and fear of crime is a robust one and is in agreement with the previous works done by Gibson et al. (2002) and Sampson et al. (1997).

It is the main finding of this study that higher levels of perceived collective efficacy are associated with decreased fear of crime measured as feelings of “vulnerability to crime and violence” within the context of the natural gas development in Pennsylvania. Concerning the particular measure used in this study, it was found that for every one unit increase in collective efficacy, respondents were 45.4% less likely to feel fear of crime. Of particular note among the control variables was age, every 1 year increase in a respondents’ age was associated with a 3.6% increase in the chances of feeling fear of crime. Additionally, this study did not find any statistically significant evidence of an influence by unconventional well density, as a proxy for potential to interact with workers, on this relationship.

However, as previously stated, all survey items used in this analysis began with the phrase, “Because of Marcellus Shale…”. It can be said of these results that changes from Marcellus Shale in collective efficacy are related to changes from Marcellus Shale in fear of crime. Furthermore, this relationship holds regardless of well density, a proxy for direct interaction with natural gas activity and workers. In other words, if respondents expressed Marcellus Shale activity has led to a decrease in their communities’ efficacy they are more likely to also express that the activity has led to greater vulnerability to crime, and vice versa. This
framing of the concepts of social disruption, collective efficacy and fear of crime still allows for
the same substantive conclusions and outcomes. The foundation of both disruption and collective
efficacy are the individual community members’ perceived social ties to other community
members. This framing of the survey items does not change this. Furthermore, this interpretation
of results still supports England & Albrecht’s definition of social disruption as communities
entrance “in to a period of generalized crisis and loss of traditional routines and attitudes.” as
well as O’Connor’s (2015) characterization that communities become less cohesive.

Finally, social disruption is discussed in the natural resource development literature as
somewhat of a vague concept wherein researchers talk about symptoms they’ve chosen; then
compare population influxes in areas of natural development to point to increased feelings of
vulnerability, disorder, or increases in crime (for an example see Kohrs’ 1974 work). As it is
discussed in the literature, disruption is an inherently community oriented concept akin to Emile
Durkheim’s theory of anomie. In examining the division of labor, he postulated that “individuals
can become isolated and be cut adrift in their highly specialized activities. They can more easily
cease to feel a common bond with those who work and live around them (Ritzer, 2011; 90).”

In his research into suicide in 1897, Durkheim connected sociological theory to concrete
research in a way never done before; he set out to empirically prove his theory’s superiority over
other concepts and factors. Unlike Durkheim’s anomie, social disruption literature has yet to do
the same. The field would greatly benefit from a work wherein social disruption is reexamined
and operationalized. Sampson did so with his 1997 work concerning collective efficacy, as did
the present work. Social disruption research should be centered on an operationalized measure of
social cohesion among neighbors, as was done here. This would add more legitimacy and weight
to any resulting conclusions regarding products of the disruption.
Limitations

There were a few difficulties within this research that could be improved upon in the future. The first difficulty was the aforementioned survey item wording. The four collective efficacy measures as well as the fear of crime measure were all preceded by the phrase “Because of Marcellus shale…” This was the format of a majority of questions on the larger survey. Two ideal situation would have been an improvement. First, if these five items were completely separated from the Marcellus shale issue; thus, the mediation effects, in the form of well density, would have been the only involvement of Marcellus. A second option would have been two sets of these items, one asking “before Marcellus Shale” and “after.” Despite this, the items still do measure the core values outlined by Sampson et al (1997). I would expect ether of these changes to increase the strength of correlations, but not drastically change the significance or direction.

The second difficulty was the well proximity measure being used as a representation of possible interaction with workers. There anecdotally appears to be an overarching belief held by many local rural Pennsylvanians that the out of state workers that have come to Pennsylvania are ne’er-do-wells or even potential criminals (Filteau, 2014). A simple item on the survey directly asking respondents how often they interact with Marcellus shale workers in their community would have been superior to well proximity as a proxy measure. This lack of a more tangible measured worker interaction was the biggest difficulty with this study. Additionally, in a perfect analysis there could have been an entire section of the survey devoted to types of potential interaction with the natural gas industry. These could have then been compared and contrasted with the direct interaction measure. Also, a crucial statistic would be population change of out-of-state workers vs local residents. This number is not currently known. Due to the transient nature of the worker population, census data is limited in its ability to shed light on this. The inclusion of both a direct survey item about interaction and population composition change
would allow a researcher to look into whether one or another more-so effects fear of crime and/or collective efficacy.

The third difficulty was the survey sample itself. While it did yield a good amount of data, only four Pennsylvanian counties were represented. Ideally, all counties in Pennsylvania would have been surveyed, or at least a mix of counties with and without Marcellus Shale activity. Furthermore, a longitudinal analysis could yield much clearer results about changes in fear of crime and collective efficacy in the context of Marcellus shale. A longitudinal analysis would be beneficial because of the implication in most natural resource development research (including the present one) that change is occurring, a one-time survey is unable to analyze change over time.

A final difficulty, with no easy solution, is limitation of attribution by survey respondents. Respondents can have a tendency to attribute circumstances and outcomes to perceived environmental factors. Thus giving “false positives” on survey items. This occurrence is based on Goffman’s 1974 work on framing. This perspective postulates that individuals rely on a collection of anecdotes and stereotypes to understand and respond to events. In the case of this study it makes it difficult to attribute findings to actual Marcellus Shale activity versus respondents’ prejudices.
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