THESIS

RISKY AIR: AN ANALYSIS OF RISK PERCEPTIONS, PUNITIVE ATTITUDES, AND REGULATORY SUPPORT TOWARDS CORPORATE VIOLATIONS OF THE CLEAN AIR ACT

Submitted by

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ABSTRACT

RISKY AIR: AN ANALYSIS OF RISK PERCEPTIONS, PUNITIVE ATTITUDES, AND REGULATORY SUPPORT TOWARDS CORPORATE VIOLATIONS OF THE CLEAN AIR ACT

This research explores whether perceptions of environmental risk influences support for social control measures, with specific reference to violations of the Clean Air Act. Drawing on national survey data collected between April and September of 2013, the research assesses whether environmental risk perception affects support for social control measures in the form of regulation and punishment. Risk perception is measured using a risk theory developed by Robert O'Connor, Richard J. Bord, and Ann Fisher (1999), which includes three components: 1) problem awareness, 2) negative consequences to be experienced by oneself and others, and 3) knowledge of the causes of the problem.

The research findings indicate that perceived negative consequences to self and/or others and knowledge of the causes of the problem are significant predictors of regulatory support while problem awareness was not. Two of the three forms of risk were generally not relevant for understanding public support of punishment in response to corporate environmental crime. The notable exception was negative consequences to self and others, where people who favored stricter forms of punishment were those who perceived the most negative consequences associated with air pollution. In sum, it appears that O'Connor et al. (1999) risk perception theory is salient for understanding regulation but only partially relevant for understanding punishment preferences for environmental corporate crime.

DEDICATION

I could write a thousand pages of thanks and never be able to fully express how grateful I am for all of those that have helped me in every way I can imagine, and in others that I did not think possible, so I just want everyone that has helped me to know that I am forever in their debt. As a child with ADHD, I have had many problems with focusing, which has challenged me throughout my academic career. Yet, here I am writing a dedication page for my master's thesis! I have indeed come far; however, I would not have been able to reach such heights without help. First, I must thank my parents, Gene and Julie Tullis, for the help that they have given me. Without their consistent help and support, I would not have been able to make it through life, much less graduate school. I also need to thank both Dr. Tara O'Connor Shelley and Dr. Michael Hogan for their help, financially, emotionally, and mentally. Dr. Shelley has provided me with such invaluable wisdom and a lot of her time in making this thesis truly wonderful, and I feel that without her help and guidance, I would have dropped out of graduate school a long time ago. Dr. Michael Hogan has also been an instrumental part of my thesis, particularly when I was frustrated with my data and working with SPSS; he helped me to understand what I needed to do and how to interpret my results. I also wish to thank Dr. Charles Davis who has taken a significant amount of his precious time to review my lengthy thesis and sit on my committee at the last minute. Also I wish to present a special thank you to the undergraduate students who made this possible.

Once again, thank you to everyone who has made this possible, and now without any further ado, I present to you this thesis!

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INTRODUCTION

From a social sciences perspective, investigations into environmental quality and change are relatively new, and criminology has not traditionally considered the environment as a topic that requires special attention. We know that issues involving climate change, environmental degradation, and social control of crime and regulatory infractions all play an important role on quality of life. And yet, it is less common to connect the topics of the environment and crime. This research explores whether perceptions of environmental risk influences support for social control measures, with specific reference to violations of the Clean Air Act (CAA).

The research is guided by Robert O'Connor, Richard J. Bord, and Ann Fisher's theory of risk and concern. This theory consists of three elements: 1) "expectations that the problem will or is happening," 2) "expectations that negative consequences are likely for self and others," and 3) "knowledge of the causes of the problem" (O'Connor, Bord, and Fisher 1999:462). O'Connor and colleagues developed this theory to explain climate policy preferences and thus, it was immediately applicable to the current research endeavor. This theory will be applied to hypothetical scenarios involving corporate violations of the CAA to learn if the theory can explain an individual's willingness to impose social control in the form of civil and criminal penalties. To this author's knowledge, there are no previous studies on individuals' beliefs regarding punishment for violators of air pollution laws and regulations using this theoretical lens. Thus this research will allow us to better understand individuals' views of the severity of the air pollution problem while also learning what they want to do about it.

This research seeks to answer six research questions derived from O'Connor et al. (1999) risk theory. The first three research questions deal with support for regulation and whether problem awareness, negative consequences to self and others, and knowledge of the causes of the

problem influences support for regulation in general. The final three research questions concern punitive attitudes and whether problem awareness, negative consequences to self and others, and knowledge of the causes of the problem influences support for punishment of illegal corporate behavior. The data gathered to answer these research questions was obtained through a national survey of 406 adults collected between April and September of 2013.

This thesis is organized into 6 chapters. Beginning with Chapter 1, I briefly review the sociology of risk literature concentrating on the contributions of Robert O'Connor, Richard J. Bord, and Ann Fisher. In Chapter 2, I summarize the environmental concern literature to help understand other important predictors of environmental attitudes and support for regulation. In Chapter 3, I overview the Clean Air Act (CAA) to better understand the types of regulation and punishment that are feasible under its framework. In Chapter 4, the methodology informing the research is detailed while findings are presented in Chapter 5. The thesis concludes with discussion and other concluding remarks.

This research makes two important contributions. First, green criminology is a newly emergent field; this study contributes to that developing discipline. Second, the study expands the field of green criminology by applying the sociology of risk and environmental concern literatures to the study of social control.

CHAPTER ONE: RISK THEORY

Introduction

The sociology of risk as a field of study examines actual risk or risk exposure as well as individual perceptions of risk. While not being directly studied here, Ulrich Beck (some would call him the father of risk sociology) is the main theoretical mind behind social theories on risk. In *Risk Society: Towards a New Modernity*, Beck (1992) defined risk as

> "A systematic way of dealing with hazards and insecurities induced and introduced by modernization itself. Risk, as opposed to older dangers, is consequences which relate to the threatening force of modernization and to its globalization of doubt" (Beck 1992:21).

Risk, for Beck, arose when scarcity, such as lack of food or goods, declined due to the rise of the industrial society. Risks are now "manufactured," or man-made, and some of these risks threaten the existence of humanity, such as man-made environmental disasters. In short, Beck believed that risk in the modern world is created by people and puts those same people in danger. For example, in modern society, individuals are exposed to numerous risks, such as lead, carbon dioxide, and ozone and many of these risks can lead to adverse health effects.

Other sociologists do not view risk as an encompassing term and differentiate between actual/objective and subjective/perceived forms of risk. *Actual/objective risk* refers to the myriad of objective risks that an individual is exposed to (Bord, O'Connor, and Fisher 2000; Sjöberg 2001; Zahran, Brody, Grover, and Vedlitz 2006). This is different from *perceived/subjective risk*, which is how an individual views risk, even if that risk is not actually there or it is less/more severe than a person perceives it to be (O'Connor, Bord, and Fisher 1998; O'Connor et al. 1999; Plutzer, Maney, and O'Connor 1998; Siegrist and Cvetkovich 2000; Slovic and Peters 2006). Studies of objective/subjective risk often examine risk as both an independent and dependent variable (Brody et al. 2008; Park and Vedlitz 2013; Zahran et al. 2006).

While there are a myriad ways to conceptualize risk, the thesis is informed by O'Connor et al. (1999) risk perception theory which concentrates on subjective or perceived risk. One reason this theory was selected was that it directly addressed a possible relationship between perceived risk and support for climate policy and is directly applicable to my thesis topic. The first section of this chapter will summarize risk perception theory and applications of O'Connor et al. (1999) work in other studies. The second section will include a broader review of risk-related research in sociology with an emphasis on understanding of how risk is conceptualized in the literature.

O'Connor, Bord, and Fisher's Theory of Risk and Concern

Robert E. O'Connor, Richard J. Bord and Ann Fisher (1999) theorized that there are three key types of perceived risk and these risks operate as predictors of support for climate policy. Climate policy was operationalized by asking respondents if they would support policies/mitigating behaviors[1] that would help address climate change (O'Connor et al. 1999:464). Each of the three types of risk are identified and defined in the following three paragraphs.

The first type of risk perception refers to problem awareness or "expectations that the problem will or is happening" (O'Connor et al. 1999:462). For example, if an individual perceives that air pollution is currently a problem, or might happen in the future, then his/her support for climate change policies will also increase. O'Connor et al. measured this concept by asking "how likely do you think it is that average annual temperatures will increase by 3 degrees Fahrenheit within the next 50 years" (O'Connor et al. 1999:466).

[1] For example, voluntary actions related to purchasing cars with better gas mileage, insulating and weatherizing homes, using public transportation, reducing energy consumption, etc. They also queried respondents about government mandated policies that involved rain forest preservation, mandatory automobile fuel efficiency, regulation of temperature in public buildings, increased gasoline taxes, etc.

The second type of risk perception refers to "expectations that negative consequences are likely for self and others" (O'Connor et al. 1999:462). This type of risk examines whether an activity or environmental problem is perceived to have negative consequences. For example, if an individual perceives that air pollution will have negative consequences for himself/herself and/or others, then this will increase support for climate policy. O'Connor et al. measured this concept by asking respondents to rate how likely seven items were to happen if "annual average temperature does increase by 3 degrees Fahrenheit over the next fifty years." These items ranged from "my standard of living will decrease" to "my chances of suffering from a serious disease will increase" (1999:466).

The third type of risk perception represents "knowledge of the causes of the problem" (O'Connor et al. 1999:462). In other words, does an individual understand what causes the problem? For example, if an individual sees a factory that is emitting large amounts of pollution into the air, then that individual may likely assume that one source of air pollution in their community comes from that factory. In their article, O'Connor et al. measured this concept by asking respondents to identify accurate causes of climate change to assess their knowledge (1999:466).

In sum, risk perception, as developed by O'Connor et al. (1999) has three aspects. First, an individual has to expect that the activity in question will or is happening. Second, the individual has to expect that the risky activity will pose negative consequences for himself/herself and/or others. Finally, the individual needs to have knowledge of the source of the problem.

The article by O'Connor et al. (1999) resulted in a number of conclusions. The main conclusion is "that risk perceptions matter in predicting behavioral intentions" as all three forms

of risk perception influenced respondent willingness to adopt voluntary actions as a way to mitigate climate change (O'Connor et al. 1999:469). With regard to climate change policy, they found that "most people are in the middle, favoring some actions and opposing others" (O'Connor et al. 1999:469) and that all three forms of risk were significant predictors of policy support.

There have not been many explicit tests of O'Connor et al. (1999) theory of risk other than a few additional studies authored by O'Connor and colleagues that will be briefly reviewed here. In the first study, Bord, O'Connor, and Fisher (2000) examined public knowledge of the true causes of climate change, and how such knowledge influenced support for policies (including individual voluntary actions) that would mitigate climate change. Though using a slightly different dependent variable than his previous work in 1999 (voluntary action), this research is related to his third conception of risk perception, "knowledge of the causes of the problem" (O'Connor et al. 1999:462). Bord et al. found that the public was misinformed about causes of climate change, leading to support of policies that would not properly address climate change. In sum, these findings indicate support for one tenet of O'Connor et al. (1999) risk theory, that is, a lack of knowledge of the causes of climate change does not result in support for policies that will mitigate climate change.

In a second study, O'Connor, Bord, Yarnal, and Wiefek (2002) examined determinants of an individual's willingness to reduce greenhouse gas emissions. The authors argue that willingness to reduce greenhouse gas emissions can be explained by three key factors. The first category is cognitive and includes the ideas of risk perception, knowledge for the need for action, and knowledge of the consequences (O'Connor et al. 2002:3). The second category is economic, which includes the level of economic security one has in one's life (O'Connor et al. 2002:4). The

final category is how an individual identifies politically, which included conservative, liberal, as well as Republican and Democrat (O'Connor et al. 2002:5). The variable that explained the greatest amount of the variance within the research was cognitive (risk perception), which provides further support for the theory of risk perception, specifically knowledge of the causes of the problem (O'Connor et al. 2002:15).

As previously discussed, risk researchers often study trust, costs and benefits of activities associated with risks, ideology, proximity and vulnerability to risk. These topics will be discussed below.

Sociology of Risk: Trust

A common thread in the sociology of risk research is the role of trust that individuals place with experts and institutions in determining how much harm or risk a specific activity could present. For example, Siegrist and Cvetkovich (2000) examined whether "assessments of those who are responsible for managing the hazard" affect risk perceptions related to said hazards (713). Siegrist and Cvetkovich wanted to ascertain whether individuals lacking a specific knowledge of a hazard/technology would base their perception of the hazard/technology on experts who the individual views as a trustworthy source of information. Siegrist and Cvetkovich found that individuals who lacked specific knowledge of a technology did use trusted experts to influence their perceived risk of that technology (2000:717). The authors also found that "for activities and technologies people are familiar with, trust is not needed for making judgments" (Siegrist and Cvetkovich 2000:717).

Sjöberg (2001) studied the relationship between trust and risk perceptions relating to nuclear power. Sjöberg's findings contradicted those of Siegrist and Cvetkovich. Sjöberg found that while the public views experts as knowledgeable they also believe that it is impossible to

know with absolute certainty all the risks that can occur with any given technology (2001:197). Generally, the belief in the unknown consequences of the technology (in this case nuclear power), outweighed individuals' trust in experts (Sjöberg 2001:194).

Sociology of Risk: Cost and Benefit

Slovic and Peters (2006) found that if an individual views an activity as unfavorable, they are more likely to view that activity as risky and of minimal benefit, whereas individuals who view an activity as favorable are more likely to view that activity as not risky and highly beneficial (Slovic and Peters 2006:323). This idea relates to the fact that, according to Slovic and Peters, "people judge a risk not only by what they think about it but also by how they feel about it" (2006:323). In uncertain situations, individuals are more likely to view and respond to that situation in an "all or nothing" manner, regardless of the actual probability of the situation (Slovic and Peters 2006:324). If an individual can factor in how much he/she trusts an expert on the activity, then it is possible for the situation to become less uncertain.

Sociology of Risk: Ideology

Plutzer, Maney, and O'Connor (1998) examined how ideology (liberal versus conservative) and elite professional status influenced risk perception. Scientists, journalists, and policy makers were asked to assess how safe or dangerous nuclear power is. Plutzer et al. found that "all three elite groups are susceptible to ideological bias, and it is impossible to determine whether it is liberals who exaggerate danger, conservatives who exaggerate safety or some combination of the two" (Plutzer et al. 1998:202). The authors suggest that ideology may hold more importance over risk perception than elite professional status. This finding is not specific to those working in elite professions, but is also prevalent among the lay public, with liberals being

more environmentally risk adverse than conservatives (Dunlap and McCright 2008; McCright and Dunlap 2011a).

Sociology of Risk: Proximity and Vulnerability

Zahran, Brody, Grover and Vedlitz (2006) conducted a study to determine whether an individual's physical location affects support for policies that mitigate against climate change. The main finding was that objective risk does influence support for climate policy, but risk perception (subjective risk) was a bigger predictor of climate policy. Specifically, Zahran et al. examined whether individuals living in high risk locations (due to the effects of climate change) affected the individual's willingness to adopt and support climate change policies (2006:772). With mixed results, Zahran et al. found that those living in high risk locations were less willing to support climate policy (2006:783). The results may be due to the fact that in those areas, reducing the CO_2 level would be very costly, and as a result, have negative effects on those living there (Zahran et al. 2006:783). It is a common belief that living on the coast provides many benefits, and that these benefits may outweigh the risks associated with climate change in coastal areas for these residents (Zahran et al. 2006:784).

In a second study, Brody, Zahran, Vedlitz and Grover (2008) specifically examine risk as a dependent variable. They found that physical vulnerability, closeness to a hazard, socioeconomic variables, and attitudinal variables all influenced individual risk perception. While physical vulnerability did explain risk perception, the authors found that socioeconomic and attitudinal variables (many were from the NEP), were better explanations of perceived risk (Brody et al. 2008:90).

Park and Vedlitz (2013) discuss risk perception as both an independent and dependent variable. The authors found that exposure to climate-related hazards, such as proximity to a

coast, were not predictive of policy preferences or risk perceptions (Park and Vedlitz 2013:233). The study also demonstrated that specific knowledge of the hazards and risks differed depending on the respondent's political orientation with liberals more risk adverse than conservatives (Park and Vedlitz 2013:233).

Conclusion

We know that individuals experience risk as part of their social experience. What we know less about is exactly how individuals perceive risk, and how those perceptions influence policy support, particularly in the realm of punishment for those who are responsible for generating risk. O'Connor et al. (1999) risk theory offers three types of risk that might influence policy support: 1) "expectations that the problem will or is happening," 2) "expectations that negative consequences are likely for self and others," and 3) "knowledge of the causes of the problem" (462).

CHAPTER TWO: ENVIRONMENTAL CONCERN

Introduction

There are many ways to conceptualize and study environmental concern. Some view environmental concern "as an evaluation of, or an attitude towards facts, one's own behavior, or others' behavior with consequences for the environment" (Fransson and Gärling 1999:370). Others have identified environmental concern as "a general attitude, which centers on the cognitive and affective evaluation of the object of environmental protection" (Bamberg 2003:21). In addition, scholars have defined environmental concern as "the degree to which people are aware of problems regarding the environment and support efforts to solve them and/or indicate a willingness to contribute personally to their solution" (Hunter, Hatch, and Johnson 2004:678). As shown by the wide range of definitions, the study of environmental concern might include how one views the environment, a person's willingness to adopt environmentally friendly behaviors, or policy preferences. Given the varying definitions of environmental concern, as well as the wide range of subtopics within this field of study (attitudes regarding numerous environmental issues, behaviors, policies, and intentions), this chapter will focus on the type of environmental concern most relevant to my research, namely, public attitudes regarding environmental policy, with a focus on air pollution and climate policy whenever possible. While climate change is not directly studied in this research, it is important to note that the climate change studies presented here make up a large portion of the environmental concern literature, and as such, need to be represented accordingly.

In order to measure attitudes, one of the most popular methods is to use the New Environmental Paradigm Scale (NEP), which was developed in 1978 by Dunlap and Van Liere, and updated by Dunlap in 2000 to measure an individual's pro-ecological worldview (Dunlap et

al. 2000). The NEP is a survey that uses 12 items to measure an individual's pro-ecological worldview (Dunlap et al. 2000). The NEP is used to assess whether an individual is more anthropocentric (humans are above the environment), or more ecocentric (humans are part of the environment) (Dunlap et al. 2000). According to Dunlap et al. the new NEP showed that "there is a tendency for respondents to endorse proecological beliefs" (2000:434). Their research supports prior research stating that individuals who are young, well-educated, and politically liberal tend to be more pro-environmental. In contrast to the NEP, other research explores if, and how, socio-demographic factors affect environmental concern. These factors include: age, education, gender, income, partisan identification, place, political ideology, race, and academic major. The remainder of this chapter will explore each of these factors, followed by a brief discussion on how environmental risk is a salient topic for the study of environmental concern.

Age

Age is a central variable of interest in the study of environmental concern. A famous study by Mohai and Twight (1987) examined how age related to environmental concern by differentiating between cohort and aging effects. They hypothesized that cohort differences could affect attitudes towards the environment due to "differing historical and economic conditions within which each cohort is born and raised" (Mohai and Twight 1987:799). In contrast, aging effects are "seen as the result of changing outlook due to biological, psychological, or social changes as the individual becomes older" (Mohai and Twight 1987:799). Using data from a national survey conducted in the late 1980s, Mohai and Twight found that there was a negative relationship between age and environmental concern (younger individuals were more environmentally concerned) and that this relationship was most likely to be caused by cohort effects (1987:813). More specifically, Mohai and Twight found that the greatest level of

environmental concern is among the 20-24 age group, and that concern steadily decreases with increasing age; environmental concern was lowest among the 75 and over age group (1987:812).

In another famous study, Van Liere and Dunlap (1980) examined four different hypotheses in order to determine what precisely is known about the different socio-demographic variables relating to environmental concern: the age hypothesis (younger individuals tend to be more concerned about the environment), the social class hypothesis (the higher an individual's social class, the more likely he/she is to be concerned about the environment), the residence hypothesis (urban residents will be more environmentally concerned), and the political hypothesis (Democrats and liberals are more environmentally concerned). Van Liere and Dunlap's (1980) findings indicated that the age hypothesis was supported and was significant; the social class hypothesis was supported, but had a very weak association; the residence hypothesis was also supported, but had a weak association; and the political hypothesis was also supported, but had a weak association.

More recent studies have also supported the negative relationship between age and environmental concern (Hamilton, Colocousis, and Duncan 2010:329). McCright and Dunlap (2011b) conducted a study on climate change denial. While not the focus of their study, or this research, it is interesting to note that younger individuals are more likely to believe that a consensus exists among scientists on climate change, suggesting that younger individuals are more aware of environmental issues. In a study on education, Levine and Strube (2011) found that the older the college student was (as in juniors and seniors), the more likely he/she was to have positive environmental attitudes (318).

Education

It is commonplace to control for education in research on environmental concern. The majority of studies examine educational achievement by differentiating between those with a college education versus those without a college education (Levine and Strube 2011; McCright and Dunlap 2011a; Mobley, Vagias, and DeWard 2009; Thapa 1999) while a small handful of studies explore the influence of the type of college major on environmental concern (Arnocky and Stroink 2011; Ewert and Baker 2001; Hodgkinson and Innes 2001; Lang 2011; Ridener 1999).

In the majority of studies, environmental concern increases with the level of education (Levine and Strube 2011; McCright and Dunlap 2011a; Mobley et al. 2009; Thapa 1999). For example, in a national study of adults, McCright and Dunlap (2011a) focused on environmental concern in the form of attitudes about climate change and the role of political ideology, education, and self-assessed knowledge about climate change. The authors report that education has a positive and significant effect on environmental concern when measured as attitudes about climate change. The authors also found that college educated conservative white males, with a self-assessed understanding of climate change were more likely to deny the existence of climate change (McCright and Dunlap 2011a:1168).

Thapa (1999) researched the relationship between education and environmental concern among a sample of undergraduate students, using the NEP scale. Thapa found that while college students were environmentally-focused in their attitudes, their environmental attitudes did not translate into pro-environmental actions (1999:435). Levine and Strube (2011) also conducted a study on undergraduates to explore whether environmental concern varied by freshman, sophomore, junior, and senior status. The authors operationalized environmental concern into

implicit (associating pictures with positive or negative words) and explicit (NEP) attitudes to determine which types of attitudes explained environmental behavior (Levine and Strube 2011:311). The authors found that students with more university experience had higher levels of both implicit and explicit environmental attitudes (Levine and Strube 2011:319).

Other researchers have explored how the type of academic major might influence environmental concern. The majority of this research has shown that business majors have the lowest level of environmental concern (Ewert and Baker 2001; Hodgkinson and Innes 2001; Lang 2011; Ridener 1999), while those majoring in areas such as outdoor recreation, parks, tourism, biology, environmental studies, and sociology tend to have more environmental concern (Arnocky and Stroink 2011; Hodgkinson and Innes 2001). The central reason for this pattern of findings across several studies is best explained by the work of Hodgkinson and Innes (2001) who found that those majoring in "business, economics, or a related subject" had a more economic view of the world (40), whereas those students majoring in biology, environmental studies, and sociology had a more positive attitude towards the environment (39).

Gender

One of the most consistent predictors of environmental concern is gender, whereby women are more environmentally concerned than men (Blocker and Eckberg 1997; Bord and O'Connor 1997; Xiao and McCright 2011; Zelezny, Chua, and Aldrich 2000). For example, Zelezny, Chua, and Aldrich (2000) examined gender differences in environmental attitudes using data from 14 countries. Specifically, the authors wanted to determine whether women had a higher level of ecocentrism, "a fundamental belief in the inherent value of nature, the biosphere, and all living things" than men (Zelezny et al. 2000:452). They found that women have higher levels of ecocentrism than men (Zelezny et al. 2000:452).

Blocker and Eckberg (1997) conducted a study using data from the 1993 General Social Survey in order to examine the relationship between gender and environmental concern in more depth. The authors used five models to determine this relationship: 1) economic growth orientation, 2) concerns about health and safety, 3) environmental knowledge, 4) parenthood status, and 5) trust in science and technology. For economic growth orientation, the idea is that men traditionally have a greater involvement in the marketplace, making them more likely to favor economic growth, lowering their level of environmental concern (Blocker and Eckberg 1997:843). The concerns about health and safety model states that "women's nurturance orientation leads them to be concerned about health and safety issues; this is reflected in higher levels of environmental concern" (Blocker and Eckberg 1997:843). The environmental knowledge model posits the idea that men are likely to be more knowledgeable about technical environmental issues, leading them to be less environmentally concerned about environmental damage (Blocker and Eckberg 1997:844). The parenthood status model argues "women in more traditionally "female" roles should be the most concerned about environmental damage" (Blocker and Eckberg 1997:844). Lastly, the trust in science and technology model states that "women tend to be more distrustful than men of science and technology; low levels of trust are positively related to environmental concern" (Blocker and Eckberg 1997:844). Blocker and Eckberg (1997) demonstrated that women were "more likely to lead a green lifestyle, to believe that humans naturally harm nature, to fear effects of pollution, to express belief in animals rights, and to express belief in the sacredness of nature" (847). Other findings from this study include that the family roles as well as childrearing does not affect environmental concern, while women's greater concern for health as well as safety does extend to their concern for the environment (Blocker and Eckberg 1997:854).

In a more recent study, Xiao and McCright (2011) also examined numerous factors (parenthood, employment, homemaker status) to explain the gender effect on environmental concern, and learned that the only explanatory variable in their study was that of perceived vulnerability to risk whereby women were more likely to have higher degrees of risk perception, which then effects environmental concern (Xiao and McCright 2011:1082). A related study by Bord and O'Connor (1997) examined perceptions of hazardous waste, global warming, and health-related ecological risks, and found that women have greater environmental concern than men (836). These findings also support the work of Blocker and Eckberg (1997) who similarly documented that women were more likely to express environmental concern regarding matters involving health and safety issues. In sum, there is an established body of research demonstrating that women are more environmentally concerned than men (Zelezny et al. 2000), and this is particularly the case when health and risk issues are present (Blocker and Eckberg 1997; Bord and O'Connor 1997; Xiao and McCright 2011).

Income

Environmental sociologists have examined the influence of individual income on environmental attitudes. It has been argued that that if environmental policies have an adverse effect on the economy, this in turn can impact individual income. The conflict between the economy and job security is the focus of a study by Buttel and Flinn (1976a), who explicitly studied public perceptions of the environment and the economy. Using survey data, Buttel and Flinn found that there was a difference between the desire for economic growth and protection of the environment. In particular, their findings indicated that economic growth is strongly negatively correlated with environmental reform but this effect was not as large as was previously suggested by other researchers (1976a:415). They also reported that there was a

difference between working and middle class respondents. Middle class respondents' were more likely to engage in the environment-economy debate than working class respondents (Buttel and Flinn 1976a:416). By the 1990's public attitudes began to consistently show support for environmental concern (Dunlap and Scarce 1991) leading Dunlap to characterize the environment as an "enduring concern" of the public (2002:12).

A more recent study in this line was conducted by Duroy (2008), who tested the affluence hypothesis with data from the third wave of the World Values Survey, which holds that environmental concern is positively associated with national income. In other words, as income rises, so will environmental concern. While the research findings supported the affluence hypothesis, environmental concern was higher in less developed countries than the affluence hypothesis would suggest (Duroy 2008:433). More specifically, Duroy found that wealthier countries tend to be more concerned about global environmental issues, while in poorer countries, environmental concern tends to be more local (2008:421).

Place

Area of residence or place (rural/urban or region) may also affect attitudes towards the environment. For example, Salka (2001) conducted a study that focused specifically on the Western United States, due to the fact that "future political conflict in the Western United States will stem primarily from disagreement between urban and rural residents over environmental issues" (33). In order to study how place might influence environmental concern, Salka focused on referenda on environmental issues in California, Oregon, and Colorado (2001:34). Salka found that urban counties had higher levels of support for environmental referenda than rural counties (2001:41). Interestingly, it was not place in itself that explained these rural/urban

differences, but rather clustered party affiliation, as Republican voters were more common in rural areas (Salka 2001:43).

Guagnano and Markee (1995) conducted a study to explore how region, along with standard socio-demographic variables (age, sex, income, and education) would influence environmental concern. When the authors considered region in relation to the other socio-demographic variables, they found that region was not a relevant factor in explaining environmental concern (Guagnano and Markee 1995:145).

Partisan Identification

Partisan identification is an important determinant of environmental views, and, generally speaking, Democrats are more environmentally concerned than Republicans (Dunlap and McCright 2008; Dunlap, Xiao, and McCright 2001; Konisky, Milyo, and Richardson Jr. 2008; McCright and Dunlap 2011b). Dunlap, Xiao, and McCright (2001) examined the views of Republicans and Democrats from the general public, as well as political elites in both parties. They found that political elites tend to be quite polarized over the issue of environmental protection, with Democratic political elites mostly supporting environmental policies and Republic political elites mostly opposing environmental policies (Dunlap et al. 2001:30). This trend also holds true for the general public, although to a lesser degree than was the case among the political elites (Dunlap et al. 2001:32).

Konisky, Milyo, and Richardson Jr. (2008) examined whether the scale of an environmental issue (local, national, global), along with an individual's trust in the government, could determine environmental concern, while taking into account party identification. They found that individuals were more likely to support and trust government efforts to protect the environment at the local and national level, but not at the global environmental level (Konisky et

al. 2008:1081). However, findings indicated that, regardless of the issue, "ideologically conservative individuals and Republicans expressed considerably less enthusiasm for further government action on the environment" (Konisky et al. 2008:1082).

Many environmental concern researchers have moved from studying environmental concern generally to exploring specific aspects of concern such as climate change and climate policy. Utilizing survey data, Dunlap and McCright (2008) demonstrated that Democrats are more likely to believe that climate change is happening (2008:2); are not likely to believe that news on climate change is exaggerated (2008:2); that climate change is a result of human activities (2008:3); and that climate change will pose a significant threat in their life time (2008:4). Conversely, Republicans are more likely to deny that climate change is occurring (2008:2); are more likely to believe that the news exaggerates the severity of climate change (2008:2); that climate change is not caused by human activities (2008:3); and that climate change will not pose a significant threat in their life time (2008:4).

McCright and Dunlap (2011b) conducted a follow up study to examine whether the public is still politically polarized about environmental issues and climate change policy. The findings indicated that Democrats are still more likely to agree with the scientific consensus that climate change is occurring than are Republicans (2011b:170); Democrats are more likely to express concern about climate change than are Republicans (2011b:170); educational attainment increases concern about climate change for Democrats, yet has a negative effect on concern for Republicans (2011b:175); and self-assessed understanding of climate change and the science behind it will increase concern for Democrats, and have a negative effect on concern for Republicans (2011b:175). In sum, Democrats are more likely to support environmental policies and have a higher level of environmental concern than Republicans, and this is also the case with

regard to views about climate change and policy (Dunlap and McCright 2008; Dunlap et al. 2001; Konisky et al. 2008; McCright and Dunlap 2011b).

Political Ideology

Ideology, specifically political ideology, usually is made up of three aspects. First, ideology is coherent, meaning that it is consistent (Knight 2006:625). Second, the definition of ideology usually "refers to parties, groups, and 'isms,'" which provides a way to contrast "one abstract group, or its beliefs, with another" (Knight 2006:625). Lastly, ideology has been conceptualized in spatial terms, in other words, as "a location on a left-right or liberal-conservative continuum" (Knight 2006:625). Research consistently indicates that conservatives are less environmentally concerned than liberals (Buttel and Flinn 1976b:479; Jacques, Dunlap, and Freeman 2008:350; McCright and Dunlap 2000:505; McCright and Dunlap 2003:353; McCright and Dunlap 2010:107).

There has been a great deal of sociological research on political ideology and views about climate change (a subfield of environmental concern). For example, McCright and Dunlap (2000) conducted a study in which they analyzed conservative counter-claims regarding climate change as a specific type of environmental concern. They found three main ways that conservatives challenge climate science. The conservative movement: 1) "criticizes the scientific evidence and general beliefs in support of the existence of anthropogenic global warming"; 2) "emphasizes the potential benefits of global warming, if it should occur"; and 3) stresses "that taking any proposed internationally binding action would have numerous negative consequences" (McCright and Dunlap 2000:510). Thus, their research suggests that conservatives have less environmental concern with regard to issues surrounding climate change and policy.

Referring back to the previous section on political party identification, it is worth considering whether partisan identification or political ideology is a better predictor of environmental concern. This topic was specifically examined by Buttel and Flinn (1976b), who found that though partisan identification does help to explain how an individual thinks about the environment, it is not the best measure (1976b:480). In their view, laissez-faire ideology, or beliefs regarding how much government intervention in the economy should occur, is a better predictor (Buttel and Flinn 1976b:486). In sum, conservative ideology is more likely to present a stronger measure of anti-environmental attitudes than partisan identification (Buttel and Flinn 1976b; McCright and Dunlap 2003).

Race and Ethnicity

Researchers have long been interested in understanding how race/ethnicity might impact environmental attitudes. In general, recent studies show that Latinos and African Americans are more concerned about the environment than Whites (Burger and Greenberg 2006; Whittaker, Segura, and Bowler 2005) though there is some variability in findings across studies (Lee 2008; Mohai and Bryant 1998).

Some of the early work in this area was conducted by Mohai and Bryant (1998). They refer to three hypotheses for understanding a possible relationship between race and environmental concern. The first is the *hierarchy of needs hypothesis*, which states that once an individual has met their more basic needs, such as food and shelter, the individual is then able to focus on higher order needs, which in this case may include the environment (Mohai and Bryant 1998:478). With this hypothesis in mind, Mohai and Bryant suggested that because African Americans and other people of color are disproportionately poor, and more focused on basic needs, they would be less interested in environmental concerns when compared to Whites

(1998:478). The next hypothesis they discussed is known as the *cultural difference hypothesis*, which suggests that racial minorities are not as concerned with environmental issues, given a long history of exclusion from natural areas during the time periods of slavery and discrimination (Mohai and Bryant 1998:479). The final hypothesis is known as *environmental deprivation*, and is drawn directly from the environmental justice literature. This hypothesis suggests that racial and ethnic minorities have a higher level of concern about environmental issues since they are more likely than whites to be exposed to and live in hazardous and polluted areas (Mohai and Bryant 1998:481). Mohai and Bryant found no support for the hierarchy of needs or cultural difference perspective, and some support for the environmental deprivation perspective. However, they ultimately conclude that there is little to no evidence that racial minorities have different attitudes about environmental concern than whites do (1998:500).

In a similar vein, other environmental scholars have increasingly found little to no support for the hierarchy of needs and cultural difference explanations, and more support for the environmental deprivation and environmental justice perspectives. For example, over the course of their longitudinal study (1980-2000), Whittaker, Segura, and Bowler (2005) found that Latinos and African Americans were more supportive of environmental issues than whites (445). In another study, Burger and Greenberg (2006) examined minority attitudes on environmental and ecological protection. Their findings indicated that Spanish-speaking Hispanics were more concerned about ecological issues (including protecting ecosystems and the species found within them) whereas African-Americans, Whites, and English-speaking Hispanics had a higher level of environmental concern regarding environmental protection (including clean air, water, waste management, as well as toxic chemical management) (Burger and Greenberg 2006:43). In their study of a majority African-American county in Tennessee, Jones and Rainey (2006) found that

"those who believe they are being exposed to more environmental risks, associated health impacts, and environmental injustices are going to be more concerned about their local environment than those who feel they are being less exposed and affected by these problems" (Jones and Rainey 2006:491). In sum, most of the studies presented here suggest that there is a relationship between race/ethnicity and environmental concern whereby racial and ethnic minorities tend to be more concerned than whites (Jones and Rainey 2006; Whittaker et al. 2005). However, some older studies suggest that the difference may not be large (Lee 2008; Mohai and Bryant 1998).

Air Pollution

Many of the above studies examined public support for climate change policies and/or general beliefs about climate change as specific indicators of environmental concern. This section, while brief, examines research on public views on air pollution as a form of environmental concern. Bickerstaff and Walker (2001) conducted qualitative interviews to determine public awareness of and attitudes towards air pollution. According to the authors, individual awareness of air pollution is influenced both by the level of air pollution and the amount of publicity that air pollution has received (Bickerstaff and Walker 2001:134). The sensory experiences (seeing and smelling pollution) of the individuals created awareness of poor air quality (Bickerstaff and Walker 2001:136). Findings indicated that research participants were aware of visible air pollution (particulate matter) but were unaware of invisible pollutants (such as carbon dioxide) in the air (Bickerstaff and Walker 2001:137). In addition, many people blame air pollution on the government and business, and do not believe that these institutions are interested in improving air quality (Bickerstaff 2004:833). Finally, public perceptions of risk for

oneself and the future appear to increase support for policies which address air pollution (Gerber and Neeley 2005).

Conclusion

In conclusion, we know that women are more environmentally concerned than men (Blocker and Eckberg 1997; Bord and O'Connor 1997; Xiao and McCright 2011; Zelezny et al. 2000) and that environmental concern tends to decrease as age increases (Mohai and Twight 1987; Van Liere and Dunlap 1980). In addition, research indicates that Republicans (Dunlap and McCright 2008; Dunlap et al. 2001; Konisky et al. 2008; McCright and Dunlap 2011b) and conservatives are less environmentally concerned (Buttel and Flinn 1976b; McCright and Dunlap 2003) as compared with Democrats and liberals. Income is more difficult to assess, but it appears that those with more wealth express more environmental concern than those with less wealth (Duroy 2008). We also know that racial minorities, particularly those living near environmental hazards, have more environmental concern than Whites (Jones and Rainey 2006; Mohai and Bryant 1998; Whittaker et al. 2005). Finally, it appears that education has a positive effect on environmental concern for most individuals (Levine and Strube 2011; Mobley et al. 2009), with the exception of conservative white males (McCright and Dunlap 2011a).

CHAPTER THREE: AIR POLLUTION

Introduction

There has always been air pollution, and not all of it has been human made (forest fires and volcanic eruptions). However, as a result of the technological advances that have occurred throughout human history, the air has gone through many different "transformations" and the modern conveniences that humanity enjoys have come with the cost of many environmental disadvantages. Water pollution, deforestation, hazardous waste, and air pollution are among those environmental costs associated with modernity. Of all the assorted forms of pollution and environmental degradation, air pollution provides an interesting case because pollutants in the air can be difficult to detect and see (absent a smokestack at the factory), making it something of an invisible threat and thus less likely for the public to view as risky.

The purpose of this chapter is to define air pollution, examine the basics of the Clean Air Act (CAA), discuss health effects associated with air pollution and review the range of civil and criminal sanctions that are permissible under the CAA. This review is necessary so that realistic survey questions concerning regulation and punishment can be constructed. Finally, the chapter will explore the current state of the air, and discuss whether the laws and regulations have produced any noticeable effects to date.

What is Air Pollution?

According to the United States Clean Air Act, air pollution is defined as:

> "Any air pollution agent or combination of such agents, including any physical, chemical, biological, radioactive (including source material, special nuclear material, and byproduct material) substance or matter which is emitted into or otherwise enters the ambient air. Such term includes any precursors to the formation of any air pollutant, to the extent the Administrator has identified such precursor or precursors for the particular purpose for which the term 'air pollutant' is used" (Clean Air Act § 7602 g).

Also within the Clean Air Act, the term *manmade air pollution* refers to air pollution that "results directly or indirectly from human activities" (Clean Air Act § 7491 g3).

Aside from these technical definitions of air pollution, it is helpful to consider how air pollution impacts public health. One study suggests there is a one to two year shortening of life for those who have been exposed to air pollution (Brunekreef and Holgate 2002:1234). In addition, air pollutants can lead to many respiratory problems, some of which include asthma, bronchitis, and lung cancer (Bascom et al. 1996:7). While there is evidence to suggest that air pollution leads to negative health effects, there is debate as to the level of pollution in the air that is needed to produce the negative health effects (Brunekreef and Holgate 2002:1238). On one side of this debate is the idea that no level of air pollution is "healthy," and therefore, the amount of air pollutants in the air should be lowered (Samet 2011:199). On the other side of the debate is the argument that lowering the amount of pollutants in the air will create minimal benefits at the cost of economic growth (Samet 2011:199).

The Clean Air Act

The protection of air quality is not a new historical phenomenon. In fact, during the fourteenth century, England had a law on smoke abatement, with the option of capital punishment (McMurry and Ramsey 1986:1133). While not as harsh as fourteenth century England, the United States has a complex body of law concerning air pollution, which is covered by The Clean Air Act (CAA) - the United States' response to air pollution. The CAA was originally crafted in 1963; the purpose of this act was to provide funding for research into cleaning up air pollution (Environment Protection Agency 2013x). It was not until 1970 that the CAA was passed to handle tasks such as reducing the amount of pollutants in the air (Environment Protection Agency 2013x). In 1990 the CAA was amended again, giving the EPA

more regulatory power in enforcing the laws covered by the CAA (Environment Protection Agency 2013x).

There are four main stated goals of the CAA. First, the CAA aims to "protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population" (Clean Air Act § 7401 b1). This goal frames the CAA as a resource to be used in promoting public health and protecting individuals from adverse health effects that result from air pollution. The second stated goal is "to initiate and accelerate a national research and development program to achieve the prevention and control of air pollution" (Clean Air Act § 7401 b2). This goal states that, in order to achieve the first and subsequent goals of the CAA, research needs to be conducted with the aim of improving the control of air pollution. The third stated goal of the CAA is "to provide technical and financial assistance to State and local governments in connection with the development and execution of their air pollution prevention and control programs" (Clean Air Act § 7401 b3). Basically, this is stating that the federal government will provide the resources for the individual states to accomplish the goals of the CAA. The fourth goal of the CAA is "to encourage and assist the development and operation of regional air pollution prevention and control programs" (Clean Air Act § 7401 b4). Aside from its focus on regions (as opposed to individual states), this goal is similar to the third goal.

To achieve the goals above, the CAA has many elements that determine the type of pollutant, as well as the amount of a pollutant that may be present within the air. In order to better understand the CAA, it is important to understand which pollutants are regulated, and how they are classified within this body of law.

National Ambient Air Quality Standards

National ambient air quality standards (NAAQS) are standards set by the EPA to regulate pollutants that have been deemed harmful to the environment and public health. These standards are broken up into two categories, primary standards and secondary standards. Primary NAAQS are designed to protect public health, whereas secondary NAAQS are designed to protect public welfare (Environment Protection Agency 2013l). The NAAQS consists of four components. The first component is the *indicator*, which is the specific pollutant that will be measured (Bachmann 2007:671). The second component is the *level*, which is how much of a pollutant can be in the air (Bachmann 2007:671). For level, there are three units of measurement, parts per million (ppm), parts per billion (ppb), and micrograms per cubic meter of air ($\mu g/m^3$) (Environment Protection Agency 2013l). The third component of the NAAQS is *averaging time*, or the time period associated with the specific level (Bachmann 2007:671). The fourth and final component is the *form*, or how the other information is averaged (Bachmann 2007:672). The NAAQS focuses on six pollutants. These are known as criteria pollutants and include: Carbon Monoxide (CO), Lead (Pb), Nitrogen Dioxide (NO_2), Ozone (O_3), Particulate Matter (PM), and Sulfur Dioxide (SO_2). Each of these will be discussed individually in the following sections.

National Ambient Air Quality Standards: Carbon Monoxide

Carbon Monoxide (CO) is produced from combustion processes (engines) (Environment Protection Agency 2013g). CO is more common in urban areas, especially in the winter time (Bascom et al. 1996:8). The most common emission source of CO is mobile emissions, with the highest contributor being on-road vehicles (Environment Protection Agency 2013a). The health effects arising from CO mainly relate to the ability of CO to reduce the bloods capacity to deliver oxygen to areas of the body (Environment Protection Agency 2013h). This ability of CO is

amplified in the heart, where it can aggravate heart disease (United States Environmental Protection Agency 2012:3). There are two primary NAAQS set by the EPA for CO, which are differentiated by the averaging time. For an eight hour averaging time, the level that has been set for CO is 9 parts per million, whereas for the one hour averaging time, the level for CO is set for 35 parts per million (Environment Protection Agency 2013m). Both of these standards are not to be exceeded more than once a year (Environment Protection Agency 2013m).

National Ambient Air Quality Standards: Lead

Lead (Pb) is found naturally in the environment and is also manufactured (Environment Protection Agency 2013k). Before the 1980s, the major source of Pb in the air was from mobile sources, specifically the combustion of gasoline with Pb additives (Bascom et al. 1996:6). However, the Pb additive to gasoline has been phased out in the United States (Bascom et al. 1996:6), and as a result, mobile sources, specifically Pb emissions from cars, are no longer the top source of Pb in the air (Environment Protection Agency 2013k). The top emission source of Pb is still technically mobile sources, but the greatest contributor to this is aircraft (Environment Protection Agency 2013b). Health effects from Pb affect children and adults differently. For children, the most common health effect from exposure to Pb, is damage to the nervous system, which leads to developmental disabilities (United States Environmental Protection Agency 2012:3). Adults exposed to Pb are more likely to experience health effects relating to the heart and kidneys (United States Environmental Protection Agency 2012:3). For Pb, the NAAQS is combined for primary and secondary standards (public health and public welfare). The averaging time for Pb is a three month average of .15 micrograms per cubic meter of air that is not to be exceeded (Environment Protection Agency 2013n).

National Ambient Air Quality Standards: Nitrogen Dioxide

Nitrogen Dioxide (NO_2) is part of a group of gasses known as Nitrogen Oxides (NO_x) (Environment Protection Agency 2013s). The most common source of NO_x would be mobile sources; on-road vehicles are the major source of gasses within this category (Environment Protection Agency 2013c). NO_x tends to be found in higher concentrations indoors, due to the use of gas heaters and other indoor fuel combustion (Bascom et al. 1996:5). The health effects of NO_2 relate mainly to decreased lung function, as well as exacerbating lung diseases (United States Environmental Protection Agency 2012:3). NO_2 has both a primary and secondary NAAQS. The primary NAAQS for NO_2 is averaged over a one hour time period, with 100 parts per billion that is not to exceed the 98^{th} percentile after being averaged over three years (Environment Protection Agency 2013o). The secondary NAAQS for NO_2 is measured over an annual time period with the standard set at 53 parts per billion, not to exceed the annual mean (Environment Protection Agency 2013o).

National Ambient Air Quality Standards: Ozone

Ozone (O_3) is created when volatile organic compounds (VOC) and NO_x mix together in the presence of sunlight (United States Environmental Protection Agency 2012:3). Due to the fact that O_3 is a chemical reaction between VOC and NO_x, there is not a true emission source of O_3, so in order to determine the highest source of O_3, it is productive to look at the sources of NO_x and VOC. The highest source of NO_x is mobile sources, with on-road vehicles being the top emission source within that category (Environment Protection Agency 2013c). The highest source of VOC is also mobile sources, with on road vehicles being the top emission source within that category (Environment Protection Agency 2013f). Taken together, the greatest source of O_3 is mobile sources, with on road vehicles being the top emission source. Due to the needed

presence of NO_x, VOC, and sunlight, O_3 tends to be a problem in large cities during the morning and afternoon "rush hours" (Bascom et al. 1996:8). The health effects of O_3 are similar to NO_x due to the chemical necessity that it plays in O_3 formation. The health effects of O_3 relate to a decrease in lung function, as well as aggravation of lung diseases (United States Environmental Protection Agency 2012:3). O_3 has a combined primary and secondary NAAQS averaging time of eight hours, with the standard set at .075 parts per million that is not to be exceeded based on the annual fourth-highest daily maximum 8 hour concentration that has been averaged over three years (Environment Protection Agency 2013p).

National Ambient Air Quality Standards: Particulate Matter

Particulate Matter (PM) consists of fine particles (dust, organic chemicals, and metals) (Environment Protection Agency 2013t). The main source of PM is from dust, which includes unpaved road dust, construction dust, and paved road dust (Environment Protection Agency 2013d). PM is unique since it is broken up into two different categories, PM that is 10 micrometers in diameter or smaller (PM_{10}) and PM that is 2.5 micrometers in diameter or smaller ($PM_{2.5}$) (Environment Protection Agency 2013t). PM_{10} can penetrate the lower respiratory system, whereas $PM_{2.5}$ can penetrate the area of the lung where the blood exchanges carbon dioxide for oxygen (Brunekreef and Holgate 2002:1235). The health effects of PM include nonfatal heart attacks, irregular heartbeat, and decreased lung function (Environment Protection Agency 2013u). PM has two sets of NAAQS due to the differentiated sizes of PM. $PM_{2.5}$ has primary, secondary, and a combination of primary and secondary NAAQS. The primary NAAQS for $PM_{2.5}$ are measured annually, with a level set at 12 micrograms per cubic meter of air that is not to exceed the annual mean, which has been averaged over three years (Environment Protection Agency 2013q). The secondary NAAQS for $PM_{2.5}$ are measured annually with a level

set at 15 micrograms per cubic meter of air that is not to exceed the annual mean, which has been averaged over three years (Environment Protection Agency 2013q). The combined primary and secondary NAAQS for $PM_{2.5}$ have an averaging time of twenty four hours, with a level set at 35 micrograms per cubic meter of air that is not to exceed the 98^{th} percentile, which has been averaged over three years (Environment Protection Agency 2013q). The NAAQS for PM_{10} comprise combined primary and secondary standards. This consists of an averaging time of twenty four hours, with a level set at 150 micrograms per cubic meter of air, that is not to be exceeded more than once per year (on average over three years) (Environment Protection Agency 2013q).

National Ambient Air Quality Standards: Sulfur Dioxide

Sulfur Dioxide (SO_2) is part of a group of chemicals known as Sulfur Oxides (SO_x). The most common emission source of SO_2 is fuel combustion, and electricity generation is the highest source of SO_2 within that category (Environment Protection Agency 2013e). The health effects of SO_2 consist largely of the aggravation of lung diseases, especially asthma (United States Environmental Protection Agency 2012:3). SO_2 has both primary and secondary NAAQS. The primary NAAQS for SO_2 averaging time is one hour with a level of 75 parts per billion that is not to exceed the 99^{th} percentile of one hour daily maximum concentrations, which have been averaged over three years (Environment Protection Agency 2013r). The secondary NAAQS for SO_2 averaging time is three hours, with a level of .5 parts per million, that is not to be exceeded more than once per year (Environment Protection Agency 2013r).

Workings of the National Ambient Air Quality Standards: State Implementation Plans

In order for the EPA to enforce and monitor the NAAQS, each individual state is required to generate their own plan for implementing the NAAQS. Each state is required to create what is

known as a State Implementation Plan (SIP), which has two key purposes: 1) to "demonstrate that the state has the basic air quality management program components in place to implement a new or revised NAAQS," and 2) to "identify the emissions control requirements the state will rely upon to attain and/or maintain the primary and secondary NAAQS" (Environment Protection Agency 2013w). Every state is "required to submit SIPs with general infrastructure elements showing the state has the capacity to attain, maintain, and enforce a new or revised NAAQS" (Environment Protection Agency 2013w).

There are a number of rules regarding SIPs and their development. For example, if the EPA develops more NAAQS, states need to develop a plan for enforcing the new NAAQS. Once a state has developed a SIP for a NAAQS, the state then submits their SIP to the EPA, which will approve or reject the SIP (Environment Protection Agency 2013v). In order to have the SIP accepted, the SIP needs to include multiple measures. First, a SIP needs to "include enforceable emission limitations and other control measures, means, or techniques, as well as schedules and timetables for compliance" (Clean Air Act § 7410 2a). Second, SIPs need to "provide for establishment and operation of appropriate devices, methods, systems, and procedures necessary to monitor, compile, and analyze data on ambient air quality" (Clean Air Act § 7410 2b). Third, SIPs need to include programs that will not only allow for the NAAQS to be achieved, but ensure that in accomplishing the NAAQS requirements, the state does not hinder other states' efforts to comply with the NAAQS (Clean Air Act § 7401 2c and 2d). Fourth, SIPs need to provide for adequate funding and personnel in order to comply with the NAAQS (Clean Air Act § 7401 2e). Finally, in order for a SIP to be accepted by the EPA, it needs to "provide for consultation and participation by local political subdivisions affected by the plan" (Clean Air Act

§ 7401 2m). In short, the role of the SIPs is to ensure that each state follows and enforces the CAA, specifically the NAAQS.

State Implementation Plans: Nonattainment Areas

States can be listed as either an *attainment area* or a *nonattainment area*. An attainment area describes a state which is in compliance with the NAAQS, and nonattainment area describes a state which is not in compliance with the NAAQS. Data relating to nonattainment areas is presented below:

- In 2008, there were 123,004 individuals in 46 areas of the United States who resided in a nonattainment area for O_3. The highest concentration of individuals that made up this group consisted of 20,217 individuals in the New York, New Jersey, Long Island areas (Environment Protection Agency 2013j).
- In 2006, there were 74,316 individuals in 32 areas of the United States who resided in a nonattainment area for $PM_{2.5}$. The highest concentration of individuals that made up this group consisted of 20,404 individuals in the New York, New Jersey, Long Island areas (Environment Protection Agency 2013j).
- In 2010, there were 29,202 individuals in 46 areas of the United States who were residing in a nonattainment area for PM_{10}. The highest concentration of individuals that made up this group consisted of 15,799 individuals in the Los Angeles South Coast Air Basin (Environment Protection Agency 2013j).
- In 2010, there were 1,217 individuals in 9 areas of the United States who lived in a nonattainment area for SO_2. The highest concentration of individuals that made up this group consisted of 1,030 individuals in Salt Lake City (Environment Protection Agency 2013j).

- In 2008, there were 9,669 individuals in 21 areas of the United States who lived in a nonattainment area for Pb. The highest concentration of individuals that made up this group consisted of 9,437 individuals in the Los Angeles South Coast Air Basin (Environment Protection Agency 2013j).

Hazardous Air Pollutants

In addition to the six criteria pollutants listed earlier, the CAA has a list of 187 hazardous air pollutants that are regulated as well (United States Environmental Protection Agency 2012:19). These hazardous pollutants (known as HAPs) are associated with adverse health effects, whereas the pollutants under the NAAQS are associated with protecting public health and welfare (Lunder, Woodruff, and Axelrad 2004:157). Basically, NAAQS were created to regulate pollutants in order to protect public health and welfare, whereas HAPs are regulated because those 187 pollutants have been determined to have adverse health effects. The 1990 Amendments to the CAA specified that facilities must adopt maximum achievable control technologies (MACT) so that emissions of HAPs are as low as possible. This means that facilities must use the best technology that is available in order to limit the emissions of HAP (Lunder et al. 2004:157). In order to regulate HAPs, the EPA set National Emission Standards for Hazardous Air Pollutants (NESHAPs) (Flatt 2007:114). The standards for HAPs that were set by the NESHAPs are a level that:

> "Protects the greatest number of persons possible to an individual lifetime risk level no higher than approximately one in one million" and "limits to no higher than approximately one in ten thousand the estimated risk that a person living near a plant would have if he or she were exposed… for seventy years" (Flatt 2007:114).

Protecting the Environment: Environmental Protection Agency Enforcement

The question now becomes, how does the EPA enforce all of these laws and regulations? The EPA has two general enforcement actions, civil and criminal (Environment Protection

Agency 2013i). *Civil enforcement* is designed to protect health and the environment by "taking legal action to bring polluters into compliance with the law" (Environment Protection Agency 2013i). This differs from *criminal enforcement*, which aims to aid in the "criminal prosecution of deliberate or egregious violations of environmental laws or regulations and any associated violation of the U.S. criminal code" (Environment Protection Agency 2013i). Civil environmental enforcement, within the EPA, has the legal standard of strict liability, meaning that if someone violates an environmental law, they are violators of that law, regardless of intent (Environment Protection Agency 2013i). Criminal environmental enforcement has the legal standard of intent, which will be further discussed in the following sections. The burden of proof in a civil environmental case is based on "preponderance of evidence." This means that if further evidence is presented suggesting that there has been a violation of an environmental law, then civil liability has been established (Environment Protection Agency 2013i). The burden of proof in criminal environmental cases is the same as any other criminal case, which is "beyond a reasonable doubt" (Environment Protection Agency 2013i). If liability is established in a civil case, the penalties usually include fines, injunctions, or other actions that will improve the environment (Environment Protection Agency 2013i). If someone has been found guilty in a criminal case, the penalties can include criminal fines, restitution, and/or jail/prison time (Environment Protection Agency 2013i).

Enforcing the Clean Air Act: Civil

For civil enforcement of the CAA, the EPA has the ability to "commence a civil action for a permanent or temporary injunction, or to assess and recover a civil penalty of not more than $25,000 per day for each violation, or both" (Clean Air Act § 7413 b). Civil enforcement can occur in three ways. First, the EPA can instruct the violator to comply with the CAA

(Environment Protection Agency 2013i). Second, the EPA can have the violator pay a fine (what is known as an administrative penalty order) (Environment Protection Agency 2013i). Lastly, the EPA may sue the violator in court (Environment Protection Agency 2013i). For instance, the EPA may use civil enforcement actions if someone "has violated, or is in violation of, any requirement or prohibition of an applicable implementation plan or permit" (Clean Air Act § 7413 b1). For example, if a state says that pollutant X cannot be emitted, but a source emits pollutant X, then civil action can be taken.

Enforcing the Clean Air Act: Criminal

Before criminal penalties within the CAA are discussed, it is important to define who is affected by these penalties. Under the CAA, the term *person* "includes an individual, corporation, partnership, association, state, municipality, political subdivision of a state, and any agency, department, or instrumentality of the United States and any officer, agent, or employee thereof" (Clean Air Act § 7602 e). For criminal penalties, the CAA states that "any person who knowingly violates any requirement or prohibition of an applicable implementation plan…shall, upon conviction, be punished by a fine…or by imprisonment for not to exceed 5 years, or both" (Clean Air Act § 7413 c1). In addition, if the person is a repeat offender, then "the maximum punishment shall be doubled with respect to both the fine and imprisonment" (Clean Air Act § 7413 c1). The penalty of fines and/or imprisonment for no more than two years can be used on anyone who knowingly:

> "Makes any false material statement, representation, or certification in, or omits material information from, or knowingly alters, conceals, or fails to file or maintain any notice, application, record, report, plan, or other document required to be either filed or maintained [or] falsifies, tampers with, renders inaccurate, or fails to install any monitoring device" (Clean Air Act § 7413 c2a, c2c).

If an individual fails to pay a fee that is related to the CAA, then that individual can face more fines and/or imprisonment for up to one year (Clean Air Act § 7413 c3). Another penalty that

exists under the CAA relates to cases where a person releases a HAP that places an individual in imminent danger of death or serious bodily injury, through negligence. In these circumstance involving *negligence*, the individual can receive a fine and/or imprisonment for up to a year (Clean Air Act § 7413 c4). Finally, if a person *knowingly* releases a HAP into the ambient air that could place another individual in imminent danger of death or serious bodily injury, the offending individual can receive a fine and/or imprisonment of no more than fifteen years (Clean Air Act § 7413 c5a). If the "person" in this case is an organization, then the punishment is a fine that is not to exceed $1,000,000 for each violation (Clean Air Act § 7413 c5a).

Criminal enforcement of the CAA is differentiated from civil enforcement by intent. There are two broad types of intent - *knowingly* and *willfulness* (Uhlmann 2009:1237). Knowingly relates to situations in which the offender had knowledge of the facts surrounding the offense (Uhlmann 2009:1237). *Willfulness* is applicable in situations where the offender was aware that he/she was breaking the law (Uhlmann 2009:1237). Interestingly, the term person in the CAA includes responsible corporate officers, and is known as the *corporate officer doctrine* (Uhlmann 2009:1239). The corporate officer doctrine states that corporate officials can be prosecuted for failing to prevent violations (Uhlmann 2009:1240). Corporate officials can be found guilty if they know that the violation is occurring, have the authority to prevent the violation from occurring, and if they fail to prevent the violation (Uhlmann 2009:1241).

Current Status of the Clean Air Act

It is possible to reflect on the effectiveness of the CAA by considering the six criteria pollutants with reference to improvements in air quality since the implementation of the CAA in 1970:

- Between 2001 and 2010, there has been a 13% decrease in the concentration of O_3 (United States Environmental Protection Agency 2012:9).
- Between 2001 and 2010, there has been a 24% decrease in the concentration of $PM_{2.5}$ (United States Environmental Protection Agency 2012:12).
- Between 2001 and 2010, there has been a 29% decrease in the concentration of PM_{10} (United States Environmental Protection Agency 2012:15).
- Between 2001 and 2010, there has been a 71% decrease in the concentration of Pb (United States Environmental Protection Agency 2012:16).
- Between 2001 and 2010, there has been a 33% decrease in the concentration of NO_2 (United States Environmental Protection Agency 2012:17).
- Between 2001 and 2010, there has been a 52% decrease in the concentration of CO (United States Environmental Protection Agency 2012:17).
- Between 2001 and 2010, there has been a 50% decrease in the concentration of SO_2 (United States Environmental Protection Agency 2012:17).

It is important to note that these trends are promising they statistics do not tell the entire story. While all of the six criteria pollutants have decreased, this does not mean that they have met the NAAQS set for the pollutants. In fact, with the exception of O_3, NAAQS have not yet been achieved (United States Environmental Protection Agency 2012:12-17). This leads one to ask, has the CAA been effective? There have certainly been some improvements in air quality since the implementation of the Act. At the same time, it is important to note that the EPA uncovers over 1000 violations of the CAA every year (Stretesky and Gabriel 2005:875) and that air pollution is thought to be responsible for more than 70,000 deaths a year (Ozymy and Jarrell 2011:365). In addition, half of all Americans live in counties that have unhealthy levels of

pollutants present (Ozymy and Jarrell 2011:365). So over time we may have "cleaner air" but this does not mean we live without dangerous levels of air pollution—some of which directly caused by civil and criminal violations of the CAA.

Conclusion

The Clean Air Act was created in response to the environmental crisis in the United States in the 1970s. As a result the CAA was born which established rules and regulations to protect the public from the negative consequences of air pollution. This has been accomplished by setting standards that individuals/corporations must follow when dealing with certain air pollutants. While there has been a dramatic decline in the level of pollutants in the air, many people still reside in areas that have high levels of pollution, which are not in compliance with the CAA. Are people aware of this? Do they associate risk with air pollution? Are they willing to punish those that violate the CAA and pollute the air? Are individuals willing to regulate air pollution? These issues will be explored in the next few chapters.

CHAPTER FOUR: METHODOLOGY AND DATA

This research explores whether an individual's perception of risk from air pollution influences their support for social control policies (regulation) and practices (punishments). The methodology and data collection was informed by O'Connor et al. (1999) risk theory, which states that support for environmental policy is contingent upon three key elements: 1) "expectations that the problem will or is happening," 2) "expectations that negative consequences are likely for self and others," and 3) "knowledge of the causes of the problem" (462). The research also controls for socio-demographic variables known to influence support for: 1) environmental attitudes and policy and 2) punishment more generally (punitive attitudes).

Research Questions and Hypotheses

The central research question guiding the study is whether O'Connor et al. (1999) three elements of environmental risks are associated with public support for social control in the form of increased regulation and punishment for specific infractions of the Clean Air Act (CAA). To fully explore this overarching research question, I examine several specific research questions and hypotheses that relate to support for regulation, as well as punishment for violations of the CAA. As shown below in Table 4.1, the first series of research questions (1-3) examine the three forms of risk in relation to support for environmental regulation, while the second series of questions (4-6) address support for punishment for violations of the CAA.

Research Question #1: The first question relates to the first aspect of O'Connor et al. (1999) risk theory and examines whether *awareness of air pollution as a problem* influences support for environmental regulation.

- H1: Awareness of air pollution as a problem will positively influence support for environmental regulation.

Research Question #2: The second research question is derived from the second aspect of O'Connor et al. (1999) risk theory and explores whether *perceived negative consequences* associated with air pollution influence support for environmental regulation.

- H2: Perceptions of negative consequences will positively influence support for environmental regulation.

Research Question #3: The third research question explores the third aspect of O'Connor et al. (1999) risk theory and examines whether *public awareness of the causes of air pollution* influences support for environmental regulation.

- H3: Awareness of the causes of air pollution will positively influence support for environmental regulation.

The next set of research questions pertains to public willingness to support punishment for violations of the CAA as a form of social control.

Research Question #4: The fourth research question relates to the first aspect of O'Connor et al. (1999) risk theory and examines whether *awareness of air pollution as a problem* influences support for punishment for violations of the CAA.

- H4 (a/b)[2] : Awareness of air pollution as a problem will positively influence support for punishment.

Research Question #5: The fifth research question is derived from the second aspect of O'Connor et al. (1999) risk theory and explores whether *perceived negative consequences* associated with air pollution influence support for punishment for violations of the CAA.

- H5 (a/b): Perceptions of negative consequences will positively influence support for punishment.

[2] The hypotheses for BOTH punishment variables involving an accidental release and illegal release are identical and are not separated out into specific statements. For simplicity, (a) denotes the accidental release and a (b) denotes the illegal release.

Research Question #6: The sixth research question explores the third aspect of O'Connor et al. (1999) risk theory and examines whether *public awareness of the causes of air pollution* influences support for punishment for violations of the CAA.

- H6 (a/b): Awareness of the causes of air pollution will positively influence support for punishment.

Table 4.1: Summary of Research Questions and Hypotheses.

Research Question	Hypothesis
R1: Does awareness of air pollution as a problem influence support for environmental regulation related to air quality?	H1: Awareness of air pollution as a problem will positively influence support for environmental regulation.
R2: Do perceptions of negative consequences associated with air pollution influence support for environmental regulation related to air quality?	H2: Perceptions of negative consequences will positively influence support for environmental regulation.
R3: Does public awareness regarding the causes of air pollution influence support for environmental regulation related to air quality?	H3: Awareness of the causes of air pollution will positively influence support for environmental regulation.
R4: Does awareness of air pollution as a problem influence the willingness to support punishment for violations of the CAA?	H4 (a/b): Awareness of air pollution as a problem will positively influence support for punishment.
R5: Do perceptions of negative consequences associated with air pollution influence the willingness to support punishment for violations of the CAA?	H5 (a/b): Perceptions of negative consequences will positively influence support for punishment.
R6: Does problem awareness regarding the causes of air pollution influence the willingness to support punishment for violations of the CAA?	H6 (a/b): Awareness of the causes of air pollution will positively influence support for punishment.

Research Methodology

The thesis utilizes survey research as it is a common method to study individual perceptions and attitudes (Sapsford 2007:3). The survey instrument (Appendix A) was specifically designed for this research and another related research project for the Center for the Study of Crime and Justice (CSCJ) at Colorado State University. A list of survey prompts was

also developed (Appendix B) to assist respondents as needed. Once IRB approval was obtained (Appendix C), the survey was pretested on over 40 adults residing in Colorado to ensure that the survey questions were clear, concise, and correctly measured the core research concepts. After revision, the survey instrument consisted of 80 substantive and 10 demographic and background questions of which 47 substantive and 5 demographic questions related to this study. The average time for a respondent to complete the survey was 18 minutes.

The survey was administered by 37 undergraduate sociology students as part of a senior Capstone Course (SOC 403) and/or independent study experience (SOC 495) that were explicitly designed as service learning courses. To participate in the research project, students were required to: 1) complete a research methods course, or be currently enrolled in a methods course; 2) complete readings and short papers regarding survey research generally, and on interviewer-related error more specifically; and 3) attend three training sessions. The training sessions covered the purpose of the research, a review of the survey instrument and prompt sheet, proper interview techniques, phone operations, call disposition recording procedures, and the informed consent protocol. In order to discourage unethical behavior, students were not graded on the number of surveys they completed or given specific quotas to fill. We also did not provide students with any other incentives to increase the number of survey completions. All surveys were administered under my direction, along with Dr. Tara Shelley and Dr. Mike Hogan in the Department of Sociology's call center between April and September of 2013.

Sample

Survey Sampling International (SSI) drew a random sample of residential and cell phone numbers utilizing a two-stage Mitofsky-Waksberg sampling strategy. A Mitofsky-Waksberg sampling strategy randomly selects telephone numbers according to populations and area codes,

and then narrows the selection to minimize the selection of nonresidential phone numbers (Weisberg, Krosnick, and Bowen 1996). A sample of 406 respondents, aged 18 years or older, took the survey. The survey completion rate was 92.8% (377 surveys were fully completed, 29 surveys were incomplete). Following the standards set by the American Association for Public Opinion Research (2011), the incomplete surveys were retained in the sample, and a final sample of 406 adults completed the survey. The margin of error was ± 4.79 percentage points, with a 95% confidence level.

The demographic characteristics of the sample (with 2010 census data in parentheses) are as follows: 57.1% female (50.8%), 42.9% male (49.2%), 80.8% white (77.9%), 7.1% black (13.1%), 5.5% Hispanic or Latino (16.9%), 1.1% Native American (1.2%), 1.6% Asian or Pacific Islander (0.2%), and the average age was 54.4 (the US has a median age of 36.8).

Dependent Variables

A total of three dependent variables were analyzed as part of this research. The first dependent variable measures respondent support for environmental regulations relating to air quality (REGULATION). The second series of dependent variables explore respondent support for the imposition of punishment in response to two hypothetical environmental crime scenarios that represent violations of the Clean Air Act (CAA) (PUNACCID and PUNILLG). Each of these dependent variables will be described in greater detail below.

Respondents were asked to assess their level of support for different forms of regulation via question 9 of the survey which asked, "Now I am going to read some proposals that have been suggested for dealing with air pollution. Please tell me if you strongly support, support, oppose, or strongly oppose the following regulatory proposals." The proposals were as follows:

- Stronger enforcement of federal air pollution laws and regulations

- Stronger enforcement of state air pollution laws and regulations
- Setting stronger limits on the amount of exhaust that can come from cars
- Setting legal limits on the amount of energy consumers can use in their homes
- Setting strict pollution controls on oil and coal burning power plants
- Allowing corporations to detect and report their own environmental violations
- Setting industry wide limits on pollution, and allowing companies to buy and sell the rights to exceed their individual limits

The responses to these regulatory proposals were coded as follows:

- Strongly oppose = 0
- Oppose = 1
- Support = 2
- Strongly support = 3

The responses to each of these items were then added to create an index named REGULATION which had a lowest possible score of 0, representing strong opposition for regulations, and a highest score of 21, representing strong support for regulation. REGULATION had a mean of 12.21 and a Cronbach's alpha of .773.

The second set of dependent variables examines support for the imposition of punishment in response to two hypothetical environmental crime scenarios that represent violations of the Clean Air Act (CAA). The first scenario, PUNACCID, involved an accidental release: "Suppose a company *accidentally* releases a *hazardous* pollutant into the air due to *equipment failure*. Please indicate if you think each of the following government responses would be acceptable, too strong, or not strong enough." The second scenario, PUNILLG, involved an illegal release: "Suppose a company *illegally* releases a *hazardous* pollutant into the air and fails to report the

release to government officials. Please indicate if you think each of the following government responses would be: acceptable, too strong, or not strong enough." The reasoning behind having two scenarios, as opposed to just one, was to determine whether respondents were more or less harsh on a company that releases a hazardous pollutant into the air illegally versus an accidental release that could still be constructed as a violation of the CAA but with less culpability[3]. After each scenario, survey respondents were asked to rate the following punishment options:

- No punishment
- Fine the company an amount equal to one week of their gross income
- Fine the company an amount equal to three months of their gross income
- Increase government inspections of the company
- Suspend business activities for a specified amount of time set by a court
- Jail or prison time for the worker
- Jail or prison time for the company executives

Each scenario had a three item response set that was coded as follows:

- Too Strong = 0
- Acceptable = 1
- Not strong enough = 2

Responses to each of these items were then added to create two indices at the suggestion of factor analysis: PUNACCID (Cronbach alpha of .743) and PUNILLG (Cronbach alpha of .685). Both of these variables had a lowest possible score of 0, indicating that all the punishments listed were considered to be too strong, and a highest possible score of 14, indicating that the punishments listed were considered to be not strong enough. PUNACCID had a mean of 6.97

[3] Because fines vary substantially under the CAA, fine levels were set to be relative to the size of the company to gauge public support of fines generally.

and PUNILLG had a mean of 8.65 suggesting that respondents were more punitive about the scenario with the illegal discharge, which would be expected with the heightened severity of that scenario.

Table 4.2: List of Dependent Variables.

Dependent Variable	Description	Range	Cronbach Alpha
REGULATION	Support for Regulation Overall	0= Strong Opposition to Regulation 21= Strong Support for Regulation	.773
PUNACCID	Support Punishment Accidental Release	0= Punishments Too Strong 14= Punishments Not Strong Enough	.743
PUNILLG	Support Punishment Illegal Release	0= Punishments Too Strong 14= Punishments Not Strong Enough	.685

Independent Variable: Problem Awareness

The first aspect of O'Connor et al. (1999) theory of risk is "expectations that the problem will or is happening" (462). This aspect of risk was represented in the survey instrument in question 3, "I am going to read you a list of environmental issues. Please indicate if you think each issue is a significant problem, a moderate problem, a minor problem, or not a problem," with the following two environmental issues being used to create the variable PROBLEM:

- Air pollution in your community
- Air pollution in the United States

The responses to each of these environmental issues were coded as follows:

- Not a problem = 0
- Minor problem = 1

- Moderate problem = 2
- Significant problem = 3

Responses to each of these items were then added to create the index PROBLEM with a lowest possible score of 0, representing a low level of problem awareness, and a highest possible score of 6, representing a high level of problem awareness. PROBLEM had a mean of 3.44 and a Cronbach's alpha of .64.

Independent Variable: Negative Risk for You and Others

The second aspect of O'Connor et al. (1999) theory of risk is "expectations that negative consequences are likely for self and others" (462). This concept of risk is represented in the survey instrument by question 6A, "please tell me if you strongly agree, agree, disagree, or strongly disagree that air pollution threatens *your* personal health and safety," and 6B, "please tell me if you strongly agree, agree, disagree, or strongly disagree that air pollution threatens the health and safety of other people". Responses to these questions were coded as follows:

- Strongly disagree = 0
- Disagree = 1
- Agree = 2
- Strongly agree = 3

Responses to questions 6A and 6B were added together to create the index CONSEQUENCES which had a lowest possible score of 0, representing a low belief that air pollution threatens self/others, and a highest possible score of 6, representing a high belief that air pollution threatens self/others. CONSEQUENCES had a Cronbach's alpha of .808 and a mean of 4.05.

Independent Variable: Knowledge of the Causes of the Problem

The third and final aspect of O'Connor et al. (1999) theory of risk is "knowledge of the causes of the problem" (462). This aspect of risk is represented in the survey instrument by question 8, "please indicate if you think each of the following is a major cause, a moderate cause, a minor cause, or not a cause of air pollution," with the causes listed as follows:

- Cars
- Commercial vehicles and large trucks
- Boats
- Airplanes
- Construction equipment
- Coal burning power plants
- Oil drilling
- Drilling for natural gas
- Fracking
- Oil refineries
- Burning hazardous waste
- Other industrial activities

Responses were coded as follows:

- Not a cause = 0
- Minor cause = 1
- Moderate cause = 2
- Major cause = 3

Respondent responses to question eight were added together to create an index CAUSES which had a lowest possible score of 0, indicating a low belief that the examples listed above cause air pollution, and a highest possible score of 36, representing a high belief that the examples listed above cause air pollution. The index CAUSES had a mean of 23.69 and a Cronbach's alpha of .918.

Table 4.3: List of Independent Variables.

Independent Variable	Description	Range	Cronbach Alpha
PROBLEM	Problem Awareness of Air Pollution	0= Low Level Problem Awareness 6= High Level Problem Awareness	.64
CONSEQUENCES	Risk to Self and Others	0= Low Level Risk Consequences 6= High Level Risk Consequences	.808
CAUSES	Knowledge of the Causes of the Problem of Air Pollution	0= Low Cause 36= High Cause	.918

Control Variables

The control variables utilized in this research are those that hold relevance in the environmental concern literature, since these variables have generally been shown to influence environmental attitudes and support for environmental policy (see Chapter 2). The variables include: age, education, sex, race, income and political ideology. In addition, since both of the dependent variables utilized in this thesis are orientated around social control in the form of punishment and regulation it is also necessary to control for known predictors of punitive attitudes. There is not an established literature on what makes an individual more or less punitive towards violations of environmental law; however, there is an established line of research on predictors of punitive attitudes for violations of crime generally. The punitive attitudes literature

suggests that whites, males, conservatives, southerners and older individuals tend to be more punitive while those with more education tend to be less punitive (Chiricos, Welch, and Gertz 2004:374; Maruna and King 2009:10; Piquero, Carmichael, and Piquero 2008:296; Shelley, Chiricos, and Gertz 2011:320). The paragraphs that follow detail the control variables utilized in this research.

Given that southerners are typically more punitive (Chiricos et al. 2004) than others, a variable based on region was created for the punishment models only. This variable is a binary variable that has the South coded as 0 and everything else coded as 1. The states included in this variable include Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas, Virginia, and the District of Columbia. States were classified as SOUTH if they permitted slavery in 1863.
The age of the respondent (AGE) is a continuous variable, and was determined by asking respondents "what year were you born" (question 20) and then subtracting the year the survey was administered (2013-birth year). Since the literature indicates that older respondents generally believe that the environment is less important than younger individuals (Mohai and Twight 1987:799; Van Liere and Dunlap 1980:182), similar findings are expected in this research.

Education (COLLEGE) is a binary variable and was derived from question 21, "which of the following best describes the highest level of education that you have completed? Please stop me when I reach the *highest level* of education that you have received." Respondents were then read the following options:

- No high school
- Some high school
- High school graduate

- Vocational/Trade school graduate
- Some college or associates degree
- College graduate
- Post graduate work or degree

Since the environmental concern literature indicates that those with college experience tend to express more environmental concern than others (Levine and Strube 2011; McCright and Dunlap 2011a; Mobley et al. 2009; Thapa 1999), these items were collapsed into two categories. Those respondents indicating some college or more were coded as 1, while all other items were coded as 0. A majority of individuals in the sample (69.7%) reported that they have some college or more in terms of education.

The next variable that was created was a racial identification variable (RACE). The RACE variable was derived from question 22, which asked "what race or ethnicity do you consider yourself," with the following response set:

- Hispanic or Latino
- White/ Caucasian
- Black/ African-American
- Asian or Pacific Islander
- Native American
- Multi-Racial
- Other

RACE was then coded into a binary variable, with white being 0 and everything else being 1.

Political ideology was determined by using two survey questions, economic/fiscal ideology (question 23) and social ideology (question 24). These two questions asked "in terms of economic/social issues, would you say that you are" (one of the following):

- Very conservative
- Conservative
- Somewhat conservative
- Somewhat liberal
- Liberal
- Very liberal

Responses were coded as follows:

- Very conservative = 0
- Conservative = 1
- Somewhat conservative = 2
- Moderate = 3
- Somewhat liberal = 4
- Liberal = 5
- Very liberal = 6

To get a general sense of a respondent's overall political ideology, their responses to questions 23 and 24 were added to create an index called POLIIDEO which had a lowest possible score of 0, representing very conservative, and a highest possible score of 12, representing very liberal. POLIIDEO had a Cronbach's alpha of .746 and a mean of 5.26 suggesting most respondents view themselves as moderates.

The variable INCOME was generated from question 25, "which of the following categories includes your annual household income, before taxes? Please stop me when I reach your income category," and had the following responses:

- Less than $25,000
- $25 - $49,000
- $50 - $74,000
- $75 - $99,000
- $100 - $149,000
- $150 - $199,000
- $200,000 or more

These responses were recoded using the mid-point of their respective intervals in thousands of dollars.

Finally, the sex of the respondent was determined from question 26, "for demographic purposes, I am required to ask all respondents to report their sex," to which respondents responded with either male or female. The variable, SEX, was coded as follows:

- Male = 0
- Female = 1

Analytic Strategy and Presentation of Results

Survey data was initially entered into SPSS by undergraduate research assistants, and then personally rechecked by me. After all the data was cleaned and validated, I constructed the variables as previously noted. Since all of my dependent variables were indices, Ordinary Least Squares (OLS) regression was used as my analytic strategy. I also verified that I did not violate the assumptions of regression. For example, I requested multicollinearity statistics and examined

the dependent variables to make certain that they had a normal distribution (Lewis-Beck 1990:26). The variables in question did have normal distributions, which were obtained by creating histograms with a normal distribution curve superimposed on the table. To test for the presence of multicollinearity, variance inflation factors (VIF) were requested and examined (and shown in Tables 5.2-5.4). As detailed in Tables 5.2-5.4 none of the factors were above two, suggesting the absence of a multicollinearity problem, since the traditional threshold to determine multicollinearity ranges from 4 to 10 (O'Brien 2007:685).

The findings will presented in a series of tables beginning with bivariate correlations (Appendix D), a summary table with descriptive statistics for each variable (Table 5.1), and three regression tables reflecting the OLS regression results for each of my dependent variables: REGULATION, PUNACID, PUNILLG (Tables 5.2-5.4).

CHAPTER FIVE: RESULTS

This chapter presents the findings associated with the six research questions previously detailed in Table 4.1 on page 45. The findings will be presented in a series of tables beginning with bivariate correlations (Appendix D), a summary table with descriptive statistics for each variable (Table 5.1), and three regression tables reflecting the OLS regression results for each of my dependent variables: REGULATION, PUNACCID, and PUNILLG (Tables 5.2-5.4). The findings will be considered as they relate to each of the six research questions and associated hypotheses.

Bivariate Correlation Results

Table 5.1 below and the bivariate correlation matrix (Appendix D) allow for a preliminary examination of the relationships of interest between the three risk variables (PROBLEM, CONSEQUENCES, CAUSES) and the three dependent variables (REGULATION, PUNACCID, PUNILLG) that represent social control. All three of the theoretical risk variables were positively correlated with all three of the dependent variables at the .01 level of significance. For the control variables, only RACE and SEX were consistently significant across all three dependent variables. More specifically, RACE had a positive correlation with the three dependent variables, suggesting that non-whites were more likely to support regulation and punishments for both accidental and illegal releases. Similarly, SEX was also positively correlated with the three dependent variables, suggesting that females were more likely to support regulation and punishments for both accidental and illegal releases. It is also noteworthy that political ideology (POLIDEO) was also positively correlated with two of the three dependent variables (REGULATION and PUNACCID), suggesting that liberals were more likely to support regulation and punishment for an accidental release whereas there may not be

an observable difference between conservatives/liberals concerning the illegal release (PUNILLG). College educated individuals were also generally less likely to support regulation (though not significant) and significantly less likely to support punishment for both accidental and illegal releases.

Table 5.1: Variables Used in the Analysis.

Variable Name	Description and Coding	Mean[#]	Standard Deviation	*r*REGULATION	*r*PunAccid	*r*PunIllg
REGULATION	Support for Regulation Overall 0=Strong Opposition to Regulation 21=Strong Support for Regulation	12.21	4.132	----	----	----
PUNACCID	Support Punishment Accidental Release 0=Punishments Too Strong 14=Punishments Not Strong Enough	6.97	2.612	----	----	----
PUNILLG	Support Punishment Illegal Release 0=Punishments Too Strong 14=Punishments Not Strong Enough	8.65	2.061	----	----	---

PROBLEM	Problem Awareness of Air Pollution 0= Low Level Problem Awareness 6= High Level Problem Awareness	3.44	1.621	.347**	.189**	.162**
CONSEQUENCES	Risk to Self and Others 0=Low level Risk Consequences 6= High Level Risk Consequences	4.05	1.529	.533**	.190**	.200**
CAUSES	Knowledge of the Causes of the Problem of Air Pollution 0= Low Cause 36= High Cause	23.69	7.89	.573**	.234**	.182**
SOUTH	1=All Others 0=South	1[#]	.47	-.012	-.002	-.071
AGE	Age of Respondent	54.40	18.394	-.047	.076	.003

COLLEGE	1=Some College or More 0=Below Some College	1[#]	.431	-.045	-.143*	-.122*
RACE	1=Non-Whites 0=White	0[#]	.395	.127*	.183**	.121*
POLIIDEO	Political and Economic Ideology of Respondent 0=Very Conservative 12=Very Liberal	5.26	3.369	.324**	.119*	.106
INCOME	Income Level of Respondent	77691.36	55967.901	-.025	-.140*	-.101
SEX	1=Female 0=Male	1[#]	.496	.150**	.121*	.171**

*p<.05, **p<.01, [#] Represents Mode

Table 5.2

The first three research questions examined if awareness of air pollution as a problem (PROBLEM), perceptions of negative consequences (CONSEQUENCES), and awareness of the causes of air pollution (CAUSES) would each influence support for regulation (REGULATION). Table 5.2 demonstrates the results of the analyses related to these first three research questions and contains two models—the first model shows the results for the three theoretical variables of interest while the second model includes the control variables. Model 5.2A shows that both CONSEQUENCES and CAUSES significantly increased support for regulation whereas PROBLEM had a negative coefficient and was not a significant predictor of regulation. In Model 5.2B, the control variables were added and both CONSEQUENCES and CAUSES remained significant predictors of support for regulation. Liberals were also significantly more likely to support regulation than conservatives. Given these results, there is no support for my first hypotheses (H1) that awareness of air pollution will positively influence support for regulation. It appears that there is support for (failure to reject) my second (H2) and third hypotheses (H3) as both CONSEQUENCES and CAUSES were significant predictors of REGULATION at the .01 level of significance.

Table 5.2: Support for Regulation.

Model 5.2A: Risk and Support for Regulation.						**Model 5.2B: Risk, Controls, and Support for Regulation.**					
Variable	**B**	**Std. Error**	**Beta**	**Sig**	**VIF**	**Variable**	**B**	**Std. Error**	**Beta**	**Sig**	**VIF**
PROBLEM	-.106	.157	-.042	.501	1.713	PROBLEM	-.155	.173	-.061	.370	1.741
CONSEQ.	.862	.165	.314	.000	1.606	CONSEQ.	.972	.176	.355	.000	1.548
CAUSES	.233	.033	.424	.000	1.639	CAUSES	.215	.039	.385	.000	1.842
						AGE	.017	.012	.074	.178	1.141
						COLLEGE	-.804	.531	-.084	.131	1.144
						RACE	.285	.518	.029	.583	1.050
						POLIIDEO	.194	.071	.159	.007	1.288
						INCOME	6.805E-6	.000	.091	.100	1.154
						SEX	-.340	.467	-.041	.467	1.213

N	275	**N**	229
R^2	.386	**R^2**	.417
Adjusted R^2	.380	**Adjusted R^2**	.393
Std. Error of the Estimate	3.291	**Std. Error of the Estimate**	3.207

Table 5.3

The second set of research questions examined if awareness of air pollution as a problem (PROBLEM), perceptions of negative consequences (CONSEQUENCES), and awareness of the causes of air pollution (CAUSES) would each influence support for punishment. Table 5.3 is the first of two tables that presents the results of the analyses related to support for punishment of an accidental release (PUNACCID). Table 5.3 demonstrates the results of the analysis related to the second set of research questions (4-6) concerning an accidental release of a hazardous pollutant into the air (PUNACCID). Model 5.3A shows that only CAUSES significantly increased support for punishment while CONSEQUENCES and PROBLEM were not significant. In Model 5.3B, the control variables were added and none of the three theoretical variables of interest influenced support for punishment, although CONSEQUENCES approached statistical significance ($p < .10$). In terms of control variables, older respondents (AGE) and non-whites (RACE) were significantly more likely to support punishment for an accident release. Given these results, there is no support for my hypotheses (H4 (a)-H6 (a)) that PROBLEM, CONSEQUENCES, and CAUSES will positively influence support for punishment.

Table 5.3: Support for Punishment for Accidental Release.

Model 5.3A: Risk and Punishment for Accidental Release.						**Model 5.3B: Risk, Controls, and Punishment for Accidental Release.**					
Variable	**B**	**Std. Error**	**Beta**	**Sig**	**VIF**	**Variables**	**B**	**Std. Error**	**Beta**	**Sig**	**VIF**
PROBLEM	.049	.122	.030	.692	1.611	PROBLEM	.097	.131	.061	.459	1.696
CONSEQ.	.204	.130	.115	.118	1.508	CONSEQ.	.257	.133	.149	.055	1.506
CAUSES	.054	.026	.152	.040	1.533	CAUSES	.031	.029	.089	.284	1.719
						SOUTH	-.031	.343	-.006	.927	1.062
						AGE	.019	.009	.133	.048	1.127
						COLLEGE	-.727	.396	-.124	.068	1.154
						RACE	1.398	.404	.230	.001	1.113
						POLIIDEO	.062	.054	.082	.248	1.261
						INCOME	-2.862E-6	.000	-.062	.358	1.160
						SEX	-.090	.350	-.018	.797	1.197

N	268	**N**	226
R^2	.063	**R^2**	.149
Adjusted R^2	.052	**Adjusted R^2**	.110
Std. Error of the Estimate	2.572	**Std. Error of the Estimate**	2.407

Table 5.4

As noted earlier, the second set of research questions examined if awareness of air pollution as a problem (PROBLEM), perceptions of negative consequences (CONSEQUENCES), and awareness of the causes of air pollution (CAUSES) would each influence support for punishment. Table 5.4 is the last of the two tables that presents the results of the analyses related to support for punishment of an illegal release of a hazardous pollutant into the air (PUNILLG). Model 5.4A shows that only CONSEQUENCES increased support for punishment while CAUSES and PROBLEM were not significant predictors. In Model 5.4B, the control variables were added and CONSEQUENCES remained a significant predictor of punishment concerning an illegal release (PUNILLG). None of the control variables were statistically significant although COLLEGE and RACE approached statistical significance ($p < .10$)[4].

Given these results, there is no support for my hypotheses H4 (b) and H6 (b) that PROBLEM and CAUSES will positively influence support for punishment. It appears that there is support for (failure to reject) my fifth (H5 (b)) as CONSEQUENCES was a significant predictor of PUNILLG ($p < .05$).

[4] Non-whites and those without a college education were more likely to support punishment for an illegal release ($p < .10$).

Table 5.4: Support for Punishment for Illegal Release.

Model 5.4A: Risk and Punishment for Illegal Release.						**Model 5.4B: Risk, Controls, and Punishment for Illegal Release.**					
Variables	**B**	**Std. Error**	**Beta**	**Sig**	**VIF**	**Variable**	**B**	**Std. Error**	**Beta**	**Sig**	**VIF**
PROBLEM	.121	.096	.093	.208	1.552	PROBLEM	.071	.105	.055	.503	1.628
CONSEQ.	.207	.102	.146	.042	1.484	CONSEQ.	.226	.107	.165	.035	1.487
CAUSES	.019	.021	.064	.373	1.501	CAUSES	-.010	.024	-.034	.682	1.709
						SOUTH	-.366	.275	-.087	.184	1.040
						AGE	.004	.007	.033	.625	1.122
						COLLEGE	-.584	.319	-.126	.069	1.164
						RACE	.567	.318	.119	.076	1.090
						POLIIDEO	.055	.043	.093	.204	1.296
						INCOME	-2.134E-6	.000	-.059	.392	1.166
						SEX	.364	.282	.090	.199	1.201

N	275	**N**	232
R^2	.063	**R^2**	.100
Adjusted R^2	.053	**Adjusted R^2**	.060
Std. Error of the Estimate	2.046	**Std. Error of the Estimate**	1.961

CHAPTER SIX: DISCUSSION AND CONCLUSION

This chapter will: 1) review the research purpose, methods, and findings of the thesis, 2) consider theoretical implications in lieu of the research findings, and 3) discuss the limitations of the research as well as present ideas for future research.

Purpose, Methods, and Findings

This research explored whether perceptions of environmental risk influenced support for social control measures, with specific reference to violations of the Clean Air Act. Drawing on national survey data collected between April and September of 2013, the research assessed whether environmental risk perception affected support for social control measures in the form of regulation and punishment. Risk perception was measured using a risk theory developed by O'Connor et al. (1999), which is comprised of three components: 1) problem awareness, 2) negative consequences to be experienced by oneself and others, and 3) knowledge of the causes of the problem.

The bivariate results indicated that all three of the theoretical risk variables (PROBLEM, CONSEQUENCES, and CAUSES) were positively correlated with all three of the dependent variables (REGULATION, PUNACCID, and PUNILLG). Conversely, the multivariate results indicate that perceived negative consequences to self and/or others (CONSEQUENCES) and knowledge of the causes of the problem (CAUSES) were significant predictors of regulatory support while problem awareness was not. Two of the three risk perception variables were unrelated to support for punishment. The exception was CONSEQUENCES which significantly influenced support of punishment of a company that illegally released a hazardous pollutant into the air.

Most of the control variables did not behave as expected as they were most often not statistically significant (with COLLEGE, RACE, POLIDEO as notable but occasional exceptions). There may be an explanation for this unexpected set of findings. As shown in Chapter 2 females, liberals, younger individuals, and non-whites consistently show more environmental concern and support for environmental policies. Conversely, when we consider punishment, the punitive attitudes literature tells us that the exact opposite demographic generally supports punishment (males, conservatives, older individuals, whites). Thus, these literatures may only be relevant in identifying proper control variables for studies that examine only environmental attitudes or only punitive attitudes and hold less salience for explaining social control of environmental problems particularly when punishment is involved. Case in point, the adjusted R^2 values were much higher for the regulatory models (see Table 5.2) than the models involving punishment (see Tables 5.3-5.4).

Why did the independent variables explain REGULATION better than the two punishment variables? The first possible explanation is that O'Connor et al. (1999) originally developed their risk theory as a way to predict support for climate policy or regulation but not for punishment. A second possible explanation is that the independent variables that typically predict support for punishment may differ for traditional street crime and corporate crime. Future research should further explore how individual characteristics influence support for punishment of traditional, corporate, and environmental crimes. Another possible explanation worthy of consideration is that the public may not distinguish the difference between regulation and punishment suggesting that a generalized measure of social control might be a more comprehensive indicator.

Findings and Theoretical Implications

When considering the findings detailed above it appears that O'Connor et al. risk theory holds some relevance for understanding public support of regulation of air pollution though not as uniformly as originally theorized. The notable exception to this is problem awareness (PROBLEM) which diverges from O'Connor et al. previous empirical work on risk perceptions and support for climate policy. It is possible that problem awareness as a risk perception variable does not hold the same value as understanding the causes of a problem (CAUSES) and realizing negative consequences to self or others (CONSEQUENCES) when considering air pollution generally rather than polarizing topic of climate change. Indeed, this might be the case as both negative consequences and causes deal with more personal forms of risk (air pollution might hurt you/others, you know the specific causes of air pollution) while problem awareness could be viewed as a more generic indictor of risk.

As previously noted, two of the three forms of risk were not relevant for the final three research questions concerning the punishment of a company that had an accidental and illegal release of a hazardous air pollutant. The notable exception was the most visceral form of perceived risk—negative consequences to self and others—whereby people who favored stricter forms of punishment were those who perceived the most negative consequences associated with air pollution. More specifically, the perception of negative consequences increased support for punishment involving an illegal release ($p < .05$) and the accidental release ($p < .10$). Thus, it may take a perceived threat to oneself and/or others to generate support for the punishment of those who violate environmental laws. In sum, it appears that O'Connor et al. risk perception theory is only partially relevant for understanding punishment preferences as a response to corporate environmental crime. However, it should be noted that the risk theory developed by O'Connor et

al. (1999) was originally developed for the purpose of explaining environmental regulation and not punishment practices. So with this in mind, these findings may not be that unexpected.

Limitations and Future Research

There are several limitations associated with this research. First, the sample over represents college educated individuals and under represents minorities though this is not uncommon for survey research (Apelberg, Buckley, and White 2005; Kubiak, Pimlott, and Allen 2011). Still this problem may have skewed my results as individuals who are college educated tend to be more environmentally concerned (see Chapter 2) and less punitive (see section on control variables in Chapter 4). Minorities are generally more environmentally concerned (see Chapter 2) and are less punitive (see section on control variables in Chapter 4), and as such, I may not have an accurate representation of their viewpoint either.

A second limitation may have to do with my sample size and response rate. While the response rate for this project could be considered low[5], it should be noted that public opinion scholars have shown that low response rates do not necessarily produce biased data (Curtin, Presser, and Singer 2000; Keeter et al. 2000; Merkle and Edelman 2002). The sample size, 406, is another possible for this research. While a larger sample size would have been ideal, this research project was limited in terms of funding and other resources. For example, the students who administered the survey were part of a service learning class and when the semester ended so did administration of the survey and this prevented us from contacting potential respondents up to eight attempts per standard industry norms (the project only utilized three attempts).

Another limitation is the regulation variable which contains two items, government regulation as well as industry self-regulation, which individuals could feasibly have contrasting

[5] Using formulas provided by the American Association for Public Opinion Research, a response rate of 4.7% was achieved, and a cooperation rate of 9.6% was achieved.

perceptions about. Although the Cronbach's alpha of REGULATION was .773, future research should examine government regulation and industry self-regulation separately. The manner in which I measured a respondent's knowledge of the causes of air pollution (CAUSES) also presents a possible limitation as the enumerated causes were not weighted relative to their accuracy/inaccuracy level of causality. Thus, future research should weight respondent answers on the items that comprise this index to create a more accurate measurement of the causes of air pollution.

A final limitation worthy of discussion concerns the three risk variables. Although the VIF values are generally considered satisfactory (all are below 2), it is possible that there is a problem with multicollinearity when consideration is given to the bivariate correlations (Table 5.1 and Appendix D). For example, understanding the causes of the problem has moderately high correlations with problem awareness (.578) and consequences (.554). When independent variables are highly correlated it can create difficulties in isolating their true effects on the dependent variable especially since multicollinearity inflates standard errors, which in turn impacts significance tests (Berry and Feldman 1985). Thus, since the three independent variables are significantly correlated with each other, it may create difficulties in discerning their true impact on the three social control variables. This is only pointed out as one possible explanation and should not be viewed as an excuse for non-significant results (Berry and Feldman 1985). Though it would not be consistent with the theoretical expectations of O'Connor et al., these results suggest it might be prudent to examine the impact of each risk variable separately to further understand if they have explanatory power individually.

Conclusion

This research explored whether perceptions of environmental risk influences support for social control measures, with specific reference to violations of the Clean Air Act. Risk perception was measured using a risk theory developed by O'Connor et al. (1999), which included three components: 1) problem awareness, 2) negative consequences to be experienced by oneself and others, and 3) knowledge of the causes of the problem. The research findings indicate that perceived negative consequences to self and/or others and knowledge of the causes of the problem are significant predictors of regulatory support while problem awareness was not. Two of the three forms of risk were generally not relevant for the final three research questions concerning the punishment of a company that had an accidental and illegal release of a hazardous air pollutant. The notable exception was the most visceral form of perceived risk—negative consequences to self and others—whereby people who favored stricter forms of punishment were those who perceived the most negative consequences associated with air pollution. More specifically, the perception of negative consequences increased support for punishment involving an illegal release ($p < .05$) and the accidental release ($p < .10$). In sum, it appears that O'Connor et al. risk perception theory is salient for understanding regulation but only partially relevant for understanding punishment preferences for environmental corporate crime.

REFERENCE LIST

Apelberg, Benjamin J., Timothy J. Buckley, and Ronald H. White. 2005. "Socioeconomic and racial disparities in cancer risk from air toxics in Maryland." *Environmental Health Perspectives* 113(6):693.

Arnocky, Steven and Mirella L. Stroink. 2011. "Variation in Environmentalism Among University Students: Majoring in Outdoor Recreation, Parks, and Tourism Predicts Environmental Concerns and Behaviors." *The Journal of Environmental Education* 42(3): 137-151.

Bachmann, John. 2007. "Will the Circle Be Unbroken: A History of the U.S. National Ambient Air Quality Standards." *Journal of the Air and Waste Management Association* 57: 652-697.

Bamberg, Sebastian. 2003. "How does environmental concern influence specific environmentally related behaviors? A new answer to an old question." *Journal of Environmental Psychology* 23: 21-32.

Bascom, Rebecca, Philip A. Bromberg, Daniel A. Costa, Robert Devlin, Douglas W. Dockery, Mark W. Frampton, William Lambert, Jonathan M. Samet, Frank E. Speizer, and Mark Utell. Committee of the Environmental and Occupational Health Assembly of the American Thoracic Society. 1996. "Health Effects of Outdoor Air Pollution." *American Journal of Respiratory and Critical Care Medicine* 153: 3-50.

Beck, Ulrich. 1992. *Risk Society: Towards a New Modernity*. London: Sage Publications.

Berry, William D. and Stanley Feldman. 1985. *Multiple Regression in Practice*. London: Sage Publications.

Bickerstaff, Karen and Gordon Walker. 2001. "Public Understandings of Air Pollution: The 'Localisation' of Environmental Risk." *Global Environmental Change* 11: 133-145.

Bickerstaff, Karen. 2004. "Risk Perception Research: Socio-Cultural Perspectives on the Public Experience of Air Pollution." *Environment International* 30: 827-840.

Blocker, Jean T., and Douglas Lee Eckberg. 1997. "Gender and Environmentalism: Results from the 1993 General Social Survey." *Social Science Quarterly* 78(4): 841-858.

Brody, Samuel D., Sammy Zahran, Arnold Vedlitz and Himanshu Grover. 2008. "Examining the Relationship between Physical Vulnerability and Public Perceptions of Global Climate Change in the United States." *Environment and Behavior* 40(1): 72-95.

Bord, Richard J., Robert E. O'Connor, and Ann Fisher. 2000. "In What Sense Does the Public Need to Understand Global Climate Change?" *Public Understanding of Science* 9: 205-218.

Bord, Richard J., and Robert E. O'Connor. 1997. "The Gender Gap in Environmental Attitudes: The Case of Perceived Vulnerability to Risk." *Social Science Quarterly* 78(4): 830- 840.

Brody, Samuel D., Sammy Zahran, Arnold Vedlitz and Himanshu Grover. 2008. "Examining the Relationship between Physical Vulnerability and Public Perceptions of Global Climate Change in the United States." *Environment and Behavior* 40(1): 72-95.

Brunekreef, Bert and Stephen T Holgate. 2002. "Air Pollution and Health." *Lancet* 360: 1233-1242.

Buttel, Frederick H., and William L. Flinn. 1976a. "Economic Growth versus the Environment: Survey Evidence." *Social Science Quarterly* 57(2): 410-420.

Buttel, Frederick H., and William L. Flinn. 1976b. "Environmental Politics: The Structuring of Partisan and Ideological Cleavages in Mass Environmental Attitudes." *The Sociological Quarterly* 17(4): 477-490.

Burger, Joanna, and Michael Greenberg. 2006. "Ethnic Differences in Ecological Concerns: Spanish-Speaking Hispanics are More Concerned than others." *Environmental Research* 102: 36-45.

Chiricos, Ted, Kelly Welch, and Marc Gertz. 2004. "Racial Typification of Crime and Support for Punitive Measures." *Criminology* 42(2): 359-389.

Clean Air Act of 1970, 42 U.S.C.

Curtin, Richard, Stanley Presser, and Eleanor Singer. 2000. "The Effects of Response Rate Changes on the Index of Consumer Sentiment." *Public Opinion Quarterly* 64: 413-428.

Dunlap, Riley E. 2002. "An Enduring Concern." *Public Perspective* September/October: 10-14.

Dunlap, Riley E., and Aaron M. McCright. 2008. "A Widening Gap: Republican and Democratic Views on Climate Change." *Environment* 1-11.

Dunlap, Riley E., Kent D. Van Liere, Angela G. Mertig, and Robert Emmet Jones. 2000. "Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale." *Journal of Social Issues* 56(3): 425-442.

Dunlap, Riley E., Chenyang Xiao, and Aaron M. McCright. 2001. "Politics and Environment in America: Partisan and Ideological Cleavages in Public Support for Environmentalism." *Environmental Politics* 10(4): 23-48.

Dunlap, Riley E., and Rik Scarce. 1991. "The Polls- Poll Trends: Environmental Problems and Protection." *Public Opinion Quarterly* 55(4): 651-658.

Duroy, Quentin M.H. 2008. "Testing the Affluence Hypothesis: A Cross-Cultural Analysis of the Determinants of Environmental Action." *The Social Science Journal* 45: 419-439.

Environmental Protection Agency 2013a. "Air Emission Sources: Carbon Monoxide." Retrieved August 13, 2013 (http://www.epa.gov/cgi-bin/broker?polchoice=CO&_debug=0&_service=data&_program=dataprog.national_1.sas).

Environmental Protection Agency 2013b. “Air Emission Sources: Lead.” Retrieved August 13, 2013 (http://www.epa.gov/cgi-bin/broker?polchoice=Pb&_debug=0&_service=data&_program=dataprog.national_1.sas).

Environmental Protection Agency 2013c. “Air Emission Sources: Nitrogen Oxides.” Retrieved August 13, 2013 (http://www.epa.gov/cgi-bin/broker?polchoice=NOX&_debug=0&_service=data&_program=dataprog.national_1.sas).

Environmental Protection Agency 2013d. “Air Emission Sources: Particulate Matter.” Retrieved August 13, 2013 (http://www.epa.gov/cgi-bin/broker?polchoice=PM&_debug=0&_service=data&_program=dataprog.national_1.sas).

Environmental Protection Agency 2013e. “Air Emission Sources: Sulfur Dioxide.” Retrieved August 13, 2013 (http://www.epa.gov/cgi-bin/broker?polchoice=SO2&_debug=0&_service=data&_program=dataprog.national_1.sas).

Environmental Protection Agency 2013f. “Air Emission Sources: Volatile Organic Compounds.” Retrieved August 13, 2013 (http://www.epa.gov/iaq/voc.html#Sources).

Environmental Protection Agency 2013g. “Carbon Monoxide.” Retrieved August 13, 2013 (http://www.epa.gov/iaq/co.html).

Environmental Protection Agency 2013h. “Carbon Monoxide: Health.” Retrieved August 13, 2013 (http://www.epa.gov/airquality/carbonmonoxide/health.html).

Environmental Protection Agency 2013i. “Enforcement: Enforcement Basic Information.” Retrieved August 13, 2013 (http://www2.epa.gov/enforcement/enforcement-basic-information).

Environmental Protection Agency 2013j. “Green Book: Summary Nonattainment Area Population Exposure Report.” Retrieved August 13, 2013 (http://www.epa.gov/airquality/greenbook/popexp.html).

Environmental Protection Agency 2013k. “Lead.” Retrieved August 13, 2013 (http://www2.epa.gov/lead).

Environmental Protection Agency 2013l. “National Ambient Air Quality Standards.” Retrieved August 13, 2013 (http://www.epa.gov/air/criteria.html).

Environmental Protection Agency 2013m. “National Ambient Air Quality Standards: Carbon Monoxide.” Retrieved August 13, 2013 (http://www.epa.gov/ttn/naaqs/standards/co/s_co_index.html).

Environmental Protection Agency 2013n. “National Ambient Air Quality Standards: Lead.” Retrieved August 13, 2013 (http://www.epa.gov/ttn/naaqs/standards/pb/s_pb_index.html).

Environmental Protection Agency 2013o. "National Ambient Air Quality Standards: Nitrogen Dioxide." Retrieved August 13, 2013 (http://www.epa.gov/air/criteria.html).

Environmental Protection Agency 2013p. "National Ambient Air Quality Standards: Ozone." Retrieved August 13, 2013 (http://www.epa.gov/air/criteria.html).

Environmental Protection Agency 2013q. "National Ambient Air Quality Standards: Particulate Matter." Retrieved August 13, 2013 (http://www.epa.gov/pm/actions.html).

Environmental Protection Agency 2013r. "National Ambient Air Quality Standards: Sulfur Dioxide." Retrieved August 13, 2013 (http://www.epa.gov/ttn/naaqs/standards/so2/s_so2_index.html).

Environmental Protection Agency 2013s. "Nitrogen Dioxide." Retrieved August 13, 2013 (http://www.epa.gov/oar/nitrogenoxides/).

Environmental Protection Agency 2013t. "Particulate Matter." Retrieved August 13, 2013 (http://www.epa.gov/pm/).

Environmental Protection Agency 2013u. "Particulate Matter: Health." Retrieved August 13, 2013 (http://www.epa.gov/pm/health.html).

Environmental Protection Agency 2013v. "Six Common Air Pollutants: State Implementation Plan: Development Process." Retrieved August 13, 2013 (http://www.epa.gov/air/urbanair/sipstatus/process.html).

Environmental Protection Agency 2013w. "Six Common Air Pollutants: State Implementation Plan: Overview." Retrieved August 13, 2013 (http://www.epa.gov/air/urbanair/sipstatus/overview.html).

Environmental Protection Agency 2013x. "Understanding the Clean Air Act." Retrieved August 13, 2013 (http://www.epa.gov/airquality/peg_caa/understand.html).

Ewert, Alan, and Doug Baker. 2001. "Standing for where you sit: An Exploratory Analysis of the Relationship between Academic Major and Environment Beliefs." *Environment and Behavior* 33(5): 687-707.

Flatt, Victor B. 2007. "Gasping for Breath: The Administrative Flaws of Federal Hazardous Air Pollution Regulation and what We Can Learn from the States." *Ecology Law Quarterly* 34: 107-173.

Fransson, N. and T. Gärling, 1999. "Environmental Concern: Conceptual Definitions, Measurement Methods, and Research Findings." *Journal of Environmental Psychology* 19(4): 369-382.

Gerber, Brian J. and Grant W. Neeley. 2005. "Perceived Risk and Citizen Preferences for Governmental Management of Routine Hazards." *The Policy Studies Journal* 33(3): 395-418.

Guagnano, Gregory A., and Nancy Markee. 1995. "Regional Differences in the Sociodemographic Determinants of Environmental Concern." *Population and Environment* 17(2): 135-149.

Hamilton, Lawrence C., Chris R. Colocousis, and Cynthia M. Duncan. 2010. "Place Effects on Environmental Views." *Rural Sociology* 75(2): 326-347.

Hodgkinson, Shari P. and J. Michael Innes. 2001. "The Attitudinal Influence of Career Orientation in 1st-Year University Students: Environmental Attitudes as a Function of Degree Choice." *The Journal of Environmental Education* 32(3): 37-40.

Hunter, Lori M., Alison Hatch, and Aaron Johnson. 2004. "Cross-National Gender Variation in Environmental Behaviors." *Social Science Quarterly* 85(3): 677- 694.

Jacques, Peter J., Riley E. Dunlap, and Mark Freeman. 2008. "The Organisation of Denial: Conservative Think Tanks and Environmental Scepticism." *Environmental Politics* 17(3): 349-385.

Jones, Robert Emmet, and Shirley A. Rainey. 2006. "Examining Linkages between Race, Environmental Concern, Health, and Justice in a Highly Polluted Community of Color." *Journal of Black Studies* 36(4): 473-496.

Keeter, Scott, Carolyn Miller, Andrew Kohut, Robert Groves, and Stanley Presser. 2000. "Consequences of Reducing Nonresponse in a Large National Telephone Survey." *Public Opinion Quarterly* 64: 125-148.

Knight, Kathleen. 2006. "Transformations of the Concept of Ideology in the Twentieth Century." *American Political Science Review* 100(4): 619-626.

Konisky, David M., Jeffery Milyo, and Lilliard E. Richardson Jr. 2008. "Environmental Policy Attitudes: Issues, Geographical Scale, and Political Trust." *Social Science Quarterly* 89(5): 1066-1085.

Kubiak, Sheryl Pimlott, and Terrence Allen. 2011. "Public Opinion Regarding Juvenile Life without Parole in Consecutive Statewide Surveys." *Crime & Delinquency* 57(4):495–515.

Lang, Kenneth Brandon. 2011. "The Relationship between Academic Major and Environmentalism among College Students: Is it Mediated by the Effects of Gender, Political Ideology and Financial Security?" *The Journal of Environmental Education* 42(4): 203-215.

Lee, E. Bun. 2008. "Environmental Attitudes and Information Sources among African American College Students." *The Journal of Environmental Education* 40(1): 29-42.

Levine, Debra Siegel, and Michael J. Strube. 2011. "Environmental Attitudes, Knowledge, Intentions and Behaviors among College Students." *The Journal of Social Psychology* 152(3): 308-326.

Lewis-Beck, Michael S. 1990. *Applied Regression An Introduction. Series: Quantitative Applications in the Social Sciences*. Beverly Hills and London: Sage Publications.

Lunder, Sonya, Tracey J. Woodruff and Daniel A. Axelrad. 2004. "An Analysis of Candidates for Addition to the Clean Air Act List of Hazardous Air Pollutants." *Journal of the Air and Waste Management Association* 54: 157-171.

Maruna, Shadd, and Anna King. 2009. "Once a Criminal, Always a Criminal?: 'Redeemability' and the Psychology of Punitive Public Attitudes." *European Journal on Criminal Policy and Research* 15: 7-24.

McCright, Aaron M. and Riley E. Dunlap. 2010. "Anti-reflexivity: The American Conservative Movement's Success in Undermining Climate Science and Policy." *Theory, Culture and Society* 27 (2-3): 100-133.

McCright, Aaron M. and Riley E. Dunlap. 2000. "Challenging Global Warming as a Social Problem: An Analysis of the Conservative Movement's Counter-Claims." *Social Problems* 47(4): 499-522.

McCright, Aaron M. and Riley E. Dunlap. 2011a. "Cool Dudes: The Denial of Climate Change among Conservative White Males in the United States." *Global Environmental Change* 21: 1163- 1172.

McCright, Aaron M. and Riley E. Dunlap. 2003. "Defeating Kyoto: The Conservative Movement's Impact on U.S. Climate Change Policy." *Social Problems* 50(3): 348-373.

McCright, Aaron M. and Riley E. Dunlap. 2011b. "The Politicization of Climate Change and Polarization in the American Public's Views of Global Warming, 2001-2010." *The Sociological Quarterly* 52: 155-194.

McMurry, Robert I. and Stephen D. Ramsey. 1986. "Environmental Crime: The Use of Criminal Sanctions in Enforcing Environmental Laws." *Loyola of Los Angeles Law Review* 9(4): 1133- 1170.

Merkle, Daniel, and Murray Edelman. 2002. "Nonresponse in Exit Polls: A Comprehensive Analysis." In *Survey Nonresponse*, ed. Robert Groves, Don Dillman, John Eltinge, and Rod Little, pp. 243-258. New York: Wiley.

Mobley, Catherine, Wade M. Vagias, and Sarah L. DeWard. 2009. "Exploring Additional Determinants of Environmentally Responsible Behavior: The Influence of Environmental Literature and Environmental Attitudes." *Environment and Behavior* 42(2): 420-447.

Mohai, Paul and Ben W. Twight. 1987. "Age and Environmentalism: An Elaboration of the Buttel Model Using National Survey Evidence." *Social Science Quarterly* 68(4): 798-815.

Mohai, Paul and Bunyan Bryant. 1998. "Is There a "Race" Effect on Concern for Environmental Quality?" *The Public Opinion Quarterly* 62(4): 475-505.

O'Brien, Robert M. 2007. "A Caution Regarding Rules of Thumb for Variance Inflation Factors." *Quality and Quantity* 41: 673-690.

O'Connor, Robert E., Richard J. Bord, and Ann Fisher. 1998. "Rating Threat Mitigators: Faith in Experts, Governments, and Individuals Themselves to Create a Safer World." *Risk Analysis* 18(5): 547-556.

O'Connor, Robert E., Richard J. Bord, and Ann Fisher. 1999. "Risk Perceptions, General Environmental Beliefs, and Willingness to Address Climate Change." *Risk Analysis* 19(3): 461-471.

O'Connor, Robert E., Richard J. Bord, Brent Yarnal, and Nancy Wiefek. 2002. "Who Wants to Reduce Greenhouse Gas Emissions?" *Social Science Quarterly* 83(1): 1- 17.

Ozymy, Joshua and Melissa L. Jarrell. 2011. "Upset over Air Pollution: Analyzing Upset Event Emissions at Petroleum Refineries." *Review of Policy Research* 28(4): 365-381.

Park, Hyung Sam and Arnold Vedlitz. 2013. "Climate Hazards and Risk Status: Explaining Climate Risk Assessment, Behavior, and Policy Support." *Sociological Spectrum* 33: 219-239.

Piquero, Nicole Leeper, Stephanie Carmichael, and Alex R. Piquero. 2008. "Assessing the Perceived Seriousness of White-Collar and Street Crimes." *Crime and Delinquency* 54(2): 291-312.

Plutzer, Eric, Ardith Maney, and Robert E. O'Connor. 1998. "Ideology and Elites' Perceptions of the Safety of New Technologies." *American Journal of Political Science* 42(1): 190-209.

Ridener, Larry R. 1999. "Effects of College Major on Ecological Worldviews: A Comparison of Business, Science, and Other Students." *Journal of Education for Business*: 15-21.

Salka, William M. 2001. "Urban-Rural Conflict over Environmental Policy in the Western United States." *American Review of Public Administration* 31(1): 33-48.

Samet, Jonathan M. 2011. "The Clean Air Act and Health- A Clearer View from 2011." *The New England Journal of Medicine* 365(3): 198-201.

Sapsford, Roger. 2007. *Survey Research*. London, England: Sage Publications.

Shelley, Tara O'Connor, Ted Chiricos, and Marc Gertz. 2011. "What about the environment? Assessing the perceived seriousness of environmental crime." *International Journal of Comparative and Applied Criminal Justice* 35(2): 307-325.

Siegrist, Michael, and George Cvetkovich. 2000. "Perception of Hazards: The Role of Social Trust and Knowledge." *Risk Analysis* 20(5): 713-719.

Sjöberg, Lennart. 2001. "Limits of Knowledge and the Limited Importance of Trust." *Risk Analysis* 21(1): 189-198.

Slovic, Paul and Ellen Peters. 2006. "Risk Perception and Affect." *Current Directions in Psychological Science* 15(6): 322-325.

Stretesky, Paul B. and Jackie Gabriel. 2005. "Self-Policing and the Environment: Predicting Self-Disclosure of Clean Air Act Violations under the U.S. Environmental Protection Agency's Audit Policy." *Society and Natural Resources: An International Journal* 18 (10): 871-887.

Thapa, Brijesh. 1999. "Environmentalism: The Relation of Environmental Attitudes and Environmentally Responsible Behaviors among Undergraduate Students." *Bulletin of Science, Technology and Science* 19(5): 426-438.

The American Association for Public Opinion Research. 2011. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. 7th edition*. AAPOR.

Uhlmann, David M. 2009. "Environmental Crime Comes of Age: The Evolution of Criminal Enforcement in the Environmental Regulatory Scheme." *Utah Law Review* 4: 1223-1252.

United States Census Bureau. 2011. *Profiles of general demographic characteristics: 2010 census of population and housing*. Washington, D.C.: U.S. Department of Commerce.

United States Environmental Protection Agency. Office of Air Quality Planning and Standards. 2012. *Our Nation's Air: Status and Trends Through 2010*. North Carolina: Environmental Protection Agency.

Van Liere, Kent D. and Riley E. Dunlap. 1980. "The Social Bases of Environmental Concern: A Review of Hypotheses, Explanations and Empirical Evidence." *The Public Opinion Quarterly* 44(2): 181-197.

Weisberg, Herbert F., Jon A. Krosnick, and Bruce D. Bowen. 1996. *An Introduction to Survey Research, Polling, and Data Analysis*. 3rd ed. Thousand Oaks, CA: Sage Publications.

Whittaker, Matthew, Gary M. Segura, and Shaun Bowler. 2005. "Racial/Ethnic Group Attitudes toward Environmental Protection in California: Is "Environmentalism" Still a White Phenomenon?" *Political Research Quarterly* 58(3): 435-447.

Xiao, Chenyang, and Aaron M. McCright. 2011. "Explaining Gender Differences in Concern about Environmental Problems in the United States." *Society and Natural Resources* 25(11): 1067-1084.

Zahran, Sammy, Samuel D. Brody, Himanshu Grover and Arnold Vedlitz. 2006. "Climate Change Vulnerability and Policy Support." *Society and Natural Resources: An International Journal* 19(9): 771-789.

Zelezny, Lynnette C., Poh-Pheng Chua, and Christina Aldrich. 2000. "Elaborating on Gender Differences in Environmentalism." *Journal of Social Issues* 56(3): 443-457.

APPENDIX A: ENVIRONMENTAL ISSUES AND ENVIRONMENTAL CRIME SURVEY

Environmental Issues and Environmental Crime Public Opinion Survey

Hello my name is _____ and I am a student at Colorado State University. Colorado State University is conducting a brief public opinion survey on environmental issues and environmental crime.

"Do you have approximately 10 minutes to complete the survey?"

[If no, ask if there is a better time to call and record their preference on the call disposition sheet.]

If yes—"*Thank you. Your participation is voluntary and you may stop answering questions at any time. There is no direct benefit for your participation; however, by participating in the survey you will provide Colorado State University with information that will add to research in the field of environmental studies.* ***There are NO KNOWN RISKS in participating and your responses will be treated CONFIDENTIALLY.*** *Are you ready to take the survey?"*

Date _____

Record Student Name _____

Record Start Time _____

(*Do not read*) SCREENING QUESTIONS

Are you 18 years of age or older? (*If the respondent is under 18, ask if someone 18 or older is available to complete the survey. If no person age 18 or older is available, state that survey respondents must be 18 or older. Thank them for their time, abort the survey, & record INE on the call sheet.*)

Y N

(*Do not read*) Problem Awareness

1) Please answer yes or no. Have you ever heard of hydraulic fracturing, more commonly known as fracking?
    a. Yes (Go to Question 2)
    b. No (Read prompt)
    c. (*Do not read*) Don't know (Read prompt)
    d. (*Do not read*) Refused

READ IF NO or DK TO QUESTION 1: Hydraulic fracturing, more commonly known as fracking, is a drilling process that injects water, sand and chemicals into the ground at high pressures to dislodge oil and natural gas so that it can be pumped out of the ground. Some of the chemicals are toxic.

2) Please answer yes or no. Do you support fracking as a method for extracting oil and natural gas?
   a. Yes
   b. No
   c. (*Do not read*) Maybe
   d. (*Do not read*) Don't know
   e. (*Do not read*) Refused

3) I am going to read you a list of environmental issues. Please indicate if you think each issue is a significant problem, a moderate problem, a minor problem, or not a problem. (*Prompt if needed: In general for Q3g-Q3k*)

a. Air pollution in your community	SP	MP	MIP	NP	(DK)	(R)
b. Air pollution in the United States	SP	MP	MIP	NP	(DK)	(R)
c. Water pollution in your community	SP	MP	MIP	NP	(DK)	(R)
d. Water pollution in the United States	SP	MP	MIP	NP	(DK)	(R)
e. Fracking in your community	SP	MP	MIP	NP	(DK)	(R)
f. Fracking in the United States	SP	MP	MIP	NP	(DK)	(R)
g. Oil drilling	SP	MP	MIP	NP	(DK)	(R)
h. Drilling for natural gas	SP	MP	MIP	NP	(DK)	(R)
i. The use of nuclear power facilities	SP	MP	MIP	NP	(DK)	(R)
j. Hazardous waste disposal	SP	MP	MIP	NP	(DK)	(R)
k. Climate change	SP	MP	MIP	NP	(DK)	(R)

4) Have you, or a family member, experienced any negative health effects resulting from exposure to air pollution?
   a. Yes
   b. No (Skip to Question 6)
   c. (*Do not read*) Don't know (Skip to Question 6)
   d. (*Do not read*) Refused (Skip to Question 6)

5) What was the health problem?

_____

_____

_____

_____

(*Do not read*) Negative Consequences

6) Please tell me if you strongly agree, agree, disagree, or strongly disagree that air pollution:

   a. Threatens *your* personal health and safety
      SA A D SD (N) (DK) (R)

   b. Threatens the health and safety of *other* people
      SA A D SD (N) (DK) (R)

7) On a scale of 0-10, with zero indicating no tolerance for risk and ten indicating a high tolerance for risk, how much risk from air pollution are you willing to accept?
   _____ (DK) (R)

(*Do not read*) Knowledge of the causes of the problems

8) Please indicate if you think each of the following is a major cause, a moderate cause, a minor cause, or not a cause of air pollution.

a.	Cars	MC	MOC	MIC	NC	(DK)	(R)
b.	Commercial vehicles and large trucks	MC	MOC	MIC	NC	(DK)	(R)
c.	Boats	MC	MOC	MIC	NC	(DK)	(R)
d.	Airplanes	MC	MOC	MIC	NC	(DK)	(R)
e.	Construction equipment	MC	MOC	MIC	NC	(DK)	(R)
f.	Coal burning power plants	MC	MOC	MIC	NC	(DK)	(R)
g.	Oil drilling	MC	MOC	MIC	NC	(DK)	(R)
h.	Drilling for natural gas	MC	MOC	MIC	NC	(DK)	(R)
i.	Fracking	MC	MOC	MIC	NC	(DK)	(R)
j.	Oil refineries	MC	MOC	MIC	NC	(DK)	(R)
k.	Burning hazardous waste	MC	MOC	MIC	NC	(DK)	(R)
l.	Other industrial activities (*Prompt if needed: For example, factories, chemical production plants, or logging activities.*)	MC	MOC	MIC	NC	(DK)	(R)

(*Do not read*) Regulation

9) Now I am going to read some proposals that have been suggested for dealing with *air pollution*. Please tell me if you strongly support, support, oppose, or strongly oppose the following proposals:

a. Stronger enforcement of *federal* air pollution laws and regulations?
SS S O SO (N) (DK) (R)

b. Stronger enforcement of *state* air pollution laws and regulations?
SS S O SO (N) (DK) (R)

c. Setting stronger limits on the amount of exhaust that can come from cars?
SS S O SO (N) (DK) (R)

d. Setting legal limits on the amount of energy consumers can use in their homes?
SS S O SO (N) (DK) (R)

e. Setting strict pollution controls on oil and coal burning power plants?
SS S O SO (N) (DK) (R)

f. Allowing corporations to detect and report their own environmental violations?
SS S O SO (N) (DK) (R)

g. Setting industry wide limits on pollution and allowing companies to buy and sell the rights to exceed their individual limits? (*Prompt if needed: This is also known as a cap and trade program.*)
SS S O SO (N) (DK) (R)

(*Do not read*) Punishments

READ: Now I am going to read you a couple of hypothetical scenarios.

10) Suppose a company *accidentally* releases a *hazardous* pollutant into the air due to *equipment failure*. Please indicate if you think each of the following government responses would be acceptable, too strong, or not strong enough.

a. No punishment
AC TS NSE (DK) (R)

b. Fine the company an amount equal to one week of their gross income
AC TS NSE (DK) (R)

c. Fine the company an amount equal to three months of their gross income
AC TS NSE (DK) (R)

d. Increase government inspections of the company
AC TS NSE (DK) (R)

e. Suspend business activities for a specified amount of time set by a court
AC TS NSE (DK) (R)

f. Jail or prison time for the worker whose job it was to maintain the equipment
AC TS NSE (DK) (R)

g. Jail or prison time for company executives who were responsible for monitoring the maintenance of equipment and air quality
AC TS NSE (DK) (R)

11) Suppose a company *illegally* releases a *hazardous* pollutant into the air and fails to report the release to government officials. Please indicate if you think each of the following government responses would be acceptable, too strong, or not strong enough.

a. No punishment
AC TS NSE (DK) (R)

b. Fine the company an amount equal to one week of their gross income
AC TS NSE (DK) (R)

c. Fine the company an amount equal to three months of their gross income
AC TS NSE (DK) (R)

d. Increase government inspections of the company
AC TS NSE (DK) (R)

e. Suspend business activities for a specified amount of time set by a court
AC TS NSE (DK) (R)

f. Jail or prison time for the worker who caused the release and failed to report it to government officials
AC TS NSE (DK) (R)

g. Jail or prison time for company executives who knew about the release and failed to report it to government officials
AC TS NSE (DK) (R)

READ: Next I have a few questions that concern your opinion about fracking

(*Prompt if needed:* ***What is fracking?*** *"Hydraulic fracturing, more commonly known as fracking, is a drilling process that injects water, sand and chemicals into the ground at high pressures to dislodge oil and natural gas so that it can be pumped out of the ground. Some of the chemicals are toxic."*)

(*Prompt if needed:* ***Why do you keep asking me about fracking?*** *"We are interested in learning about what people think about fracking as a drilling process. If you are not sure, it is okay to say so, this section will only take a moment."*)

(*Prompt if needed:* ***I don't know anything about fracking****. "We are interested in learning about what people think about fracking as a drilling process. If you are not sure, it is okay to say so, this section will only take a moment."*)

(*Prompt if needed:* ***Why do you care about fracking?*** *"We are interested in learning about what people think about fracking as a drilling process."*)

(*Do not read*) Hydraulic fracturing

12) Please tell me if you strongly agree, agree, disagree, or strongly disagree that fracking has had a *positive* impact on:

a. Community quality of life
SA A D SD (N) (DK) (R)

b. Job creation
SA A D SD (N) (DK) (R)

c. Generating tax revenue
SA A D SD (N) (DK) (R)

d. Investment in community infrastructure
SA A D SD (N) (DK) (R)

e. Energy independence from foreign oil
SA A D SD (N) (DK) (R)

f. The development of clean energy
SA A D SD (N) (DK) (R)

g. Climate change
SA A D SD (N) (DK) (R)

13) Please tell me if you strongly agree, agree, disagree, or strongly disagree that fracking has had a *negative* impact on:

a. Community quality of life
SA A D SD (N) (DK) (R)

b. Road traffic
SA A D SD (N) (DK) (R)

c. Air quality
SA A D SD (N) (DK) (R)

d. Water quality
SA A D SD (N) (DK) (R)

e. Water availability
SA A D SD (N) (DK) (R)

f. Land use
SA A D SD (N) (DK) (R)

g. Noise pollution
SA A D SD (N) (DK) (R)

h. Climate change
SA A D SD (N) (DK) (R)

14) Please tell me if you strongly agree, agree, disagree, or strongly disagree that fracking:

a. Threatens *your* personal health and safety
SA A D SD (N) (DK) (R)

b. Threatens the health and safety of *other* people
SA A D SD (N) (DK) (R)

15) Do you have fracking within your community?
a. Yes
b. No (Skip to Question 17)
c. (*Do not read*) Don't know (Skip to Question 17)
d. (*Do not read*) Refused (Skip to Question 17)

16) Approximately how many miles are fracking operations from your home?

_____

_____

_____

READ: We are almost finished.

17) Now I am going to read some proposals that have been suggested for dealing with *fracking*. Would you strongly support, support, oppose, or strongly oppose:

a. A policy which requires oil and gas companies to disclose the chemicals used in their fracking fluids before drilling begins? (*Prompt if needed: Fracking fluids include water, sand, and a combination of chemicals, some of which are toxic.*) (*Prompt if needed: This would be disclosed to regulatory officials.*)
SS S O SO (N) (DK) (R)

b. Setting stricter regulations on fracking?
SS S O SO (N) (DK) (R)

c. Allowing corporations to detect and report their own environmental violations?
SS S O SO (N) (DK) (R)

d. Restricting drilling near residential property?
SS S O SO (N) (DK) (R)

e. Restricting drilling near commercial property?
SS S O SO (N) (DK) (R)

f. Restricting drilling on public lands?
SS S O SO (N) (DK) (R)

g. Restricting drilling in wilderness areas?
SS S O SO (N) (DK) (R)

h. Monitoring air pollution at the drill site?
SS S O SO (N) (DK) (R)

i. Monitoring water pollution at the drill site?
SS S O SO (N) (DK) (R)

j. Setting stronger limits on noise pollution?
SS S O SO (N) (DK) (R)

READ: The following demographic questions are for statistical purposes only. These questions will only take a moment.

(*Do not read*) Demographic Questions

18) What is your zip code? _____

19) What county and state do you live in? _____
(*CALLER NOTE: Ask for spelling if needed.*)

20) What year were you born? _____ (*CALLER NOTE: if 1996 or later R is not 18 so skip to the end of the survey & read them the closing statement.*)

21) Which of the following best describes the highest level of education that you have completed? Please stop me when I reach the *highest level* of education that you have received.
    a. No High School
    b. Some High School
    c. High School Graduate
    d. Vocational/Trade School Graduate
    e. Some College or Associates Degree
    f. College Graduate
    g. Post Graduate Work or Degree
    h. (*Do not read*) Don't know
    i. (*Do not read*) Refused

22) What race or ethnicity do you consider yourself? (*CALLER NOTE: DON'T READ LIST UNLESS ASKED BY RESPONDENT*)
    a. (*Do not read*) Hispanic or Latino
    b. (*Do not read*) White/ Caucasian
    c. (*Do not read*) Black/ African-American
    d. (*Do not read*) Asian or Pacific Islander
    e. (*Do not read*) Native American
    f. (*Do not read*) Multi-Racial (Write down what they say:_____)
    g. (*Do not read*) Other (Please specify_____)
    h. (*Do not read*) Don't know
    i. (*Do not read*) Refused

23) In terms of economic issues, would you say that you are:
    a. Very conservative
    b. Conservative
    c. Somewhat conservative
    d. Somewhat liberal
    e. Liberal
    f. Very liberal
    g. (*Do not read*) Moderate
    h. (*Do not read*) Don't know
    i. (*Do not read*) Refused

24) In terms of social issues, would you say that you are:
    a. Very conservative
    b. Conservative
    c. Somewhat conservative
    d. Somewhat liberal
    e. Liberal
    f. Very liberal
    g. (*Do not read*) Moderate
    h. (*Do not read*) Don't know
    i. (*Do not read*) Refused

25) Which of the following categories includes your annual household income, before taxes? Please stop me when I reach your income category.
    a. Less than $25,000
    b. $25 - $49,000
    c. $50 - $74,000
    d. $75 - $99,000
    e. $100 - $149,000
    f. $150 - $199,000
    g. $200,000 or more
    h. (*Do not read*) Don't know
    i. (*Do not read*) Refused

26) For demographic purposes, I am required to ask all respondents to report their sex. (*CALLER NOTE: Pause so they can respond. If they are expressing confusion you may offer the categories*)
    a. (*Do not read*) Male
    b. (*Do not read*) Female
    c. (*Do not read*) Other (Please Specify: _____)
    d. (*Do not read*) Refused

READ: Do you have any questions for me regarding this research project?

[*CALLER NOTE: If yes, read respondent the related prompts about how to obtain results, researcher contact information, confidentiality, rights as participant in research, etc., then read statement below.*]

READ: By completing this survey you have helped Colorado State University understand public attitudes on environmental issues and environmental crime. On behalf of Colorado State University, we appreciate your help and thank you for your time. Good Bye.

Record End Time: _____

[*Caller: record any notes or concerns you had about this interview.*]

_____

_____

_____

_____

[*CALLER NOTE: For respondents who have been personally impacted by fracking in some way (i.e., work in Oil/Gas industry; have personally been impacted by fracking in some way) please ask this last question.*]

Would you be interested in talking with my Professor, Dr. Tara Shelley in greater detail about your experiences with fracking?

i. *(Don't read)* Yes
ii. *(Don't read)* Maybe
iii. *(Don't read)* No

i. [*CALLER NOTE: If Yes or maybe*] May we please have your contact information so that Dr. Shelley can follow up with you at a later time? As part of CSU's confidentiality guarantee, your name and contact information will not be associated with your survey responses in any way. (*Prompt: only document what the respondent is comfortable sharing with us)*

Name: _____

Email: _____

Address: _____

Zip: _____

Best Phone Number to Reach You At?: _____

APPENDIX B: ENVIRONMENTAL ISSUES AND ENVIRONMENTAL CRIME SURVEY

PROMPTS

SURVEY PROMPTS (7/11/14)

Environmental Issues and Environmental Crime Public Opinion Survey

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(Spanish Speaking Household) Is there someone in your house that speaks English? → *Hay alguien en su hogar que hable ingles? "I ahl-gee-in en sue oh-gar K ah-bley Ing-gles*

(Spanish Speaking Household) Thank you for your time. → *"Gracias por su tiempo" "Gracias por sue tee-yempo"* (CALLER: Record as ineligible/INE)

Respondent is worried that they are not qualified to take the survey or answer a question. → *There is no right or wrong answer, this question seeks to determine your opinion or to understand your experiences.*

How did you get my number? → *A computer randomly selected your phone number. As part of our confidentiality guarantee, we do not associate your number with your responses to the survey.*

How is this confidential if you have my number? → A *computer randomly selected your number. I do not know your name or address. We also do not associate your number with your responses to the survey.*

I am on a do not call list. → *A **computer randomly generated your phone number. As part of our confidentiality guarantee, we do not associate your number with your responses to the survey. The National Do Not Call Registry does not limit calls by political organizations, charities, or telephone surveyors.** The National Do Not Call Registry applies to any plan, program, or campaign to sell goods or services through interstate phone calls. This includes telemarketers who solicit consumers, often on behalf of third party sellers. It also includes sellers who provide, offer to provide, or arrange to provide goods or services to consumers in exchange for payment.* [CALLER: DO NOT ARGUE WITH THEM!].

Respondent says they already took the survey. →*Ask the respondent if they took the survey over the phone and if from a student from Colorado State University. If no, tell them that this is a different survey and ask if they would be willing to participate. If yes, thank them for their time and abort the survey.*

Who is Dr. Shelley?/What is her phone number? → *Dr. Shelley is a faculty member in the Sociology Department. She can be reached during normal business hours at 970-491-0714 or via email at tara.shelley@colostate.edu.*

Respondent is concerned about the research or their rights as a participant. → *You may reach Dr. Shelley during normal business hours at 970-491-0714 or via email at tara.shelley@colostate.edu. You may also contact Janell Barker with the Human Research Administration Office at 970-491-1655.*

Respondent does not allow you to finish the introductory statement. → *I am sorry but research protocol requires that I read the full disclosure statement prior to starting the survey to insure that your rights as a participant in research are protected. This will only take a few seconds.*

What are known risks? → *For a confidential public opinion study there are not many known risks. One possible risk would be if you told us your name and then we associated your survey with your name which is against our research protocol.*

What is this for/What is the purpose of the survey? → *To provide Colorado State University with a better understanding of environmental issues and environmental crimes.*

What will the Colorado State University use this information for? → *Colorado State University will use this information to help inform future research on the environment and environmental crime.*

Respondent says that the survey is biased. → *The survey is not meant to be biased. We are attempting to collect responses from individuals with a wide variety of opinions in order to accurately reflect public opinion on these issues.*

Who wrote these questions? → *The questions were written by faculty in the Center for the Study of Crime and Justice in the Department of Sociology at Colorado State University.*

Who is funding this research? → *The survey is funded by Colorado State University. There are no external sources of funding supporting this research.*

Can I get a copy of the results? → *Yes, when the results are published we can send you information about how to obtain the results. To do so, you will need to provide me with an email address or a mailing address. As part of our confidentiality guarantee, we do not associate this information with your responses to the survey.* [CALLER: If asked tell them the results may not be available for up to 6-12 months].

Is this part of a class? → *Yes, the survey is being done as part of a research class in the Department of Sociology in collaboration with the Center for the Study of Crime and Justice.*

Why can't I get paid to do the survey? → *I am sorry but Colorado State University is a nonprofit organization so we are unable to compensate you for your participation. We value your opinion and hope you will choose to participate*.

Respondent says survey is general or their answers depend on more specific information. →

1. *I understand, but to keep the survey brief, we have to keep a lot of the questions at a general level.* [CALLER: As a last resort, offer them the option to be neutral or DK.]
2. *We know that in some cases none of the answers will fit the way you feel exactly but we need to keep the question/answer process consistent across all respondents so that we can see similarities and differences in the answers people give.* [CALLER: As a last resort, offer them the option to be neutral or (DK).]

Respondent says that the questions are unclear or tricky. → *We do our best to ask good questions but sometimes we have questions that are not as clear as we would like. Could you please give us your best answer to the question as it is currently worded?* [CALLER: record problems noted by the respondent.]

Respondent is becoming irate or excessively frustrated with a question. → *Move on if a prompt will not help you*.

Respondent wants you to comment or provide your own answer. → *I am sorry; I am not allowed to discuss my personal views as they may influence your responses.*

I thought that you said this would take 10 minutes? → *People vary in the amount of time it takes to complete the survey depending on whether they have questions or if they provide additional feedback. We really value your participation and hope you will complete the rest of the survey.*

If a respondent asks you what the purpose of a question is, politely say. → *I am sorry, but I am not permitted to discuss the purpose of questions with respondents as my interpretation of the purpose could influence your answer. Would you mind answering the question to the best of your ability?*

What type of crime? → *We would like to know your opinion on crimes relating to the environment, such as individuals violating the Clean Air Act.*

Respondent does not allow you to finish reading the entire question. → *Use your best judgment. If the question requires that it be read in its entirety in order to be fully understood the say "I am sorry, in order to gather the right information I must read the question in full, would you mind if I repeat it for you?" If the question does not need to be read in full to determine the answer (e.g., questions about level of education or race) then simply record the answer provided by the respondent.*

Don't we already have these policies/laws? →*Maybe, but whether we do or not, we want to know whether you support such a policy/law.*

What is fracking? → *Hydraulic fracturing, more commonly known as fracking, is a drilling process that injects water, sand and chemicals into the ground at high pressures to dislodge oil and natural gas so that it can be pumped out of the ground. Some of the chemicals are toxic. In order to keep the oil and natural gas and other materials from escaping, the well is lined with cement. Drilling can be either vertical or horizontal. Drilling vertically has been around since the 1950s, whereas horizontal drilling has been used since 2000.*

(Q3A) What do you mean by air pollution? →*Air pollution is the addition of harmful chemicals to the atmosphere.*

(Q3C) What do you mean by water pollution? →*Water pollution is the addition of harmful chemicals to surface or ground water.*

(Q3E) What do you mean by fracking? → *Hydraulic fracturing, more commonly known as fracking, is a drilling process that injects water, sand and chemicals into the ground at high pressures to dislodge oil and natural gas so that it can be pumped out of the ground. Some of the chemicals are toxic. In order to keep the oil and natural gas and other materials from escaping, the well is lined with cement. Drilling can be either vertical or horizontal. Drilling vertically has been around since the 1950s, whereas horizontal drilling has been used since 2000.*

(Q3G) What do you mean by oil drilling? →*Oil drilling is the process of digging into the ground to extract oil.*

(Q3H) What do you mean by drilling for natural gas? →*Natural gas drilling is the process of drilling into the ground to extract natural gas.*

(Q3I) What do you mean by nuclear power? → *Nuclear power plants use radioactive materials in order to generate electricity. Once this radioactive material has been used, the radioactive waste is then disposed of in a permitted disposal facility.*

(Q3J) What is hazardous waste? →*A waste that contains elements capable of causing adverse health effects to the public and/or damage to the environment.*

(Q3J) What do you mean by hazardous waste disposal? → *This waste could be disposed legally in a permitted disposal facility or illegally in a prohibited area.*

(Q3K) What do you mean by climate change? → *A long-term change in the Earth's climate, especially a change due to an increase in the average atmospheric temperature.*

(Q4) How do we know if the health effect is from air pollution? → *Please use your best judgment. If you think a negative health effect was due to air pollution, then please tell us about it.*

(Q4) What do you mean by a negative health effect? → *Anything which had a negative impact on the health of the individual. This could include health problems ranging from asthma to lung cancer.*

(Q6B) Other people where? → *This is for people anywhere.*

(Q8B) What do you mean by commercial vehicles? → *Commercial vehicles include 18-wheelers, pick-up trucks with trailers, dump trucks, and passenger vans or buses.*

(Q8E) What do you mean by construction equipment? → *This can include bulldozers, backhoes, and cranes used in the process of construction.*

(Q8F) What do you mean by coal burning power plants? → *This would be the burning of coal in order to generate electricity.*

(Q8G) What do you mean by oil drilling? → *Oil drilling is the process of drilling into the ground to extract oil.*

(Q8H) What do you mean by drilling for natural gas? → *Natural gas drilling is the process of digging into the ground to extract natural gas.*

(Q8I) What do you mean by fracking? → *Hydraulic fracturing, more commonly known as fracking, is a drilling process that injects water, sand and chemicals into the ground at high pressures to dislodge oil and natural gas so that it can be pumped out of the ground. Some of the chemicals are toxic. In order to keep the oil and natural gas and other materials from escaping, the well is lined with cement. Drilling can be either vertical or horizontal. Drilling vertically has been around since the 1950s, whereas horizontal drilling has been used since 2000.*

(Q8J) What do you mean by oil refineries? → *This type of facility makes crude oil into gasoline and other more useful types of oil.*

(Q8K) What do you mean by burning hazardous waste? → *This means setting on fire a waste that is capable of causing adverse health effects to the public and/or damage to the environment.*

(Q8L) What do you mean by other industrial activities? → *These can be anything from a factory, a chemical production plant, or logging activities.*

(Q9G) What do you mean by setting industry wide limits on pollution and allowing companies to buy and sell the rights to exceed their individual limits? → *This is more commonly known as a cap and trade program.*

(Q10 and 11)These are not realistic punishments → *We would like to know how you view these punishments possibilities or options.*

(Q10 and 11) What is a hazardous pollutant? → *A hazardous pollutant is any chemical that is capable of causing adverse health effects to the public and/or damage to the environment.*

(Q10 and 11) What type of pollutant was released? → *I do not have information about the type of pollutant; however, the pollutant released has the potential to cause serious health problems.*

(Q10 and 11) Did anyone die from it? → *No one died, however the pollutant is known to lead to adverse health effects.*

(Q10 and 11) Are these punishments individual or stacked? → *You should rate each punishment on its own merit and independently from other options.*

(Q10 and 11) Is this the only punishment the company will receive? → *You should rate each punishment on its own merit and independently from other options.*

(Q10) Was the pollutant released on purpose? → *No, this was an accidental release.*

(Q10 and 11) Were they found guilty? → *Yes, they were found guilty in a court of law.*

(Q10 and 11) How much damage was done? → *Assume that the full extent of damage is not yet known.*

(Q10 and 11) This survey or question is unfair to businesses. → *We just want to know what people like you think. If you disagree with any punishment option, that is important for us to know.*

(Q10 and 11) This never happens or is unrealistic. → *These examples were actually taken from real cases. Note: if respondent is upset move on to next question.*

(Q10B/C and 11B/C) What is gross income? → *Total income before taxes.*

(Q10G and 11G) What do you mean by company executives responsible for the release? → *Those who ordered, knew about or had oversight..*

(Q11) Was the pollutant released on purpose? → *Yes.*

What do you mean by fracking? → *Hydraulic fracturing, more commonly known as fracking, is a drilling process that injects water, sand and chemicals into the ground at high pressures to dislodge oil and natural gas so that it can be pumped out of the ground. Some of the chemicals are toxic. In order to keep the oil and natural gas and other materials from escaping, the well is lined with cement. Drilling can be either vertical or horizontal. Drilling vertically has been around since the 1950s, whereas horizontal drilling has been used since 2000.*

Why do you keep asking me about fracking? → *We are interested in learning about what people think about fracking as a drilling process. If you are not sure it is okay to say so…this section will only take a moment.*

I don't know anything about fracking. → *We are interested in learning about what people think about fracking as a drilling process. If you are not sure it is okay to say so…this section will only take a moment.*

Why do you care about fracking? → *We are interested in learning about what people think about fracking as a drilling process.*

(Q12A) What do you mean by community quality of life? → *Your personal satisfaction or dissatisfaction with the conditions under which you live.*

(Q12B) What do you mean by job creation? → *The creation of employment opportunities.*

(Q12C) What do you mean by tax revenue? → *Government income due to taxation on the oil and gas industry or on increased sales tax generated by industry employees frequenting local businesses.*

(Q12D) What do you mean by investment in community infrastructure? → *An increase in the money available for things such as roads and schools.*

(Q12E) What do you mean by energy independence from foreign oil? → *The development of domestic sources of energy so foreign oil is imported at a reduced level.*

(Q12F) What do you mean by clean energy development? → *The development of energy that does not pollute the environment when used or pollutes at a lower level than other energy sources.*

(Q12G) What do you mean by climate change? → *A long-term change in the Earth's climate, especially a change due to an increase in the average atmospheric temperature.*

(Q13A) What do you mean by community quality of life? → *Your personal satisfaction or dissatisfaction with the conditions under which you live.*

(Q13B) What do you mean by road traffic? → *The amount of cars and trucks on the road.*

(Q13C) What do you mean by air quality? → *How clean the air is or the amount of pollutants in the air.*

(Q13D) What do you mean by water quality? → *How clean the water is* or *the amount of pollutants in the water.*

(Q13E) What do you mean by water availability? → *The amount of water that is available for residential, agricultural, and industrial uses.*

(Q13F) What do you mean by land use? → *Industry preventing the land being used for other purposes.*

(Q13G) What do you mean by noise pollution? → *Unwanted or harmful noise, as from cars, airplanes, or industrial workplaces.*

(Q13H) What do you mean by climate change? → *A long-term change in the Earth's climate, especially a change due to an increase in the average atmospheric temperature.*

(Q14B) Other people where? → *This is for people anywhere.*

(Q17A) What is in fracking fluid? → *Fracking fluids include water, sand, and a combination of chemicals some of which are toxic.*

(Q17A) What type of chemicals? → *The type of chemical varies based on which energy company is engaged in the fracking process.*

(Q17A) Who would this be disclosed to? → *This would be disclosed to regulatory officials.*

(Q17) Who would enforce these regulations? → *Federal, state or local government would establish and enforce these regulations.*

(Q17A) Are states doing this or Is this required? → *States vary significantly in how they regulate the disclosure of fracking fluids. We are interested in learning if YOU would support or be against such a policy/law.*

(Q17A) My state already has this law. → *Okay, but do you strongly support, support, oppose, or strongly oppose the law?*

(17B) Who would regulate fracking? → *Federal, state or local government would establish and enforce these regulations.*

(Q17E) What is commercial property? → *Commercial property is used for business purposes.*

(Q17F) What are public lands? → *This includes areas such as National Parks.*

(Q17G) What do you mean by wilderness areas? → *This includes pristine areas that are not populated by humans.*

(Q17H) What do you mean by air pollution? → *Air pollution is the addition of harmful chemicals to the atmosphere.*

(Q17I) What do you mean by water pollution? → *Water pollution is the addition of harmful chemicals to natural water.*

(Q17J) What do you mean by noise pollution? → *Unwanted or harmful noise, as from cars, airplanes, or industrial workplaces.*

Why are you asking me about my personal information? → *We collect this information to help us analyze the survey results among different groups of people and to insure we have obtained a sample that is reflective of the community. It is not tied to your phone number.*

(Q21) Respondent is currently in college. → *Record as some college.*

(Q22) Respondent says he/she is a human being or member of the human race. → *Ok, but are you Hispanic or Latino, White/Caucasian, Black/African-American, Asian or Pacific Islander, Native American, Multi-Racial, or Other?* [CALLER: If they get upset or want to keep their original answer then code them as other].

(Q23) What do you mean by economic issues? → *Economically conservative individuals tend to support lower taxes, fewer government programs, deregulation of industry, and less government spending. Economically liberal individuals tend to support higher taxes, more government programs, regulation of industry, and an increase in government spending.*

(Q24) What do you mean by social issues? → *Socially conservative individuals tend to favor traditional values, and laws that support those values. Socially liberal individuals tend to favor expanding civil and political rights as well as the rights and welfare of the groups.*

(Q25) Respondent is a college student & is unsure how to report income. → *If your parents or guardian claim you as a dependent on their taxes then you may report their income. If not, please estimate your individual income level.*

If you get questions that this sheet cannot help you answer, notify a supervisor immediately. → *If a supervisor is not available, offer them one of the general statements about answering to the best of their ability. If that does not work, offer them the option to "refuse" or "don't know." At the conclusion of the call, notify the supervisor about the question or problem.*

APPENDIX C: IRB APPROVAL DOCUMENTS

Colorado State University
Knowledge to Go Places

Research Integrity & Compliance Review Office
Office of the Vice President for Research
321 General Services Building - Campus Delivery 2011 Fort Collins, CO
TEL: (970) 491-1553
FAX: (970) 491-2293

NOTICE OF APPROVAL FOR HUMAN RESEARCH

DATE:	April 16, 2013
TO:	Shelley, Tara, Sociology Carolan, Michael, Hogan, Michael, Sociology, Tullis, Matthew, Sociology
FROM:	Barker, Janell, Coordinator, CSU IRB 1
PROTOCOL TITLE:	Environmental Issues and Environmental Crime Survey
FUNDING SOURCE:	NONE
PROTOCOL NUMBER:	13-4183H
APPROVAL PERIOD:	Approval Date: April 12, 2013 Expiration Date: April 11, 2014

The CSU Institutional Review Board (IRB) for the protection of human subjects has reviewed the protocol entitled: Environmental Issues and Environmental Crime Survey. The project has been approved for the procedures and subjects described in the protocol. This protocol must be reviewed for renewal on a yearly basis for as long as the research remains active. Should the protocol not be renewed before expiration, all activities must cease until the protocol has been re-reviewed.

If approval did not accompany a proposal when it was submitted to a sponsor, it is the PI's responsibility to provide the sponsor with the approval notice.

This approval is issued under Colorado State University's Federal Wide Assurance 00000647 with the Office for Human Research Protections (OHRP). If you have any questions regarding your obligations under CSU's Assurance, please do not hesitate to contact us.

Please direct any questions about the IRB's actions on this project to:

Janell Barker, Senior IRB Coordinator - (970) 491-1655 Janell.Barker@Colostate.edu
Evelyn Swiss, IRB Coordinator - (970) 491-1381 Evelyn.Swiss@Colostate.edu

Barker, Janell

Janell Barker

Barker, Janell

Approval is to conduct 1500 verbal surveys using the approved recruitment/consent verbal script. Documentation of consent is waived through 117(c)(2).

Approval Period:	April 12, 2013 through April 11, 2014
Review Type:	EXPEDITED
IRB Number:	00000202

Page: 1

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321 General Services Building - Campus Delivery 2011 Fort Collins, CO
TEL: (970) 491-1553
FAX: (970) 491-2293

NOTICE OF APPROVAL FOR HUMAN RESEARCH

DATE:	May 02, 2013	
TO:	Shelley, Tara, Sociology	
	Carolan, Michael, Hogan, Michael, Sociology, Tullis, Matthew, Sociology	
FROM:	Barker, Janell, Coordinator, CSU IRB 1	
PROTOCOL TITLE:	Environmental Issues and Environmental Crime Survey	
FUNDING SOURCE:	NONE	
PROTOCOL NUMBER:	13-4183H	
APPROVAL PERIOD:	Approval Date: May 02, 2013	Expiration Date: April 11, 2014

The CSU Institutional Review Board (IRB) for the protection of human subjects has reviewed the protocol entitled: Environmental Issues and Environmental Crime Survey. The project has been approved for the procedures and subjects described in the protocol. This protocol must be reviewed for renewal on a yearly basis for as long as the research remains active. Should the protocol not be renewed before expiration, all activities must cease until the protocol has been re-reviewed.

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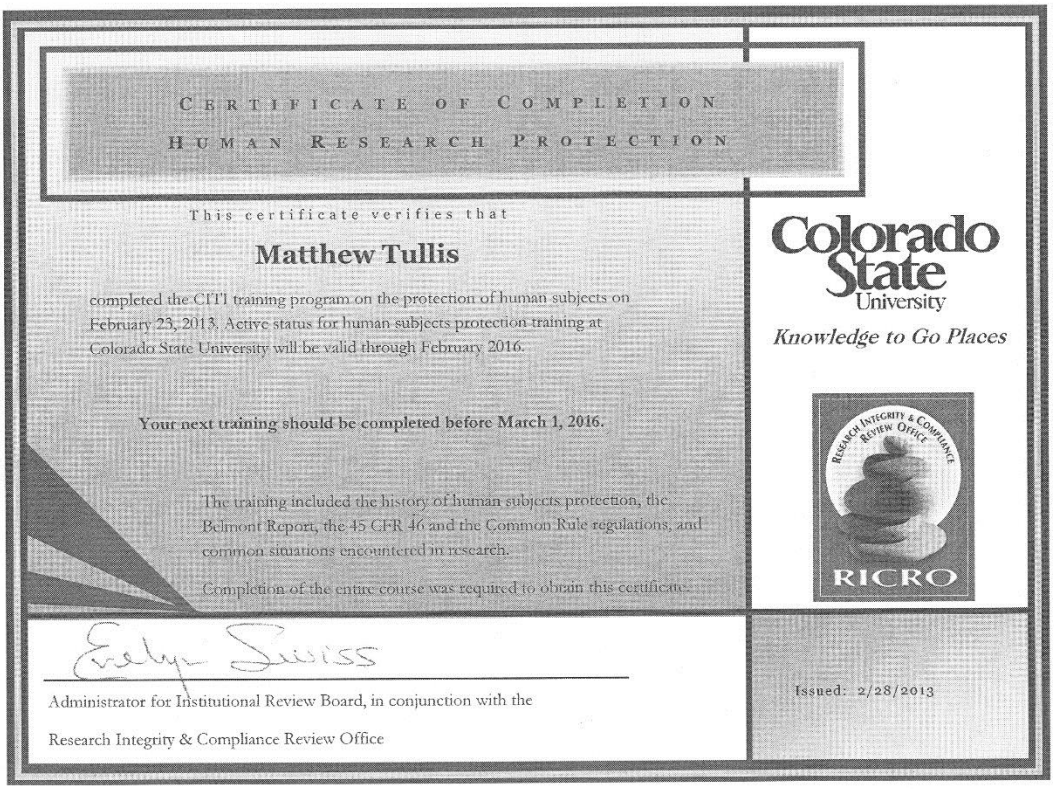
Barker, Janell

Janell Barker

Barker, Janell

Amendment approval is to use the revised instrument.

Approval Period:	May 02, 2013 through April 11, 2014
Review Type:	EXPEDITED
IRB Number:	00000202



CERTIFICATE OF COMPLETION

HUMAN RESEARCH PROTECTION

This certificate verifies that

Matthew Tullis

completed the CITI training program on the protection of human subjects on February 23, 2013. Active status for human subjects protection training at Colorado State University will be valid through February 2016.

Your next training should be completed before March 1, 2016.

The training included the history of human subjects protection, the Belmont Report, the 45 CFR 46 and the Common Rule regulations, and common situations encountered in research.

Completion of the entire course was required to obtain this certificate.

Evelyn Swiss

Administrator for Institutional Review Board, in conjunction with the

Research Integrity & Compliance Review Office

Colorado State University

Knowledge to Go Places

Research Integrity & Compliance Review Office

RICRO

Issued: 2/28/2013

APPENDIX D: BIVARIATE CORRELATION TABLE

Bivariate Correlation Table.

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
1 PROBLEM	1												
2 CONSEQ.	.495**	1											
3 CAUSES	.578**	.554**	1										
4 REGULATION	.347**	.533**	.573**	1									
5 PUNACCID	.189**	.190**	.234**	.224**	1								
6 PUNILLG	.162**	.200**	.182**	.247**	.619**	1							
7 SOUTH	-.033	.038	.013	-.012	-.002	-.071	1						
8 AGE	-.172**	-.123*	-.170**	-.047	.076	.003	.080	1					
9 COLLEGE	.049	.000	-.040	-.045	-.143*	-.122*	-.039	-.053	1				
10 RACE	.039	.098	.092	.127*	.183**	.121*	-.172**	-.234**	-.062	1			
11 POLIIDEO	.114*	.206**	.313**	.324**	.119*	.106	.040	-.141**	.190**	.075	1		
12 INCOME	-.081	-.107	-.125*	-.025	-.140*	-.101	-.046	-.052	.294**	-.087	.143*	1	
13 SEX	.193**	.179**	.235**	.150**	.121*	.171**	.057	.119*	-.073	-.064	-.074	-.093	1

*p<.05, **p<.01