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Climate Change, Situational Theory of Problem Solving, and Issue Framing Effects

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by

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ABSTRACT

This is an exploratory study of the Situational Theory of Problem Solving applied to the context of climate change communication. Selective exposure to politically slanted media is explored as a referent criterion and framing effects are also tested. Relationships between consumption of media characterized as conservative or liberal with referent criterion, Situational Motivation in Problem Solving, problem recognition, involvement recognition, and constraint recognition are tested.

INTRODUCTION

This is an exploratory study based upon the Situational Theory of Problem Solving (Kim & Grunig, 2011) in the context of climate change communication. Goals are to test the model; add to the refinement of variable parameters and their measures; and test particular framing affects regarding climate change messages.

Climate change presents a potentially dangerous threat to life on Earth. The Intergovernmental Panel on Climate Change (IPCC) states that the range of published evidence indicates that the net damage costs of climate change are likely to be significant and to increase over time (IPCC, 2007). The negative impacts include dwindling supplies of potable water, famine, extinction of some species, and coastal flooding (NASA, 2013).

Ninety-seven percent of climate scientists agree that warming trends are the result of human activity (IPCC, 2007). Yet, in the United States there is less concern and agreement about the existence, causes, and dangers of climate change. A 2008 poll revealed that only 38% of Americans rated "dealing with global warming" as a "top priority" making it the 20th ranked priority in the survey (Pew, 2012).

Climate change is an issue that is discussed frequently in media and the American public has become polarized largely along politically ideological lines regarding it. If selective exposure acts as a referent criterion within the STOPS framework undermining climate change communicators' efforts to convince opponents, framing messages in terms that resonate with those opponents may prove effective if they can find ways to reach them with their messages.

THEORETICAL FRAMEWORK

The three phases of the climate change debate– the existence of climate change, its causes, and mitigation – parallel key variables of the Situational Theory of Publics (STP) and Situational Theory of Problem Solving (STOPS). STP provided a theoretical framework around the concept that a person who perceives a problem, a connection to it, and few obstacles to solving the problem will try to acquire information about the problematic situation (Grunig, 1997). The theory incorporated independent variables based on a person's problem recognition, level of involvement, and constraint recognition to predict their level of information seeking and information attending (Kim & Grunig, 2011).

Kim and Grunig (2011) divided problems into perceptual "badness-of-fit" problems, which represented a perceptual discrepancy between expected and experienced states, and cognitive problems which represent the absence of a readymade solution to a perceptual problem. In the original STP, problem recognition included the recognition that something needs to be done about a situation and stopping to think about what to do (Grunig, 1997).

The question of whether or not climate change is actually occurring is a question of problem recognition characterized by Krosnick, Hollbrook, Lowe & Visser (2006) as a gatekeeper in climate policy engagement. Arguments have included natural warming and cooling cycles and criticisms of the data gathering methods used to document warming. While opinion polls still show some division among Americans (Dunlap & McCright, 2008), the climate science community almost unanimously acknowledges that the planet is warming

(NASA, 2013). The IPPC (2001) reported the scientific consensus that global warming has already begun and that human activities are a significant contributor to global warming.

The issue is highly politicized and publics who deny climate change and acknowledge it share some general characteristics that will be discussed later and explored in this research. McCright and Dunlap (2011) observed the following regarding the first phase – or problem recognition phase - of the debate:

> Conservative white male elites in the conservative movement and the fossil fuels industry have sent a consistent message—via conservative talk radio, television news, newspapers, and websites—to the American public for approximately twenty years: climate change is not real and thus does not warrant ameliorative action. (p. 1163)

Involvement recognition is conceptualized as a perceptual variable. Actual connection to a problem might trigger perception, but people will not act to attempt solving the problem unless they perceive a connection (Kim & Grunig, 2011). Actual connection is different from perceived connection, given that the perception can be inaccurate and biased (Fiske & Taylor, 1991). This is an important distinction in light of the disconnect between the scientific establishment of human involvement in climate change and the lack of involvement recognition among certain publics.

Involvement recognition in the context of climate change concerns the effect it may or may not have on humans, but it is also interesting to consider involvement recognition within the debate over whether or not human activity is a contributing factor or if the trend is a naturally occurring cycle. Vast amounts of scientific evidence have attributed the burning of fossil fuels as a major cause of global warming and historical data show that since the Industrial Revolution

and the proliferation of coal power plants and cars using gasoline, the warming trend has been steep (NASA, 2013). Today, most climate scientists agree that human activity is behind the warming trend (NASA, 2013).

Public opinion in the United States indicates a trend toward acceptance of the existence – or problem recognition phase – as well as the involvement phase (Pew, 2013). However, current debates focus upon the challenges of doing something to solve the problem, which relates to the constraint recognition variable of the Situational Theory of Publics. Constraint recognition occurs when people perceive that there are obstacles in a situation that limit their ability to do anything about the problem (Grunig, 1997). In the context of the climate change problem an individual must experience the perceptual problem through at least problem recognition, and possibly level of involvement as well, before experiencing the cognitive problem of constraint recognition.

Acceptance of the human activity role in climate change (involvement recognition) does not imply beliefs that changing human behavior will reverse the trend. Some examples of why this is so are that individuals; don't believe that enough people will adopt the prescribed behaviors; are skeptical of clean-energy alternatives; or believe it is too late to fix the problem. The latter is especially interesting in that it would imply a shift from skepticism and denial regarding the evidence and arguments in favor of climate change's existence and causes over to the opposite end of the spectrum and a fatalistic acceptance of those arguments to the worst-case extreme. There may be large numbers of people who once did not support climate change mitigation due to low problem and involvement recognition, but now still do not support mitigation efforts although they now have high problem and involvement recognition trumped by

high constraint recognition. This is a situation that may be manipulated by interest groups opposing climate change mitigation efforts for various reasons.

Regardless of established scientific fact and efforts to educate the public, climate change communicators struggle to convince large portions of the American public that something must be done about climate change. Kuklinski, Quirk, Jerit, and Schwider (2000) highlighted the difference between being uninformed and being misinformed. The overwhelming majority of Americans have access to factual information, but the information individuals choose to access leads them to form preferences that would differ from those that would exist if they were adequately informed (Kuklinski, et al., 2000). In a survey of knowledge about welfare, not only did most respondents recall inaccurate information, but most of them expressed confidence that their knowledge was, in fact, correct (Kuklinski et al., 2000).

The fossil fuel and other industry organizations, conservative think tanks, contrarian scientists, and conservative politicians have argued against the reality of climate change, the role of human activity, and the possible remedies (McCright & Dunlap, 2011). Political ideology, race, and gender have all been shown to affect beliefs regarding climate change, with self-identified liberals (Hamilton, 2008; McCright, 2010; Wood & Vedlitz, 2007), non-whites (Malka, Krosnick, & Langer, 2009; McCright, 2010; McCright & Dunlap, 2011; and Wood & Vedlitz, 2007), and females (Brody, Zahran, Vedlitz, & Grover, 2008; Hamilton, 2008; Leiserowitz, 2006; Malka et al., 2009; McCright, 2010; McCright & Dunlap, 2011; O'Connor, Bord, & Fisher, 1999) more likely to express concern about global warming than their conservative, white, and male counterparts.

O'Brien (2012) examined the disconnect between general knowledge regarding the existence and causes of climate change and the participation in behaviors that can mitigate the change. In her progress report on global environmental change, she acknowledged that communicating the science of global climate change, its causes, its potentially catastrophic consequences, and actions that can mitigate it have reached an impasse and that it is now necessary to study the process of societal change itself in order to intervene in global warming. Mitigating climate change requires deliberate interventions and significant investment for long-term returns that may not occur within the lifetimes of those called upon to make those investments and sacrifices (O'Brien, 2012).

The dependent variables of the Situational Theory of Publics consisted of information seeking, which is an active communication behavior in which an individual deliberately searches for messages about a given topic or problem (Grunig, 1997), and information processing, later relabeled information attending, which is a passive behavior in which an individual may discover information through messages he/she encounters and continue the processing of the information (Kim & Grunig, 2011).

In addition to problem recognition, involvement recognition, and constraint recognition, the Situational Theory of Publics originally included an independent variable of referent criterion that was later dropped because it failed to predict information seeking and information attending.

The Situational Theory of Problem Solving (STOPS) is an extension and generalization of the Situational Theory of Publics (Kim and Grunig, 2011). As a relatively young theory it has not been extensively tested in published research. A Boolean search with "Situational Theory of Problem Solving" as a subject term yields only five results, only two of which are English language publications.

It broadens the Situational Theory of Publics by adding the concept of Communicative Action in Problem Solving (CAPS) to the theoretical framework (Kim, Grunig & Ni, 2010). CAPS includes three domains of communicative action each comprised of a reactive and proactive variable, beginning with the information acquisition domain from STOP comprised of the information seeking (proactive) and information attending (reactive) variables (Kim, Grunig & Ni, 2010). Information selection consists of information forfending, which is a proactive tendency to fend off certain information by judging its value and relevance in advance in a given problem-solving task (Kim, Grunig, & Ni, 2010) and information permitting, which is a reactive tendency to permit any information if it is related to a given problem-solving task (Kim, Grunig, & Ni, 2010). The information transmission domain of CAPS consists of the reactive behavior of information sharing conceptualized as a person's giving of information to another when asked (Kim, Grunig, & Ni, 2010) and the active behavior of information forwarding, which refers to a person's transmission of information to others regarding a problematic situation without prompting by the other party (Kim, Grunig, & Ni, 2010).

In STOPS, the problem recognition variable no longer includes the step of stopping to think about what to do about a problem as it did in STOP. It is defined only as the recognition that "something is missing and that there is no immediately applicable solution to it" (Kim & Grunig, 2011, p. 128) and the act of stopping to think about what to do is conceptualized within the next variable of discussion.

STOPS adds a motivational variable that mediates the effect of problem recognition, involvement recognition, and constraint recognition on CAPS (Kim & Ni, 2010). Kim, Ni, Kim, & Kim (2012) described this Situational Motivation in Problem Solving as a state of increased cognitive and epistemic readiness to reduce the perceived discrepancy between perceived and

expected states. It represents the extent to which a person stops to think about a problem and wants more information about it (Kim & Grunig, 2011). Kim and Grunig (2011) state that in the Situational Theory of Publics this motivational variable was conceptualized as problem recognition, but in the Situational Theory of Problem Solving it is an effect of problem recognition.

The referent criterion variable that had been dropped from STOP because of failure to predict information acquisition is reintroduced in STOPS as a predictor of CAPS (Kim & Grunig, 2011). The referent criterion is any knowledge, decision rules or guidelines, or subjective judgmental frame that influences problem solving. Referent criteria may be activated by stored knowledge and prior experiences acquired in thinking or doing something about a problem (Higgins, 1996). Knowledge carried forward from prior problem-solving experience is objective, but there may also be a subjective referent improvised at an early stage of problem solving, which differentiates the referent criterion in STOPS from that conceptualized in STOP (Kim & Ni, 2010). Kim & Grunig (2011) described the subjective aspect of referent criterion as including the presence of wishful thinking and/or willful thinking toward an end state in problem solving. Those with greater interest in political affairs are more likely to activate more knowledge and subjected political perspectives in thinking about media-driven hot issues (Kim, et al., 2012). Messages and attitudes received through media may constitute a referent criterion within the STOPS framework. Therefore, the frequent exposure to either conservative or liberal leaning media is central to this research and will be examined as a referent criterion.

The effect of referent criteria upon communicative action is problematic for communication professionals in that it presents a barrier to what may otherwise be helpful information to the receiver. The receiver only seeks information that fits with their own

perspective and selectively transmits information to others in hopes of producing a similar problem perception and a solution that they believe is right (Kim & Grunig, 2011). In turn, a person's opinion and beliefs become more rigid due to the forfending of information that counters their beliefs and they may cause similar increased dogmatism among others by transmitting only information that reinforces those beliefs. This phenomenon played out over time can lead to a Spiral of Silence effect (Noelle-Neumann, 1977) and Knowledge/Belief Gap (Tichenor, Donahue, & O'Lien, 1970).

Lee, Oshita, Oh, and Hove (2014) conducted a study that integrated Spiral of Silence theory with the Situational Theory of Problem Solving and included climate change as a context. One objective of the study was to explore the research question of whether the type of public (active, aware, latent, nonpublic) moderates the relationship between fear of isolation and opinion expression. They used gun possession and climate change as issues in a survey of college students and found that fear of isolation is a significant predictor of types of publics' willingness to either express or withhold their opinion. Even among active publics, fear of isolation proved to be a strong factor that "demotivates people from expressing their opinion" (Lee, et al, 2014, p. 197).

The CAPS variables of STOPS may work cyclically to produce a Knowledge or Belief Gap between individuals who accept that climate change is a reality and those who deny it or those who accept it but experience elevated levels of constraint recognition which may be based on misinformation or framing techniques employed by politically slanted media. While Knowledge Gap Theory or Belief Gap Hypothesis are not tested in the current study, the concepts are relevant to the discussion.

Belief gap hypothesis evolved from research on knowledge gap theory which originally held that mass media infusion creates an accumulation of knowledge at a faster rate among individuals with higher levels of educational attainment, and the more highly publicized the issue, the greater the gap (Tichenor, Donahue, & Olien, 1970). There are two main points to the knowledge gap theory. First, that there is a gap in knowledge between the (education) haves and have-nots. Second, the gap grows as media coverage of an issue increases. This second part has been explored by measuring the gap at two points in time and by measuring the gap at one point in time for issues with varying degrees of publicity (Hwang & Jeong, 2009). Hwang and Jeong (2009) concluded that the empirical support for the second part of the theory has not been as strong as the first.

Over the years knowledge gap research evolved from a focus on educational attainment as the key independent variable to social group affiliation and often, more specifically, political party affiliation (Hindman, 2012). Hindman (2012) found that ideology was a better predictor than education attainment when it comes to beliefs about the existence of climate change, but not necessarily the causes of the phenomenon, and that the belief gap between conservatives and liberals will grow over time.

Based on the empirical evidence that there is – or at least was – a belief gap between Democrats and Republicans in the debates over whether global warming was real and whether human activities were a cause, a gap may still exist along ideological lines between those who believe their actions can contribute to improving the situation and those who do not. Olofsson and Ohman (2006) found that level of education and political affiliation were the two most influential factors contributing to the understanding of environmental concern.

Since media exposure and political ideology are central to this issue, selective exposure is a relevant discussion and will be examined as a referent criterion in this research. The term has been described as a systematic bias in audience composition (Sears & Freedman, 1967) and the selection of media outlets that match an individual's beliefs and predispositions (Stroud, 2007). There have been numerous studies comparing mass media climate change reporting by United States media with media from other countries (Zamith, Pinto, & Villar, 2013; Shehata & Hopmann, 2012; Boykoff, 2007; Nerlich, Forsyth, & Clarke, 2012), but research comparing coverage by different media outlets within the United States is relatively scant.

Freudenburg and Museli (2013) applied concepts from literature to Scientific Certainty Argumentation Methods, known as SCAMs, and the concept of Asymmetry of Scientific Challenge to the climate change debate. Their research examined the idea that scientific facts are socially constructed and that scientists can be influenced by many factors once the debate moves outside the laboratory. Mainstream scientists' desire to fairly consider alternative findings, even if they disagree with them, means that the overwhelming majority of climate scientists who acknowledge climate change are inadvertently helping skeptics by balancing their own findings – which have been subjected to a formula of attack and scrutiny that is well-funded by special interest groups with a vested interest in opposing climate change mitigation – with the minority climate change denial proponents whose research has not been subjected to such a system of scrutiny. As summarized by Freudenberg and Museli (2013) there is a distinction among peer-reviewed climate change articles, articles in mass media focusing on climate change policy, and articles in mass media focusing on climate change science. Their review of content analyses showed that 0% of the peer-reviewed climate change articles in scientific journals sampled by Oreskes (2004) indicated that the evidence was "in debate" or not as bad as the consensus view

while 58% of climate change policy articles in four prominent newspapers reported that the evidence was "in debate" or overblown (Boykoff & Boykoff, 2004), but only 3% of climate change science articles in those same newspapers referred to the evidence as "in debate" or exaggerated (Freudenburg & Muselli, 2010). In fact, Freudenburg and Muselli's (2010) research found that 85% of those science articles described climate change evidence as indicating conditions are worse than the consensus view. The findings show support for the Asymmetry of Scientific Challenge perspective and that the assessment reports from the IPCC understate the severity of climate change evidence, perhaps as a result of scrutiny and disproportionate coverage of climate change denial claims (Freudenburg & Muselli, 2013) and the effect those claims have on scientists. Brysse, Oreskes, O'Reilly, and Oppenheimer (2013) described the behavior by scientists as "erring on the side of least drama" (p. 328). One can see from this research that even the scientific community, equipped with technical understanding and copious amounts of data, can be influenced by the Spiral of Silence phenomenon, but in a way that would not be expected. Rather than ignore a minority opinion from an out-group due to fear of isolation from their in-group peers, they acknowledge a minority opinion held by an out-group in order to avoid attack from that group's proponents and also so that they are seen as living up to a professional ethical standard of fair consideration of dissenting conclusions.

Because of selective exposure combined with second-level – or attribute – agenda setting, the effect on the belief gap is similar to a snowball rolling downhill where differing beliefs are reinforced depending upon media exposure and the frames frequently utilized by media slanted toward a particular side of the issue.

The terminology that different groups are exposed to as a result of selective exposure plays a role in creating attitudes toward climate change. Global warming and climate change are

terms used to describe the changing climate, but they are not interchangeable. The former refers to increases in average surface-level temperatures and the latter refers to any number of long term deviations in climate trends (Environmental Protection Agency, 2013). Global warming focuses attention on temperature increase which allows opponents to cite each extremely cold day or blizzard event as proof against the trend (Samenow, 2010). An example is this headline from the Drudge Report (2004): "Gore to warn of global warming on New York City's coldest day in decades!" Schuldt, Konrad, and Schwartz (2011) found no interaction between question wording and educational attainment. Whitmarsh (2009) observed that a person's beliefs regarding the role of human activity are a factor in word choice with "global warming" implying stronger human causation compared to "climate change" implying that the trend is part of a natural cycle. Word choice has an effect on the partisan divide. Republicans are less likely to express belief in "global warming" (44%) than they are "climate change" (60.2%) (Schuldt et al., 2011). That study found no difference among Democrats regardless of which term was used. Schuldt, et al. (2011) also examined think-tank websites and found that those they classified as conservative used "global warming" the majority of the time, while those classified as liberal used "climate change". Word choice could be a deliberate tactic on the part of partisan communicators in an effort to maintain a belief gap in the climate change debate as well as other polarizing issues.

Kidwell, Farmer, and Hardesty (2013) investigated the effect of messages targeted toward liberal and conservative ideological differences on adoption of environmentally conscious behaviors. They used a political ideology scale adapted from Nail etal. (2009) to identify subjects political ideology and correlated the results with a 30-item moral foundation questionnaire developed by Graham, Nosek, Haidt, Iyer, Koleva, and Ditto (2011). The

correlations between ideology and the moral foundation questionnaire agreed with the findings of Graham etal. (2011) that binding messages appeal to conservatives' valuation of duty, authority, self-discipline, and actions consistent with their in-group's social norms (Graham, Haidt, & Nosek, 2009; McAdams, Albaugh, Farber, Daniels, Logan, & Olson, 2008) and individualizing messages appealing to liberals' valuation of empathy, fairness, and individuality (McAdams et al, 2008; Morrison & Miller, 2008). Kidwell etal (2013) developed a binding and an individualizing message, performed manipulation checks on them, and confirmed that the binding message enhanced recycling intentions among conservatives while the individualizing message enhanced recycling intentions among liberals. They expanded the study by including a 14-week field test of actual recycling behavior which provided further evidence confirming that the messages congruent with research subjects' ideology and moral foundations had a positive effect on recycling behavior.

The framing effects examined in the current study revolve around framing issues as "guns" or "butter" issues. In the realm of political agenda theory, guns issues revolve around defense and security while butter issues concern education, health, and social welfare issues (Zia & Todd, 2010). In their nationwide survey research Wood & Vedlitz (2007) found evidence that individuals define issues socially rather than through the application of objective information. That study (Wood & Vedlitz, 2007) provided confirmatory evidence that conservatives are more concerned about guns issues, such as terrorism, and liberals are more concerned with butter issues, such as the economy, healthcare, and poverty along with global warming. Zia & Todd (2010) replicated the study on a local level in the San Francisco Bay area and found evidence that political and religious ideology, rather than education, influence citizens' concern regarding policy issues of terrorism, global warming, the economy, poverty, and healthcare. Zia and Todd

(2010) prescribed that connecting climate change and economic recovery in an attempt to reframe the issue as a butter issue that also appeals to conservative economic beliefs may be effective in cutting across ideologically divided cultural models.

System justification tendencies are also a factor to consider in the realm of referent criteria. System justification tendencies lead people to defend the status quo and resist attempts to change it, and research indicates that these tendencies are stronger among conservatives (Jost, Nosek, & Gosling, 2008). In the context of climate change, this may play an important role as the debates about the existence of climate change (problem recognition) and human cause and consequences (involvement recognition) seem to have gone against the beliefs of conservatives and in favor of liberals. Response-efficacy belief gap (constraint recognition) may be the last holdout for many conservatives in efforts at system justification. Research by Jost et al. (2008) found that conservatives have much stronger system justification tendencies than do liberals. Feygina, Jost, and Goldsmith (2010) more recently suggest that system justification is associated with the denial of problems, such as climate change, that threaten system functioning. As Leiserowitz (2006) surmised,

> …messages about climate change need to be tailored to the needs and predispositions of particular audiences; in some cases to directly challenge fundamental misconceptions, in others to resonate with strongly held beliefs (p. 64).

The Attitude, Certainty, and Existence (ACE) model proposes that seriousness judgments about global warming are a function of beliefs about the existence of the concept, attitudes toward it, certainty about attitudes, beliefs about human responsibility for causing it, and people's ability to remedy it (Krosnick, Hollbrook, Lowe, & Visser, 2006). Lack of response-efficacy may even work in reverse to discourage beliefs or encourage denial. Labeling a

problem as serious may be uncomfortable to people if they feel they cannot or should not solve it. Although not conceptualized or observed in the STOP or STOPS framework and research, this carries the implication that problem recognition and involvement recognition may be dependent upon constraint recognition due to system justification tendencies.

Another theory that may hold clues to referent criteria and play into the development of a belief gap derives from cultural theory. Kahan, Braman, Gastil, Slovic, and Mertz (2007) assert that individuals tend to form perceptions about risk that are shaped by their cultural worldviews (e.g., hierarchicalism, egalitarianism, individualism). They go on to argue that individuals tend to adopt beliefs that are shared by members of salient in-groups, often resisting revision of such beliefs when they are confronted with contrary information from perceived out-groups (Kahan et al., 2007). This could be one explanation for why rational, educated conservatives might reject evidence that scientists overwhelmingly accept as proof that global warming is real and human activity is the key contributing factor. The current study does not examine cultural worldview as a referent criterion within the STOPS framework that would impact CAPS variables, but this would be an interesting area for future research.

Any examination of beliefs must take into account the role of religion. As summarized by Sherkat and Ellison (2007), numerous studies have focused on the interrelation of conservative religious beliefs and environmentally responsible behavior with mixed results. Their research used data from the 1993 General Social Survey to explore correlations between private environmental behaviors, political environmental activism, willingness to sacrifice for the environment, beliefs in the seriousness of the issue, religious factors, political conservatism, and demographic factors. They found that religious conservatives did not differ in their beliefs about the seriousness of the issue, but were less likely to report private or political environmental

activity as well as sacrificing for the environment (Sherkat & Ellison, 2007). These results indicate possible congruence on problem recognition and involvement recognition, but a gap in constraint recognition between religious conservatives and other groups.

Research by Barker and Bearce (2012) reveal a possible relationship between constraint recognition and certain religious beliefs. They examined the connection between end-of-times religious beliefs and the willingness to take action to mitigate climate change. They note that mitigating climate change requires a decision that involves a tradeoff between costs and benefits that happen at varying times and that individuals with shorter time horizons are less likely to choose to make an investment that will take time to generate a return benefit. Their research specified group – or sociotropic time horizons – rather than individual. In other words, the time horizon in the context of climate change refers to humanity's end of time rather than the individual. People who believe that the end of the world is near will not see value in making sacrifices now that they - or the whole world for that matter - will not be around long enough to realize a benefit from. They analyzed data from the 2007 Cooperative Congressional Election Studies and found evidence supporting the hypothesis that Americans who believe in end-of-times theology are less likely to endorse efforts to curb global warming (Barker & Bearce, 2012). Noting the presence of several confounding independent variables, the researchers attempted to control for political ideology, age, and other factors that may affect one's engagement in climate change mitigating activity. The religion factor may work in conjunction with selective exposure to further enhance a belief gap as evangelicals often selectively expose themselves to news sources they perceive to be friendly to their point of view (Kuklinski et al, 2000).

Demographics also factor into the belief gap discussion regarding the response-efficacy of environmentally responsible behaviors. What has been labeled as the "white male" effect

contributes to greater acceptance of technological and environmental risk among white men than people of other races and gender (Kahan, et al., 2007). This insensitivity to risk is described as a defensive response to a form of cultural identity threat that afflicts white males who hold hierarchical and individualistic values (Kahan, et al., 2007).

Over the years there has been a shift of focus on the independent variable toward group affiliation in knowledge gap research as well as a shift toward beliefs rather than knowledge as the main dependent variable, especially regarding debates of highly public and polarizing science and health issues (Hwang & Jeong, 2009), a category within which the climate change issue belongs. As outlined earlier the facts and science – or knowledge – in the climate change debate is in almost unanimous agreement, but there is still disagreement based on beliefs.

Theorists have debated the definition of knowledge and whether or not Tichenor, et al. (1970) were measuring beliefs about knowledge rather than knowledge itself in their knowledge gap research (Hindman, 2009). Hindman (2009) argued that in a politically polarized social environment where political pundits and media elites communicate to audiences fragmented along partisan lines, the beliefs of the reference group serve as shortcuts for knowledge. In the framework of STOPS, these beliefs could manifest as referent criterion. Hindman (2009) analyzed data from five probability-based telephone surveys comprised of nationally representative samples where beliefs about global warming were treated as dependent variables. The independent variables were quantified by searching transcripts of broadcast news programs for the term "climate change" to measure the level of coverage the issue was getting in mass media. Hindman then compared the level of coverage preceding each of the five surveys to the dependent variable to search for a correlation between the two variables. His findings were significant in that they applied knowledge and belief gap research to a politically polarized topic.

In an environment where individuals are able to select the ideological leaning of the mass media messages to which they are exposed, arguments based on – and appealing to – beliefs are more accepted by the receiver than factually based arguments which contradict their beliefs (Hindman, 2009).

Zia and Todd's (2010) assessment of cultural models demonstrated the strength of the correlation effect of ideology, religious identity, and political party affiliation on public concern about global warming.

> Improving education of citizens will thus not be enough to communicate the urgency and implications of climate change science. More sophisticated strategies will need to be developed to communicate climate change forecasts that cut across ideologically divided cultural models (pp. 755-756).

HYPOTHESES

Because of the fact that referent criteria may be subjective as well as objective and the evidence that referent criteria have an effect on CAPS (Kim & Grunig, 2011; Kim, Grunig & Ni, 2010), frequent prior exposure to politically slanted media is measured as an independent variable that serves as a referent criterion and the following hypotheses are proposed:

H1: Consumption of slanted media is related to referent criterion.

H2: Consumption of slanted media is related to situational motivation in problem solving.

H3.1: Consumption of slanted media is positively related to information forfending.

H3.2: Consumption of slanted media is positively related to information permitting.

H3.3: Consumption of slanted media is positively related to information forwarding.

H3.4: Consumption of slanted media is positively related to information sharing.

H3.5: Consumption of slanted media is positively related to information seeking.

H3.6: Consumption of slanted media is positively related to information attending.

H4.1: There is a relationship between message framing and problem recognition.

H4.2: There is a relationship between message framing and involvement recognition.

H4.3: There is a relationship between message framing and constraint recognition.

H5.1: There is a relationship between consumption of conservative media and problem recognition.

H5.2: There is a relationship between consumption of conservative media and involvement recognition.

H5.3: There is a relationship between consumption of conservative media and constraint recognition.

H6.1: There is a relationship between consumption of liberal media and problem recognition.

H6.2: There is a relationship between consumption of liberal media and involvement recognition.

H6.3: There is a relationship between consumption of liberal media and constraint recognition.

METHOD AND PROCEDURE

This is a mixed-method study combining a questionnaire (Appendix A) with experimental stimuli in the form of a 45-second video administered to undergraduate mass communication students at the University of South Florida. Climate change mitigation is a process that will require significant and long-term investment that may not show returns within the lifetimes of those making the sacrifices (O'Brien, 2012). Therefore, studying a sample that must live with the costs of mitigation strategies for decades to come is an informative exercise that may yield different results than a study of an older sample or a sample of mixed generations. Generally, STOP and STOPS researchers will measure each variable with questions applied from several problem situations to control for situational differences (Kim & Grunig, 2011). However, this study is concerned only with the variables in the context of the climate change problem.

The message framed as guns will draw upon arguments that developing domestic alternative energy sources improves national security as well as economic security. The message framed as a butter issue will draw upon arguments that climate change has harmful effects on the environment, wildlife and future generations (Nisbet, Hart, Myers, & Ellithorpe, 2013). The Nisbet et al. (2013) study also utilized a message stressing the negative economic consequences of climate change policies and regulations to test for the effects of gun and butter frames in a competitive message environment. This study will not include that aspect, although replicating

this study replacing the guns and butter frames with immediate costs versus long-term economic benefit frames may yield important findings.

These messages refrain from the use of controlling language, which is important in light of research by Miller, Lane, Deatrick, Young, and Potts (2007) showing that the use of controlling language induces psychological reactance among young adults that causes risk communication efforts to have the opposite of intended effects. Because of strongly held beliefs among conservatives regarding threats to freedom it is imperative that messages must be consistent in their use of autonomy-supportive language instead of controlling language. Controlling terms such as "should," "ought,", "must", and "need," have been avoided in favor of autonomy-supporting terms such as "could,", "can," "may," and "might want to." This method has been shown to produce lower threats to freedom among research subjects (Miller et al., 2007).

Political ideology is measured by one item asking participants to place themselves on Likert scale from very liberal to very conservative with moderate at the midpoint. Single-item ideology scales have been shown in previous research to validly assess political orientation (Nail etal, 2009; Wood & Vedlitz, 2007). Unfortunately, a shift from on-line administration to classroom administration inadvertently included a switch from a 7-point scale for online respondents to a 5-point scale for classroom respondents. Therefore, the ideology variable was excluded from data analysis due to incompatibility throughout the sample.

Proponents of the strong media effects perspective would expect that those who consume politically slanted media – either liberal or conservative - will be more polarized on the climate change issue than those who differ ideologically without the frequent consumption of slanted

media. While one might assume that conservatives are exposed more frequently to conservative-leaning media than liberals and vice-versa, there were items on the survey to attempt substantiation of this. The genre of media analyzed will consist of cable television, talk-radio, and political discussion web sites. This study did not investigate the political bias of respective media, but will rely on previous studies and characterizations. Prior research has substantiated that Fox News programs favor Republicans and conservatives (Jamieson & Cappella, 2008). The measure of exposure to slanted radio programs included measures of exposure to the Rush Limbaugh radio show on the conservative side. There are no radio programs with the audience size of Rush Limbaugh on the opposite end of the political spectrum, but some media commentators, especially conservatives, often characterize National Public Radio and programs such as the Diane Rehm show and "Democracy Now" as liberally biased. For the purposes of this research NPR programs will be used to measure exposure to relatively liberal media. Levels of exposure to on-line media - excluding websites derivative of radio and television programs - will be measured as well. On-line searches indicate significant opinion that popular conservative leaning websites include the Drudge Report and liberal leaning websites include the Huffington Post. Ten survey items with seven-point Likert response options measuring consumption of television networks and programs, radio programs, and websites that have been frequently described as slanted to either the conservative or liberal perspective were used to identify participants who consume politically slanted media.

Measurement items for involvement recognition and constraint recognition were modified from Grunig's (1997) items to apply to the climate change situation. Items measuring problem recognition, involvement recognition, constraint recognition, Situational Motivation in Problem Solving, presence of referent criteria, and the six CAPS variables were based on Kim &

Grunig's (2011) items and additional working measures of the Situational Theory of Problem Solving provided by the authors upon request and modified to apply to the climate change problem.

Originally, the survey and video were administered online through Qualtrics, an online survey software package. However, response rates were too low and more than half of those who did respond were not able to view either of the videos that were part of the study. Administration of the survey shifted to classroom settings. Since those who fully completed the online survey were included in the final sample along with those who completed it on paper, both methods will be described in some further detail.

Participants were originally recruited through an email sent to 935 from the school of Mass Communications with a follow-up email sent one week later. The email contained a description of the research and informed consent statement. A link to the Qualtrics survey was imbedded at the end of the email. 50 people responded and attempted to complete the survey for a response rate of 5.3%. The first set of questions was the 24-item questionnaire measuring CAPS variables, situational motivation in problem solving, and referent criterion. These questions were presented in randomized order to the online participants. Following this set was a statement telling the participant that they were about to watch a 45-second video and asking them to respond to the remaining questions after the video. The guns and butter-framed videos (Nisbet et al., 2013) were programmed to be presented to every other respondent following the first set of 24 questions. These videos were uploaded to a Youtube page with the link to the video programmed into Qualtrics such that the subject would see one of the videos at this point in the survey. Anticipating that there may be some devices, media players, or other technical challenges to viewing, a question was imbedded following the video asking whether or not the

subject was able to view it. Unfortunately, only 15 subjects answered "yes" to the question and continued the survey. Those who answered "no" were automatically taken to the statement at the end of the survey thanking them for participation. These were not included in the final sample. Of the 15 who were able to view one of the videos and continued on, 8 had viewed the guns video and 7 viewed the butter video. Only 12 actually answered the rest of the questions to complete the survey and the guns/butter split was 6 and 6 for those. After viewing one of the videos, subjects were asked to respond to survey items to measure message framing effects on problem recognition, involvement recognition, and constraint recognition. Finally, they were asked to respond to statements that measure their consumption of politically slanted media, political ideology, and demographic information.

Because of the extremely low number of completed responses, administration of the instrument shifted to a classroom setting. Five sections of an undergraduate Mass Communication class were selected to participate. Students were read an informed consent statement and brief introduction to the survey at which time they were instructed not to participate if they were one of those who completed the entire survey online already. This was done to avoid duplicate responses. Those who attempted to participate online, but were unsuccessful, were invited to take the survey in class since their online responses were not included in the final sample. After completing the first set of questions, subjects stopped and waited for everyone else to finish. Then, each class was shown one of the videos after which they were asked to complete the remainder of the survey.

DATA ANALYSIS

Classroom administration included 96 participants who completed the survey. Due to varying levels of attendance and an odd number of classes, there is an imbalance between those who viewed the guns and butter video of 39 guns viewers and 57 butter viewers. Added to the completed online responses the balance is 45 guns and 63 butter. Subjects in the classroom setting were all exposed to the same question order as opposed to the online respondents who were presented with survey items in random order.

A combination of 12 completed online responses and 96 classroom responses resulted in 108 cases. Exactly 2/3 of the sample (n=72) are female and 1/3 (n=36) are male. 63.9% (n=69) are Caucasian; 6.5% (n=7) are African-American; 13.9% (n=15) are Hispanic; 2.8% (n=4) are Asian; and 13% (n=14) are in the "other" category which includes respondents who checked multiple boxes. There were no respondents in the Native American or Pacific Islander categories, although some of those who are categorized as "other" selected those options in combination with other ethnicities. The ages of participants ranged from 18 years old to 55 years old with a mean of 20.98 and σ=4.65.

Reliability tests for the CAPS variables revealed a substandard .611 Chronbach's Alpha for the information forfending items. Dropping the second item, "Some publicized statements about global warming are worthless," resulted in an increase to α=.758. Therefore, that item was dropped from further analysis. The information permitting items yielded α=-.126. The exclusion of the third information permitting item, "I am careful in accepting information about

global warming because of the vested interests of those who provide the information," resulted in an improved Alpha of .368. Therefore, that item is excluded from further analysis. Still, the information permitting variable remains below the α=.7 threshold, which will be addressed in the factor analysis discussion. Information seeking also fell short of the .7 standard with α=.642, but the exclusion of the third item, "I have a collection of sources that I check regularly for new information," improves the reliability to α=.692 and that item is excluded as a result. Reliability tests for the other items measuring CAPS achieved acceptable levels and are listed in Table 1 reflecting the removal of the unreliable survey items from the variables they affect.

Table 1 Reliability Statistics for Communicative Action in Problem Solving Variables

Variable	Number of items	Chronbach's Alpha
Information forfending	2	.758
Information permitting	2	.368
Information forwarding	3	.760
Information sharing	3	.811
Information seeking	2	.692
Information attending	3	.784

The dimensionality of the 15 remaining items used to measure CAPS variables was next assessed through principle components analysis. The Kaiser-Meyer-Olkin measure of sampling adequacy was .895, indicating an adequate sample and the Bartlett's Test of Sphericity was significant at .000 (Table 2).

Table 2 Kaiser-Meyer-Olkin and Bartlett's Test of CAPS Variables

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.895
Bartlett's Test of Sphericity	Approx. Chi-Square	767.664
	df	105
	Sig.	.000

As outlined by Green, Salkind, & Akey (2000), factor analysis was conducted in two steps. The factor extraction in the first step using principle component analysis was based upon a priori conceptual beliefs regarding the number of underlying dimensions within the CAPS variables; the latent root criterion; the scree test; and the interpretability of the factor solution. The latent root criterion suggests 3 factors with a possible fourth holding an eigenvalue=.918 (Table 3). The scree plot (Figure 1) indicates that there could be six factors as theorized in STOPS. Based upon the scree plot and a priori conceptual beliefs, six factors were rotated using a Varimax procedure, but more than 25 iterations were required and rotation was terminated. Next, five factors were forced with rotation converging in 8 iterations (Table 4) and indications that the information seeking and information forfending items are cross-loading on the first factor which accounted for 45.29% of the item variance (λ=6.794). Wording of the survey items pertaining to information forfending and seeking alludes to similar activities which may be related under a concept best described as information investment, whereas individuals who find the issue of global warming very salient are very active in seeking information that confirms their already-held beliefs so that they may better defend their point of view. Based upon this

factor analysis the information seeking and forfending variables are combined into a four-item measure that will be labeled information investment for subsequent analyses.

Table 3 Total Variance Explained for CAPS Variables

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	6.794	45.290	45.290
2	1.316	8.771	54.062
3	1.126	7.505	61.567
4	.918	6.120	67.686
5	.842	5.613	73.299
6	.665	4.435	77.734
7	.534	3.558	81.292
8	.494	3.292	84.583
9	.432	2.881	87.465
10	.403	2.688	90.153
11	.371	2.475	92.628
12	.349	2.326	94.954
13	.316	2.107	97.061
14	.238	1.587	98.648
15	.203	1.352	100.000

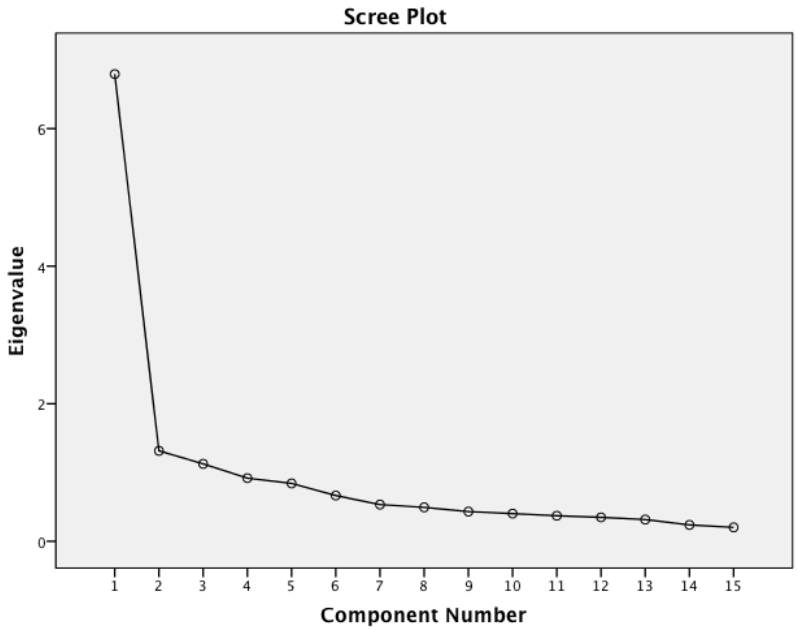

Figure 1 Scree Plot for CAPS Variables

Reliability tests for the referent criterion and situational motivation in problem solving variables (Table 5) show good reliability of the three items pertaining to each variable of α=.866 and α=.815.

Factor analysis of the situational motivation in problem solving and referent criterion variables was conducted next in the same two-step manner as used with CAPS variables. The Kaiser-Meyer-Olkin measure of sampling adequacy was .702, indicating an adequate sample and the Bartlett's Test of Sphericity was significant at .000 (Table 6). Latent root criterion (Table 7) supported two factors, each with λ>2.0 accounting for a cumulative 78.836% of variance. The rotated solution (Table 8) shows the three referent criterion items and three situational motivation items loading cleanly on two separate factors as theorized in the STOPS framework.

Table 4 Rotated Factor Matrix[a] CAPS Variables

	Factor				
	1	2	3	4	5
seek2	.705				
Forf1	.679				
Forf3	.653				
seek1	.580				
att1		.802			
att2		.516			
att3		.501			
Shr2			.706		
Shr3			.684		
Shr1			.513		
Fwd1				.752	
Fwd2				.544	
Fwd3				.427	
Prm2					.530
Prm1					.452

Extraction Method: Unweighted Least Squares.

Rotation Method: Varimax with Kaiser Normalization.[a]

Table 5 Reliability Statistics for Referent Criterion and Situational Motivation Variables

Variable	Number of items	Chronbach's Alpha
Referent criterion	3	.866
Situational motivation	3	.815

Table 6 KMO and Bartlett's Test of Situational motivation and Referent Criterion

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.702
Bartlett's Test of Sphericity	Approx. Chi-Square	320.027
	df	15
	Sig.	.000

Table 7 Total Variance Explained for Situational Motivation and Referent Criterion Variables

Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.646	44.104	44.104	2.232	37.202	37.202
2	2.084	34.732	78.836	1.911	31.856	69.058
3	.419	6.975	85.811			
4	.391	6.521	92.332			
5	.270	4.506	96.838			
6	.190	3.162	100.000			

Table 8 Situational motivation and Referent Criterion Rotated Factor Matrix[a]

	Factor	
	1	2
Rfcrit1	.935	
Rfcrit3	.809	
Rfcrit2	.741	
StMo1		.869
StMo3		.853
StMo2		.645

For the ten items used to measure consumption of slanted media the Kaiser-Meyer-Olkin measure of sampling adequacy was .737, indicating an adequate sample and the Bartlett's Test of Sphericity was significant at .000 (Table 9).

Table 9 KMO and Bartlett's Test for Slanted Media

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.737
Bartlett's Test of Sphericity	Approx. Chi-Square	345.043
	df	45
	Sig.	.000

Principle component analysis of the ten items showed three Eigenvalues above 1.0 indicating that there were three factors rather than the two (conservative or liberal) that were

expected (Table 10). The scree plot (Figure 2) suggests six factors. Five of the ten items loaded together under the theoretical category of conservatively slanted media. Four of the other items loaded together under the theoretical category of liberally slanted media (Table 11). The Huffington Post website stood apart from either category. The five items loading together were grouped into a conservative media scale with a reliability level of α=.805. The group of four were grouped into a liberal media scale with reliability level of α=.571. Removal of none of the liberal media items resulted in a significantly increased α.

Table 10 Total Variance Explained for Slanted Media Variables

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.213	32.132	32.132	3.213	32.132	32.132
2	2.128	21.282	53.414	2.128	21.282	53.414
3	1.021	10.208	63.622	1.021	10.208	63.622
4	.898	8.980	72.603			
5	.778	7.778	80.381			
6	.588	5.880	86.261			
7	.434	4.341	90.602			
8	.393	3.930	94.532			
9	.332	3.318	97.850			
10	.215	2.150	100.000			

Table 11 Component Matrix[a] for Slanted Media

	Component		
	1	2	3
O'Reilly (cnsv)	.862		
Hannity (cnsv)	.827		
Drudge (cnsv)	.815		
Limbaugh (cnsv)	.803		
Fox (cnsv)	.661		
Maddow (lib)		.794	
MSNBC (lib		.686	
DemNow (lib)		.672	
Daily (lib)		.598	
Huff (lib)			.785

Extraction Method: Principal Component Analysis.[a]

a. 3 components extracted.

Composite variables of conservative media consisting of five items and liberal media consisting of four items were created with reliability of α=.805 and α=.571, respectively (Table 12). The Chronbach's Alpha level for the liberal media composite is low, but factor analysis indicates support.

Table 12 Reliability Statistics for Composite Slanted Media Variables

Variable	Number of items	Chronbach's Alpha
Conservative media	5	.805
Liberal media	4	.571

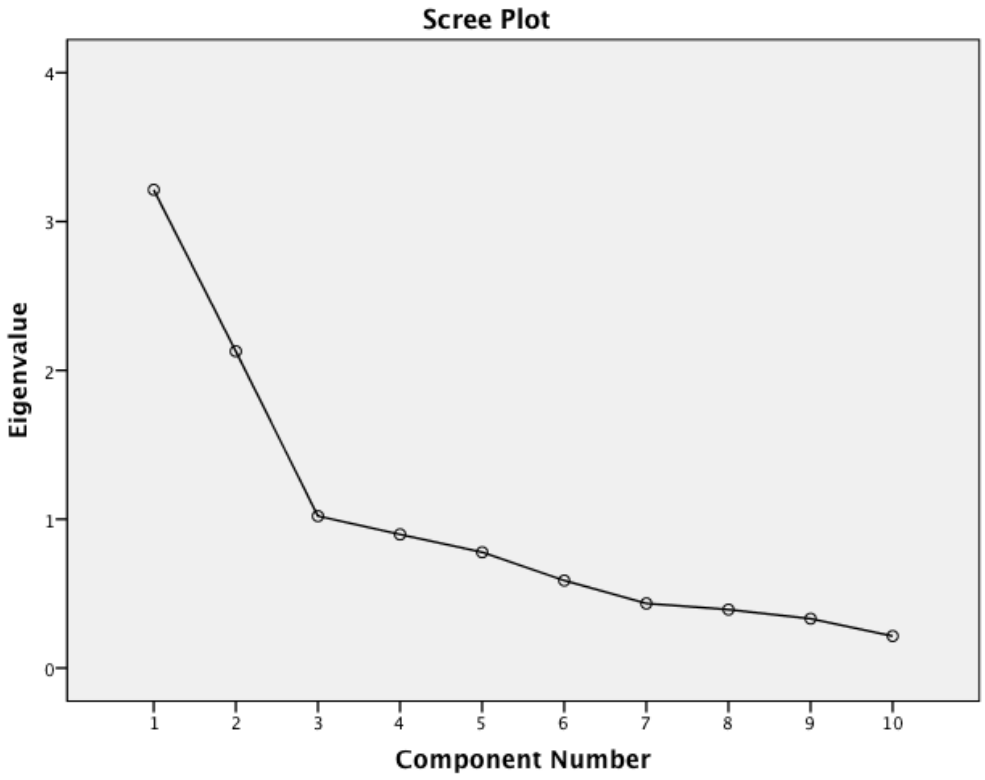

Figure 2 Scree Plot for Slanted Media Items

In order to test the first three hypotheses, Person Product Moment correlations were run for the conservative media consumption composite variable, liberal media consumption composite variable, referent criterion, situational motivation, information investment (combined

information forfending and seeking), information permitting, information forwarding, information sharing, and information attending variables (Table 13).

A weak, but significant positive correlation is shown between liberal media consumption and referent criterion, but the relationship between conservative media consumption and referent criterion falls well short of statistical significance lending partial support for **H1**.

There is a weak, but significant negative relationship between conservative media consumption and situational motivation in problem solving, while the relationship between liberal media consumption lacks significance. Therefore, **H2** is partially supported.

There is a statistically significant and moderate positive correlation between liberal media consumption and the information investment variable, which is the combination of information forfending and information seeking. The correlation between conservative media consumption and this variable is far from significant. Due to the combination of the two original CAPS variables, neither **H3.1** nor **H3.5** can be supported, but a revised hypothesis referring to the relationship between information investment and consumption of liberal media could be.

As indicated in Table 13, there are no significant relationships between consumption of slanted media and any of the remaining CAPS variables. Therefore, **H3.2**, **H3.3**, **H3.4**, and **H3.6** cannot be supported.

Table 13 Correlations Between Slanted Media Consumption, CAPS, Referent Criterion and Situational Motivation

		RefC	SitMo	Info Invest	Info Perm	Info Fwd	Info Share	Info Attend	Cnsv Media	Liberal Media
REF CRIT	Pearson Correlation	1	.131	.681**	.066	.433**	.424**	.340**	.079	.298**
	Sig. (2-tailed)		.178	.000	.495	.000	.000	.000	.415	.002
	N	108	108	107	108	108	108	108	108	108
SIT MOT	Pearson Correlation	.131	1	.384**	.594**	.603**	.482**	.619**	-.224*	.123
	Sig. (2-tailed)	.178		.000	.000	.000	.000	.000	.020	.204
	N	108	108	107	108	108	108	108	108	108
INFO INVEST	Pearson Correlation	.681**	.384**	1	.329**	.587**	.596**	.576**	-.001	.328**
	Sig. (2-tailed)	.000	.000		.001	.000	.000	.000	.993	.001
	N	107	107	107	107	107	107	107	107	107
PERMIT	Pearson Correlation	.066	.594**	.329**	1	.450**	.269**	.365**	-.088	.077
	Sig. (2-tailed)	.495	.000	.001		.000	.005	.000	.366	.431
	N	108	108	107	108	108	108	108	108	108
FORWARD	Pearson Correlation	.433**	.603**	.587**	.450**	1	.583**	.640**	-.145	.143
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000	.133	.139
	N	108	108	107	108	108	108	108	108	108
SHARE	Pearson Correlation	.424**	.482**	.596**	.269**	.583**	1	.610**	.080	.154
	Sig. (2-tailed)	.000	.000	.000	.005	.000		.000	.409	.111
	N	108	108	107	108	108	108	108	108	108
ATTEND	Pearson Correlation	.340**	.619**	.576**	.365**	.640**	.610**	1	-.112	.117
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000		.249	.227
	N	108	108	107	108	108	108	108	108	108

Table 13 (continued)

CONS MEDIA	Pearson Correlation	.079	-.224*	-.001	-.088	-.145	.080	-.112	1	-.033
	Sig. (2-tailed)	.415	.020	.993	.366	.133	.409	.249		.734
	N	108	108	107	108	108	108	108	108	108
LIBERAL MEDIA	Pearson Correlation	.298**	.123	.328**	.077	.143	.154	.117	-.033	1
	Sig. (2-tailed)	.002	.204	.001	.431	.139	.111	.227	.734	
	N	108	108	107	108	108	108	108	108	108

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Regression analyses were conducted between slanted media consumption and referent criterion showing that approximately 8% of the variance in referent criterion was accounted for by its linear relationship with consumption of slanted media (Tables 14-16), R=.311, R^2=.097, $F(2, 107)$=5.615, ρ=.005. These results indicate further support for **H1**.

Table 14 Model Summary for Slanted Media and Referent Criterion

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.311[a]	.097	.079	1.53504

a. Predictors: (Constant), LIBERALMEDIA, CONSMEDIA

Table 15 ANOVA[a] for Slanted Media and Referent Criterion

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.463	2	13.231	5.615	.005[b]
	Residual	247.417	105	2.356		
	Total	273.880	107			

a. Dependent Variable: REFCRITERION

b. Predictors: (Constant), LIBERALMEDIA, CONSMEDIA

Table 16 Coefficients[a] for Slanted Media and Referent Criterion

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.032	.455		6.671	.000
	CNSV SMEDIA	.171	.178	.089	.960	.339
	LIBERAL MEDIA	.580	.179	.301	3.241	.002

a. Dependent Variable: REFCRITERION

Regression analysis between slanted media consumption and situational motivation in problem solving show 4.6% of the variance in situational motivation is accounted for by its linear relationship to consumption of slanted media (Tables 17-19), R=.252, R^2=.063, $F(2, 107)$=3.556, ρ=.032. These results show some moderately significant indication of support for **H2**, but the effect is small.

Table 17 Model Summary for Conservative and Liberal Media

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.252[a]	.063	.046	1.44685

a. Predictors: (Constant), LIBERALMEDIA, CONSMEDIA

Table 18 ANOVA[a] for Conservative and Liberal Media on Situational Motivation

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.889	2	7.444	3.556	.032[b]
	Residual	219.806	105	2.093		
	Total	234.694	107			

a. Dependent Variable: SITMOTIVATION

b. Predictors: (Constant), LIBERALMEDIA, CONSMEDIA

Table 19 Coefficients[a] for Conservative and Liberal Media on Situational Motivation

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.529	.428		10.571	.000
	CONS MEDIA	-.391	.168	-.220	-2.327	.022
	LIBERAL MEDIA	.207	.169	.116	1.226	.223

a. Dependent Variable: SITMOTIVATION

H4 was tested with one-way analysis of variance (Tables 20-22) reflecting that subjects who viewed the "butter" framed video reported significantly higher problem recognition, M=5.16, than those who viewed the "guns" treatment, *M*=4.55. The difference in means lends support to **H4.1**.

Table 20 Descriptives for Framing Effects on PR, IR and CR

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
						Lower Bound	Upper Bound		
PR	guns	45	4.5481	1.49098	.22226	4.1002	4.9961	1.33	7.00
	butter	63	5.1587	1.45526	.18334	4.7922	5.5252	1.00	7.00
	Total	108	4.9043	1.49423	.14378	4.6193	5.1894	1.00	7.00
IR	guns	45	4.4593	1.75995	.26236	3.9305	4.9880	1.00	7.00
	butter	63	4.8413	1.40002	.17639	4.4887	5.1939	2.00	7.00
	Total	108	4.6821	1.56373	.15047	4.3838	4.9804	1.00	7.00
CR	guns	45	2.9667	1.45930	.21754	2.5282	3.4051	1.00	7.00
	butter	63	2.6587	1.29461	.16311	2.3327	2.9848	1.00	7.00
	Total	108	2.7870	1.36752	.13159	2.5262	3.0479	1.00	7.00

Table 21 Test of Homogeneity of Variances for PR, IR and CR

	Levene Statistic	df1	df2	Sig.
PR	.000	1	106	.992
IR	2.578	1	106	.111
CR	.172	1	106	.679

Table 22 ANOVA of Problem Recognition, Involvement Recognition, and Constraint Recognition

		Sum of Squares	df	Mean Square	F	Sig.
PR	Between Groups	9.786	1	9.786	4.528	.036
	Within Groups	229.114	106	2.161		
	Total	238.900	107			
IR	Between Groups	3.831	1	3.831	1.575	.212
	Within Groups	257.810	106	2.432		
	Total	261.641	107			
CR	Between Groups	2.489	1	2.489	1.335	.250
	Within Groups	197.613	106	1.864		
	Total	200.102	107			

Because one-way ANOVA did not indicate an effect of message framing on involvement recognition and constraint recognition, there is no support for **H4.2** or **H4.3**. Regression analyses were conducted to test the predicted relationships between problem recognition, involvement recognition, and constraint recognition on the situational motivation in problem solving, which acts as a mediator between those predictor variables and CAPS. Approximately 48% of the variance in situational motivation is due to the combined effect of PR, IR, and CR (Table 23). Only involvement recognition stood out as a significant unique contributor to situational motivation regarding the climate change issue (Table 23-25), R=.700, R^2=.490, $F(3, 107)$=33.284, ρ=.000.

Table 23 Model Summary Situational Motivation and CR, PR, IR

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.700[a]	.490	.475	1.07298

a. Predictors: (Constant), CR, PR, IR

Table 24 ANOVA[a] Situational Motivation and CR, PR, IR

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	114.960	3	38.320	33.284	.000[b]
	Residual	119.735	104	1.151		
	Total	234.694	107			

a. Dependent Variable: SITMOTIVATION

b. Predictors: (Constant), CR, PR, IR

Table 25 Coefficients[a] Situational Motivation and CR, PR, IR

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.983	.707		1.389	.168
	PR	.122	.118	.123	1.036	.303
	IR	.574	.118	.606	4.856	.000
	CR	.013	.104	.012	.128	.898

a. Dependent Variable: SITMOTIVATION

According to regression analysis (Tables 26-28), approximately 13% of the variance in referent criterion was due to the combined effect of problem recognition, involvement recognition, constraint recognition, conservative media consumption, and liberal media consumption, R=.410, R^2=.168, $F(5, 107)$=4.121, ρ=.002. Results are consistent with the STOPS framework in that they do not show an effect between referent criterion and problem recognition, involvement recognition, and constraint recognition, but the regression analysis does show a relationship between referent criterion and consumption of conservative media at .033 significance and liberal media at .009 significance. This gives further support to **H1**.

Table 26 Model Summary Referent Criterion and CR, PR, IR, Conservative Media Consumption, and Liberal Media Consumption

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.410[a]	.168	.127	1.49462

a. Predictors: (Constant), LIBERALMEDIA, CONSMEDIA, CR, PR, IR

Table 27 ANOVA[a] for Referent Criterion and CR, PR, IR, Conservative Media Consumption, and Liberal Media Consumption

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	46.024	5	9.205	4.121	.002[b]
	Residual	227.856	102	2.234		
	Total	273.880	107			

a. Dependent Variable: REFCRITERION

b. Predictors: (Constant), LIBERALMEDIA, CONSMEDIA, CR, PR, IR

Table 28 Coefficients[a] Referent Criterion and CR, PR, IR, Conservative Media Consumption, and Liberal Media Consumption

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.015	1.129		.899	.371
	PR	.218	.172	.204	1.271	.207
	IR	.140	.165	.137	.850	.397
	CR	.037	.145	.031	.252	.802
	CONSMEDIA	.423	.196	.220	2.159	.033
	LIBERALMEDIA	.473	.178	.245	2.652	.009

a. Dependent Variable: REFCRITERION

DISCUSSION

The findings supporting **H1** indicate that consumption of slanted media is related to referent criterion, which may be objective based on prior experiences or subjective, which Kim & Grunig (2011) described as including wishful thinking and/or willful thinking toward an end state in problem solving. In this study certain media channels and programs were chosen to represent vehicles that present issues with a slant toward either conservative or liberal perspectives. Messages in conservative media tend to argue against the existence of global warming and mitigation strategies, while liberal media tend to argue in support (McCright & Dunlap, 2011). Therefore, it stands to reason that if these media have an effect upon attitudes their consumers may hold that attitude, or the media consumption experience that fosters it, as a referent criterion within the STOPS framework and rush toward an end state in the problem solving decision-making process. Referent criterion is theorized to have a positive correlation with Communicative Action in Problem Solving (Kim & Grunig, 2011). Therefore, the findings of this research that show a significant correlation between consumption of liberal media and referent criterion suggest that liberal media have an influence in the context of climate change communication within the STOPS framework and that viewers may be relying on their past experiences consuming messages framed to encourage acceptance of climate change rather than considering new messages that they encounter. These findings did not show a significant correlation between consumers of conservative media and referent criterion.

Implications for pro-climate change communicators are that liberal media outlets and programs are useful means of reinforcing and shaping communication behavior around this issue through their influence as referent criterion. If that lack of significant correlation shown between the conservative media and referent criterion are any indication, the anti-climate change messages they advance are not taking hold as referent criterion. This finding may serve as optimism that consumers of conservative media are not closed-minded – at least in regards to referent criterion – and may be open to considering climate change messages and weighing arguments objectively if selective exposure can be overcome and they can be reached by the communicator.

While the findings suggest a relationship between liberal media consumption and referent criterion, the opposite appears to be the case for Situational Motivation in Problem Solving, which is the mediating variable between Problem, Involvement, and Constraint Recognition and the CAPS variables. Here, consumption of conservative media shows a significant correlation and it is a negative one. This should serve to reinforce any anecdotal conclusions by pro-climate change communicators that they must overcome barriers if they wish to influence consumers of conservative media toward more active communication behavior regarding climate change.

While support was shown for the relationship of consumption of slanted media with referent criterion, the findings did not support the hypothesis that consumption of slanted media had a significant relationship directly to the CAPS variables other than the combined information forfending/seeking variable which was labeled as "information investment" here. This shows support for the reintroduction of the referent criterion variable that was part of the formulation of STOPS. While consumption of such media does not act directly upon CAPS according to this study's data, such consumption does play an indirect role through its influence on referent

criterion. The factor analysis of the CAPS survey items showed information forfending and information seeking loading together on the same factor after elimination of one item from each of their scales due to low Chronbach's Alphas. This is likely due to the sample selection and survey question order, since these variables achieved strong reliability levels and factor loading in prior studies (Kim, Grunig, & Ni, 2010; Kim & Grunig, 2011).

The comparison of message framing effects indicated that the video employing appeals to environmentalism, protection of wildlife, and preservation – labeled "butter" issues – had a significantly stronger effect on problem recognition than the video using appeals to national security – labeled as a "guns" issue. The audience – or sample – for these videos was approximately 21 years old with a Standard Deviation of just 4.65 and 2/3 of the sample were female. Perhaps the emotional appeals and images in the butter video are more important to this age and gender group than the guns/butter framing dichotomy. These are some considerations that should be taken into account before placing too much emphasis on the utility of the "butter" frame in influencing problem recognition. Due to a survey construction error, political ideology was not controlled for in this study. Therefore, we cannot confirm that either message influences problem recognition, involvement recognition, or constraint recognition more among conservatives than liberals or vice versa.

Data supports the hypotheses that there is a relationship between consumption of conservative media and the problem recognition, involvement recognition, and constraint recognition variables. It is a negative relationship in the case of the first two and a positive relationship in the case of the latter. Low problem recognition, low involvement recognition, and high constraint recognition predict low communicative action in both STP (Grunig, 1997) and STOPS (Kim & Grunig, 2011). This fits with the findings of this research that there is a

negative correlation between consumption of conservative media and Situational Motivation in Problem Solving.

Correlations between consumption of liberal media and the problem recognition and involvement recognition variables were weakly positive, but significant. However, the correlation between liberal media consumption and constraint recognition failed to achieve significance. Some of this could owe to the introduction of a new item in the constraint recognition scale that read, "The actions I take won't matter unless people in other parts of the world change their ways first." This item was created due to observations by the researcher that conservative media have begun to move away from outright denial of climate change toward arguments that mitigation strategies won't work due to the impact of increasing fossil fuel usage in other parts of the world, such as China or India. The Chronbach's Alpha for the constraint recognition scale improves from α=.464 to α= .704 when this item is removed.

The findings that consumption of conservative media is related to lower PR and IR and higher CR while consumption of liberal media is related to higher PR and IR provide further data to climate change communicators for use in segmenting audiences in order to strategically target them for climate change information.

LIMITATIONS

Due to inconsistent survey item construction regarding the political ideology variable, ideology is not controlled-for in this study. As a result, this research is unable to discern between exposure to politically slanted media and political ideology as influencers of referent criterion.

Survey construction utilized the term "global warming" throughout in order to remain consistent with the terminology used in the Nisbet, et al. (2013) video narration. As indicated by Schuldt et al. (2011), Republicans are much less likely to support the concept labeled "global warming" than they are to support the concept labeled as "climate change." Therefore, the survey itself, introduces framing bias to an extent. Anchoring effects may be pronounced in the survey instrument as well since those who respondent in the classroom setting were not presented with random order items.

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APPENDIX A: QUESTIONNAIRE

This research study (eIRB#19151) is being conducted by Eddie Burch, School of Mass Communications, University of South Florida, 4202 E. Fowler Ave., CIS1040, Tampa, FL 33620-7800; (813) 470- 0016.

Your responses are voluntary and will remain confidential to the extent provided by law. You may withdraw from the research at any time. There are no anticipated risks associated with your participation. Your grade in any course will not be affected by your participation in this survey or lack thereof.

If you have any questions concerning the procedures used in this study, you may contact the principle investigator at e-mail address meburch@mail.usf.edu or (813) 470-0016. Questions or concerns about your rights as a participant can be directed to the University of South Florida Institutional Review Board at (813) 974-9343.

Opinion Questionnaire

Global warming is an issue discussed frequently by news media and individuals have developed varying opinions regarding its existence, causes, consequences and actions that should or should not be taken to address the issue. You will be shown a series of statements regarding global warming. Please indicate your level of agreement with each statement by writing the appropriate number from the scale in the space provided next to each statement. After completing the first section please put your pen/pencil down to indicate that you have finished the section and wait for other participants to finish. When everyone has finished you will be shown a 45-second video about the subject of global warming. Then, you will be asked to respond to a few more statements on the subject. Please answer as honestly as possible. There are no right or wrong answers.

Debrief

Thank you for participating in this study. The objective of this research project is to test and extend a public relations theory called the Situational Theory of Problem Solving and the effects of framing climate change/global warming messages in different ways.

Of particular interest is how individuals who frequently consume media characterized as presenting information with a political slant – either conservative or liberal – differ in beliefs regarding climate change/global warming and respond differently to messages presented in different ways. Half of the subjects in this research will view the video you saw and half will see a video framed to present the message in a way that appeals to different perspective.

If you would like to learn more about this project you may contact the principal investigator at meburch@mail.usf.edu. Thank you, once again for your participation.

Instructions**:** Using the scale below please indicate your level of agreement with the following statements by writing the appropriate number in the blank provided.

__1__	__2__	__3__	__4__	__5__	__6__	__7__
Strongly Disagree	Disagree	Slightly Disagree	Undecided	Slightly Agree	Agree	Strongly Agree

REFERENT CRITERION

___1. I know enough about global warming to know what needs to be done – or not done.
___2. I am very confident about my opinion regarding global warming.
___3. I have heard the arguments for and against solving global warming and the proper course of action is clear to me.

SITUATIONAL MOTIVATION

___4. I am curious about global warming.
___5. I frequently think about global warming.
___6. I would like to better understand global warming.

INFORMATION FORFENDING

___7. I have a selection of trusted sources that I check for news about global warming.
___8. Some publicized statements about global warming are worthless.
___9. I have invested enough time and energy so that I understand global warming.

INFORMATION PERMITTING

___10. Regarding global warming, I welcome any information regardless of where it comes from.
___11. It is important to me that I am well – and accurately – informed about global warming.
___12. I am careful in accepting information about global warming because of the vested interests of those who provide the information. [R]

INFORMATION FORWARDING

___13. I forward news about global warming to people I know through social media.
___14. Sometimes I become engaged in heated conversations about global warming.
___15. It is worth spending some time to persuade others about global warming.

INFORMATION SHARING

___16. I am willing to talk with someone about global warming when they ask me.
___17. I participate in casual conversations about global warming.
___18. I would join in a conversation when I hear people talking about global warming.

INFORMATON SEEKING

___19. I actively search for information about global warming.
___20. I compare new information I receive to previous research I've conducted regarding global warming.
___21. I have a collection of sources that I check regularly for new information.

INFORMATION ATTENDING

___22. If I hear someone talking about global warming, I am likely to listen.

___23. If I see a link posted by a friend through social media regarding global warming, I usually click to read more.

___24. I pay attention to news reports about global warming.

Stop here and please wait for further instructions. Please place your pen/pencil down to indicate that you are finished with this section.

You will now be shown 45-second message about global warming. Please watch the video before answering the remaining questions.

BUTTER FRAME**:**

1. http://youtu.be/p-IQ-1CeJik

GUNS FRAME**:**

2. http://youtu.be/5tkKL7ooISA

(Nisbet etal, 2013)

Instructions**:** Using the scale below please indicate your level of agreement with the following statements by writing the appropriate number in the blank provided.

__1__	__2__	__3__	__4__	__5__	__6__	__7__
Strongly Disagree	Disagree	Slightly Disagree	Undecided	Slightly Agree	Agree	Strongly Agree

PROBLEM RECOGNITION

___25. I think global warming is a serious problem for the world.

___26. Something needs to be done to reverse the global warming trend.

___27. I think global warming is an issue that is exaggerated by the media. [R]

INVOLVEMENT RECOGNITION

___28. Global warming has serious consequences for my life and future generations.

___29. I realize a strong connection between global warming and my life.

___30. I think life will go on fine regardless of global warming. [R]

CONSTRAINT RECOGNITION

___31. I can impact global warming through the actions I take in my everyday life. [R]

___32. The actions I take won't matter unless people in other parts of the world change their ways first.

___33. The immediate costs of doing something about global warming are worth it compared to the long-term costs of not doing anything. [R]

MEDIA CONSUMPTION HABITS

Instructions**:** Using the scale below please indicate how often you watch, read or listen to the following media.

1	2	3	4	5	6	7
Never	less than Once per month	once per month	2-3 times per month	once per week	2-3 times per week	daily

___34. How often do you watch Fox News?
___35. How often do you watch MSNBC ?
___36 How often do you watch The Bill O'Reilly show?
___37. How often do you watch Rachel Maddow show?
___38. How often do you listen to the Rush Limbaugh radio program?
___39. How often do you listen to the Democracy Now radio program?
___40 How often do you watch the Sean Hannity television show?
___41. How often do you watch the Daily Show television show?
___42. How often do you visit the Huffington Post website?
___43. How often do you visit the Drudge Report website ?

IDEOLOGY

___36. Politically, I consider myself to be

1	2	3	4	5
Very Liberal	Liberal	Moderate	Conservative	Very Conservative

DEMOGRAPHICS

Listed below are a few questions about you that may help in understanding your responses. Please fill in or select the best response to each question.

___38. What is your age?

39. What is your gender? Male ☐ Female ☐ Other ☐

40. What is your ethnicity?

☐ Caucasian ☐ African-American ☐ Hispanic
☐ Asian ☐ Pacific Islander ☐ Native American
☐ Other

Thank you for your participation in this study**.**

.

APPENDIX B: IRB CERTIFICATION LETTER

RESEARCH INTEGRITY AND COMPLIANCE
Institutional Review Boards, FWA No. 00001669
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799
(813) 974-5638 • FAX (813) 974-7091

October 16, 2014

Michael Burch
Mass Communication
Tampa, FL 33612

RE: **Exempt Certification**
IRB#: Pro00019151
Title: Global warming knowledge and beliefs

Study Approval Period: 10/15/2014 to 10/15/2019

Dear Mr. Burch:

On 10/15/2014, the Institutional Review Board (IRB) determined that your research meets USF
requirements and Federal Exemption criteria as outlined in the federal regulations at 45CFR46.101(b):

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless:
(i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Approved Items:

Protocol for Climate Change Beliefs

Informed consent verbiage from Qualtrics survey

Your study qualifies for a waiver of the requirements for the documentation of informed consent as outlined in the federal regulations at 45CFR46.117(c) which states that an IRB may waive the requirement for the investigator to obtain a signed consent form for some or all subjects if it
finds either: (1) That the only record linking the subject and the research would be the consent document and the principal risk would be potential harm resulting from a breach of confidentiality. Each subject will be asked whether the subject wants documentation linking the
subject with the research, and the subject's wishes will govern; or (2) That the research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context.

As the principal investigator for this study, it is your responsibility to ensure that this research is conducted as outlined in your application and consistent with the ethical principles outlined in the Belmont Report and with USF IRB policies and procedures. Please note that changes to this protocol may disqualify it from exempt status. Please note that you are responsible for notifying the IRB prior to implementing any changes to the currently approved protocol.

The Institutional Review Board will maintain your exemption application for a period of five years from the date of approval or for three years after a Final Progress Report is received, whichever is longer. If you wish to continue this protocol beyond five years, you will need to submit a new application at least 60 days prior to the end of your exemption approval period. Should you complete this study prior to the end of the five-year period, you must submit a request to close the study.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have
any questions regarding this matter, please call 813-974-

5638. Sincerely,

Kristen Salomon, Ph.D., Vice Chairperson
USF Institutional Review Board