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A STUDY ON THE EFFECTS OF OBESITY ATTRIBUTIONS AND MESSAGE SOURCES

ON OBESITY PREVENTION MESSAGE PROCESSING AMONG NATIVE AMERICANS:

THE MEDIATION EFFECT OF ANGER ON MESSAGE ATTITUDES,

SOURCE EVALUATIONS, AND BEHAVIOR


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# Abstract

The main purpose of this study was to design and test the effects of obesity prevention messages that specifically targeted Native American adults. The message features on which this study focused to design obesity precention messages were obesity attributions and message sources of criticisms. Based on attribution theories (Johes & Nisbette, 1972; Kelly, 1976; Weiner, 1985, 1986) and the intergroup sensitivity effect (Hornsey & Imani, 2004), varying levels of anger about obesity prevention messages and message processing outcomes (attitudes toward messages, source evaluations, and behavioral intentions) because of obesity attribution types, message sources, or both among Native American study participants were proposed. The anger Native Americans experienced regarding types of obesity attributions and message sources were treated as mediating variables in this study, which influenced subsequent message processing outcomes, including message attitudes, source evaluations, and intentions to accept the recommendation. The cognitive-functional model (Nabi, 1999, 2002) and the anger activism model (Turner, 2007) guided the study to predict roles of anger in health message processing. All these predictions that focus on Native Americans' obesity prevention message processing were revisited based on the effects of targeted messages.

A 2 (obesity attributions: internal/external) × 2 (source of criticism: Native Americans/non- Native Americans) × 2 (message recipients: Native Americans /non- Native Americans) × 2 (Message replication: a total number of messages that each participant was exposed) mixed design employed to test 16 research hypotheses. Twelve printed public service announcements were created (three message sources for each of two source types × three obesity attributions for each of the two attribution types). A total of 118 Native American members of the Cheyenne and Arapaho Tribes in Oklahoma were recruited during several community

festivals from August 16 to September 1, 2019. Non-Native American participants (N = 129) were recruited via an online study panel website from September 30 to November 1, 2019. Participants were randomly assigned to one of the message source conditions and then read two messages: One message had internal attribution and the other had external attribution.

Findings showed that message source's ethnicity was a significant message factor. As the study predicted, Native American participants reported 1) lower levels of anger about Native American message sources, 2) more positive message attitudes, and 3) more positive message source evaluations when message sources were Native American doctors than non-Native Americans. The study also found that lower levels of anger experience facilitated positive message attitudes and source evaluations by mediating message sources' influences.

Interactions between obesity attributions and message sources' influenced on Native Americans point to Native Americans experiencing varying degrees of anger on message sources. The most intense anger was reported from participants who were in a non-Native American message sources and internal attributions message condition, whereas participants showed lower levels of anger about messages when they read messages delivered by Native American doctors, and they stated either internal or external obesity attributes. Relatively lower levels of anger caused by a combination of obesity attribution types and Native American doctors also led to more positive message attitudes and source evaluations. Last, outcomes of testing targeted messages revealed that matching between message sources and recipients' ethnicities were the key factors for enhancing the targeted message's effect. Participants expressed lower levels of anger and showed positive attitudes toward messages and source evaluations when they read messages that were delivered via message sources sharing the same ethnicity with them.

This study's outcomes contributed significant insights into Native Americans' responses to obesity prevention health messaging. By identifying a message factor that may facilitate effective obesity prevention message processing outcomes, the study provided empirical evidence for theoretical propositions associated with emotional, attitudinal, cognitive, and behavioral responses to obesity prevention messaging. Moreover, outcomes can be utilized for designing actual obesity prevention messages that lead to desirable outcomes for Cheyenne and Arapaho Tribes. Implications, limitations, and suggestions for future research were discussed based on theories and the study's context.

*Keywords: Native American obesity, obesity prevention campaign, obesity attributions, message source effects, anger appeal, attribution theories, intergroup sensitivity effects, cognitive functional model, anger activism model, historical trauma, targeted health messages.*

# Chapter 1. Introduction

Obesity is a major health issue in the United States (Centers for Disease Control and Prevention, 2017). The obesity rate has been increasing continuously and now includes 36.5% of the entire adult population of the U.S. (Centers for Diseases Control and Prevention, 2018). However, obesity is a more serious concern for specific racial and ethnic groups (e.g., African Americans, Hispanics, and Native Americans and Alaska Natives (NAAN); The State Obesity, 2017). In particular, the adult obesity rate among Native American populations is higher than that of other ethnic and racial groups (The State Obesity, 2017). The U.S. Department of Health and Human Services Office of Minority Health (OMH) states on this phenomenon that: "Native American/Alaska Native adults are 50 percent more likely to be obese than Non-Hispanic White [adults]" (Office of Minority Health, 2017). The following statistics also support the concern; Across all adults aged 18 and over, 38.1% of NAAN populations self-identifying as only NAAN and 44.8 % of NAAN populations identifying as mixed with White, are obese (Centers for Diseases Control and Prevention, 2018). These rates are almost tied to those of Black or African Americans (39.7%) and higher than those of other racial groups (e.g., Hispanic or Latino: 33.0%; Non-Hispanic White, 29.4%, 30.3%; Asian, 11.9%) (Centers for Diseases Control and Prevention, 2018).

Obesity causes several physical, social, and psychological illnesses that have significant adverse effects on health, longevity, and psychological well-being (McElroy, Kotwal, Malhotra, Nelson, Keck, & Nemeroff, 2004; Puhl & Brownell, 2001; Segula, 2014; Wyatt, Winters, & Dubbert, 2006). Numerous obesity prevention campaigns, behavioral intention programs, and community-or group-based obesity prevention educational entities have been proposed and implemented to prevent and reduce obesity among Native American populations. However,

despite concerted efforts, obesity rates among Native American populations remain high.

As a line of endevour to cope with the epidemic of obesity in Native American communties, the effectiveness of specific obesity prevention messages that target Native American adults was explored. Messages that were tested in the study involve anger appeals. Given that the goal of health messages is to persuade people to adopt healthy behaviors or eliminate or reduce unhealthy behaviors in which they engage already, and these messages tend to address potential problems, the message contents, arguments, and the topic itself are likely to be associated with negative emotions (Dillard, 1994; Dillard & Nabi, 2006; Gallagher & Updegraff, 2011; Lang, 2006; Nabi, 2002). Among negative emotions, relatively few studies have investigated the effects of anger appeals in health message processing study contexts. By focusing on unique coping mechanisms that may be operated during Native Americans' anger appeal message processing, 1) potential message attributes that evoke anger among Native Americans on obesity issues and  2) anger's constructive roles in further health message processing outcomes were proposed.

With regard to message attributes associated with anger, obesity attributions and sources of criticisms on obesity were selected. These two message attributes were chosen in light of possible associations with anger. Regarding obesity attributions, the prevalence of obesity among many Native American communities has been exacerbated due to a combination of individuals and environmental factors. Based on reviewing a series of attribution theories to obtain insight on relationships between attribution types and emotions (Jones & Nisbett, 1972; Kelley, 1967; Weiner, 1972), the researcher hypothesized Native Americans' anger and subsequent message processing outcomes would vary.

Sources of criticisms were introduced as the second message characteristic that may

relate to anger. Specifically, message source's ethnicity was the key aspect of this study in terms of affective, cognitive, attitudinal, and behavioral responses to criticisms on the obesity issue. Native Americans are classified as a distinct ethnic group on the basis of underlying similarities of socio-cultural factors that are shared among these populations. Such factors determining their ethnicity are also distinghished from those of other ethnicities. The researcher took account of this point to continue the discussion on roles of message sources in health messages when messages target a unique ethnic group. Guided by the intergroup sensitivity effect (ISE: Hornsey & Imani, 2004), the researcher addressed infuences of the discrepancy between message recipients and sources of criticism in their ethnicities on processing specific health messages that bring the pervasiveness of obesity in Native American communities into question.

Next, theories that provide explanations of the roles of anger, which are evoked by these two message factors in persuasion, were introcuded. The cognitive functional model (CFM: Nabi, 1999) and the anger activism model (AAM: Turner, 2007) guided this study in predicting the constructive role of anger-driven messages in the context of obesity prevention campaigns. With the discussion on the nature of anger and its application in persuasion, such theoretical frameworks provided rationale for this study's assumption, which is that optimal levels of anger will be a significant message processing mechanism that may yield positive health message processing outcomes among Native Americans.

Last, the research put these previous discussions together under the realm of targeted health communication. Given that distinct aspects which Native Americans possess in relation to their lives compared to other ethnic/racial groups, potential anger-evoking message factors (e.g., history, culture, lifestyles, and current living conditions) were selected based on further considerations on whether these unique factors were associated with reasons of the high obesity

rate among Native Americans. The researcher concentrated on the specific group of people match the main idea that targeted health messages have long been proposed. Therefore, the potential effects of these targeted-specific obesity prevention messages on desirable message processing outcomes were addressed based on the discussions about targeted health communication.

The resesrarch was organized as the follows:

Chapter 2 introduced properties and constructive roles of anger in health message processing. Following an extensive review of attribution theories (Jones & Nisbett, 1972; Kelley, 1967; Weiner, 1972, 1985, 2000, 2006) and the intergroup sensitivity effect (ISE; Hornsey & Imani, 2004) provided insight into this study to identify, select, and manipulate potential message attributes as means of evoking anger among Native Americans. Properties and roles of anger, as well as their influence on persuasion, were informed by the cognitive-functional model (CFM; Nabi, 1999, 2002) and the anger activism model (AAM; Turner, 2007). Finally, these previous discussions were revisited based on the concept of a targeted health message. Fifteen research hypotheses were proposed on the basis of comprehensive literature reviews. Chapter 3 presented the research design to test a series of research hypotheses. Steps involved in designing and conducting an experiment and items for assessing key constructs were also explained. Chapter 4 described the study preparation and data collection procedures for the targeted Native American study populations. Collaboration processes for creating culturally appropriate and acceptable messages to the specific targeted Native American Tribes as well as for data collections were explained as a narrative form. Chapter 5 included results of data analysis. Data analysis strategies and hypotheses testing outcomes were also addressed in this chapter. Finally,

chapter 6 contained the discussion section in addition to implications, limitations, and future

study suggestions.

## Chapter 2. Literature Review

Discrete Emotions, Anger, and Health Communication

Emotions, which are defined as individuals' mental status that are formed by cognitive awareness and appraisal of their external events or agents, have long been foci of communication research (Nabi, 1999, 2002, 2015; Ortony, Clore, & Collins, 1988; Yoo, Kreuter, Lai, & Fu, 2014). From early persuasion studies to recent health communication research, discrete emotions have been incorporated in various studies as crucial states of the human mind that influence the generation of distinct motivations, cognitions, and actions (Dunlop, Wakefield, & Kashima, 2008; Zhu & Thagard, 2002). In health communication, relatively few early studies (e,g, Leventhal, 1970; Monahan, 1995; Mongeau, 1998; Rogers, 1985; Witte, 1992, 1994) addressed discrete emotions (e.g., fear). Recent research has expanded upon these previous examinations in roles of discrete emotions in health message processing by exploring one's interest on various discrete emotions (Lee & Shin, 2011; Leshner, Balls, & Thomas, 2009; O'Keefe, 2000; Slater, Rouner, & Walters, 2002; Turner, 2011; Yoo et al., 2014).

The primary concern of these previous studies was to examine the unique coping mechanisms that correspond to each of these discrete emotions in health message processing. Depending on the intensity or degrees that message recipients feel each discrete emotion as a result of message attributes, a certain emotion can be integrated to further responsive patterns to messages evoking certain types of emotions (Zhu & Thagard, 2002). Extensive studies have made a constant effort to illuminate these relations between discrete emotions and message processing outcomes (e.g., in-depth message processing, message evaluations, attitudes, and behavior) (Becheur & Valette-Florence, 2014; Lee & Shin 2011; Leshner et al., 2009; O'Keefe, 2000; Turner, 2011; Nabi, 2002, 2015; Turner, 2011; Dunlop et al., 2008; Shen & Dillard, 2007).

These persistent research efforts, therefore, have enhanced our understanding of interrelations among discrete emotions, cognitions, attitudes, and behavior.

The main idea of this study was initiated as a contribution to a line of previous research endeavors in relation to emotional appeals in health communication. Of several discrete emotions, the researcher paid special attention to anger. Anger is one of the common emotions that individuals experience in everyday life (Averill, 1983; Fischhoff, Gonzalez, Lerner, & Small, 2005). Many uncomfortable or threatening situations that individuals experience make people angry by thwarting their goals, denigrating their core values, threatening their rights or autonomy, or harming their loved ones (Averill, 1982; Frijda, 1986; Kim & Niederdeppe, 2014; Lazarus, 1991; Lerner & Tiedens, 2006; Nabi, 1999, 2002; Roseman, 1991; Smith & Lazarus, 1990). In health promotion, people also may experience anger; given that the nature of most health campaigns—especially those designed to persuade or even force people to abandon their current lifestyles or values they want to maintain—recipients might become upset about the message or its source.

Because anger is a relatively common emotion that people may easily experience during their health message processing, its roles and properties in information processing contexts have been discussed. For example, Miller and Quantip (2017) addressed the adverse outcomes of dealing with anger within the context of persuasive message processing. First, anger creates negative outcomes in thoughtful message processing (Miller & Quantip, 2017). Previous studies that have focused on the role of anger in information processing suggest that anger disturbs information processing, therefore it causes negative cognitive outcomes (e.g., altering perceptions of risk, decreasing message trust, debilitating issue-relevant thinking, generating defensive mechanisms, increasing stereotype and prejudice, and triggering hostility and

aggression) (Moons & Mackie, 2007; Smith & Dillard, 1997; Mitchell, Brown, Morris-Villagran, & Villagran, 2001). Similar negative outcomes have also been discussed in other studies in terms of the tendency of anger to cause peripheral processing of persuasive messages by debilitating issue-relevant thoughts due to a facilitation of anger relief thoughts (Lazarus, 1991; Smith & Dillard, 1997; Mitchell et al., 2001).

Several theories support adverse outcomes that are associated with feeling anger in persuasion. For example, psychological reactance theory (PRT; Brehm, 1966) considered anger as a detrimental emotion that should be avoided in persuasion (Brehm 1966; Brehm & Brehm, 1981; Dillard & Shen, 2005; Miller, Lane, Deatrick. Young, & Potter, 2007). Studies based on the PRT have supported the main argument of the theory in that anger is a component of state reactance along with counterarguments, thereby motivating people to resist message recommendations (Dillard & Shen, 2005; Miller et al., 2007; Quick & Bates, 2010; Quick & Stephenson, 2007, 2008; Rains & Turner, 2007; Reinhart, Marshall, & Feeley, 2007). Elaboration likelihood model (Petty & Cacioppo, 1986) and the heuristic-systemic model of persuasion (Chaiken, 1980), that focus on two separate human message processing routes, have also discussed that anger-driven messages are more likely to be processed via peripheral cues, thereby reducing the level of thoughtful information processing (Bodenhausen, Sheppard, & Kramer, 1994; Petty & Cacioppo, 1986; Tiedens & Linton, 2001).

For example, Quick and Stephenson's study (2007) treated anger as a latent variable that composes reactance along with negative cognition. Their study hypothesized that higher levels of anger that health message recipients reported (television condom use advertising) due to language that forcefully advocated condom use would result in negative evaluations on the ads' persuasiveness (Quick & Stephenson, 2007). The hypothesis was supported across 7 condom use

ads in that positive associations between condom ads perceived to threaten choice and anger, then the increased anger levels due to the perceptions on the threat to choice led negative responses to ad persuasiveness among study participants (Quick & Stephenson, 2007). Tiedens and Linton (2001) demonstrated that study participants relied more on heuristic message processing by relying on peripheral cues (e.g., source expertise) when their emotions were associated with confidence, such as anger, whereas participants showed more elaborated message processing when they felt emotions associated with uncertainty (e.g., worry and surprise). In Bodenhausen and colleagues' study (1994), angry study participants showed greater reliance on message sources' expertise in persuasive message processing context.

In contrast to theories that addressed negative standpoints of anger's influence on message processing outcomes, other theoretical frameworks emphasized benefits of anger, by proposing that anger may result in positive outcomes as well (Butler et al., 1995; Lerner & Tiedens, 2006; Moons & Mackie, 2007; Miller & Quantip, 2017; Nabi, 1999, 2002; Turner, 2007). These models have developed their opposing viewpoints to those negative perspectives on anger in persuasion on the basis of a unique property in both the manner in which people confront situations and the way they resolve emotion-driven goals (Lazarus, 1991). As an negative emotion that are only interrelated with approach motivation rather than avoidance or withdrawal motivation, anger allows people to narrow their focus to the object that makes them angry (Consedine & Moskowitz, 2007; Lazarus, 1991; Lerner & Tiedens, 2006; Rozin, Lowery, Imada, & Haidt, 1997; Smith & Lazarus, 1990).

In addition, anger triggers a certain type of action tendency that motivates angry individuals to change the situation, remove obstacles, and regain any status that existed prior to the anger-inducing situation (Lerner & Tiedens, 2006). Therefore, studies that were posited on

these unique coping mechanisms supported the argument that positive and constructive relationships exist between anger and desirable message processing outcomes, such as enhancing message attention, careful message processing, and increasing motivation to accept message suggestions in order to handle unpleasant situations as well as their emotional statement (Butler, Koopman, & Zimbardo, 1995; Nabi, 2002; Yoo et al., 2014). Based on these rationales, Nabi (2002) set forth a counterargument to Bodenhausen and colleagues' findings (1994) regarding associations of anger and heuristic message processing. Based on empirical examinations, Nabi (2002) argued that anger can also promote positive message processing outcomes, such as in-depth message processing and persuasion based on the quality of message argument.

The goal of this study was to continue the exploration of the constructive roles of anger in health messages processing. Only a few empirical studies have been conducted in order to study the ways in which health messages can take advantage of positive properties of anger in persuading people to improve their health conditions. Therefore, further investigations are needed to shed light on the effectiveness of anger in health communications, whereby providing future implications on roles of emotions in health message processing in a broad sense. First, message attributes that may contribute to the design of effective anger appeals in health messages that address a particular issue among members of a specific ethnic group were introduced. Two message attributes, obesity attributions and message sources that criticize the obesity issue, were proposed as potential message factors that may influence Native Americans' affective obesity message processing outcomes. The researcher of this study projected that Native Americans may experience varying levels of anger about the obesity issue as outcomes resulting from the ways these two message factors were presented.

Obesity Attribution: Who is Responsible for Obesity?

Anger is elicited as a function of human's unique appraisal and thought patterns on various situations, events, and agents (Lazarus, 1991, 1999; Frijda, 1986; Lerner & Tiedens, 2006). Besides examples that were listed above in the early this chapter as cases associated with people's anger experience, feeling anger is also evoked as a consequence of identifying the cause of the negative outcomes (Lazarus 1991; Lerner & Tirdens, 2006; Weiner, 1980). According to Lerner and Tirdens (2006), people tend to feel anger when they believe that undesirable situations are caused by others, not by situations or the self. However, the attribution process is far more complex; outcomes that need to be attributed, people's perceptual bias involved in attribution processes, and attribution of possible targets as being responsible for the events are all interrelated to each other in generating certain emotions at varying degrees. With regard to these complex mechanisms that how attribution types are connected to feeling various levels of anger, a series of attribution theories provided in-depth discussions.

Attribution theorists have investigated perceptions of an incident's cause (Jones & Nisbett, 1972; Kelley, 1967; Proudfoot & Shaver, 1975; Weiner, 1972). Based on individuals' innate desire to probe the cause of events and their outcomes, attribution theories emphasized knowing the cause and interpreting the events as significant antecedents in the determination of emotional, motivational, and behavioral processes (Harvey & Martinko, 2009; Kelley & Michela, 1980). A key prediction of attribution theories was that people make sense of behavior (both their own and others') by attributing it to either internal or external causes (Gilbert & Malone, 1995; Kelly & Michela, 1980; Niederdeppe, Shapiro, & Porticella, 2011). For example, Kelley's attribution theory (1967) proposed that people's tendency to form causal explanations for events is rooted in the perceived causes of others' and their own behaviors (Kelly & Michela,

1980). Jones and Nisbett's actor-observer hypothesis (1972) also addressed the way individuals

tend to explain their own behaviors based on situational causes (external factors which are

outside of one's control), whereas they justify others' behaviors with personal causes (internal

factors within one's control: Malle, 2006). This tendency to make attributions of external

causality was even more evident when those causes result in unsuccessful situations and negative

outcomes (Frieze & Weiner, 1971; Jones & Nisbett, 1971; Lau & Russell, 1980; Ruble, 1973).

Attribution theories have made considerable progress in generating further frameworks

that have attempted to specify connections between attribution types and emotions: How do

people respond to these different causal attributions? The attribution theory of emotion and

motivation (ATEM; Weiner, 1985, 1986, 2000, 2018) extended previous attribution theories on

the nature of human attributional processes to test which types of emotions people may feel on

the basis of specific kinds of attributes. Weiner (1985) identified 3 underlying properties of

causal attributions: locus of causality (the location of a cause, either internal or external);

controllability (controllable or uncontrollable of the event by the involved party), and stability

(the duration of the event, either constant or temporary).

Of these 3 dimensions, the locus of controllability, in particular, was related to

emotional states (e.g., feelings of pride, self-esteem, guilt, shame, anger, and sympathy), because

internal causes are more often considered controllable events, while external causes are more

often likely to be considered uncontrollable events (Weiner, 2000; Zhang & Min, 2013). For

example, the self-attribution related to exerting insufficient effort (internal causes) in controllable

circumstances was more likely to elicit feelings of guilt, while the same event caused by a

controllable act on the part of others (and therefore attributed to external causes) was more likely

to generate a feeling of anger with those others (Weiner, 2006). Discrete emotions triggered by

individuals' causal attributions also may motivate them to form subsequent attitudes and cognitive appraisals, and/or take actions (Lazarus, 1991; Nabi, 2002; Weiner, 1985, 1995).

Weiner's idea provided a theoretical framework with which further empirical studies can examine the influence of messages, such as criticizing or attributing responsibility for individuals' failure or socially undesirable behaviors, on message recipients' emotional responses (Hareli & Hess, 2008; Karasawa, 2001; Neumann, 2000; Zhang & Min, 2013). Hareli and Hess (2008) examined the effects of attributional information about individuals' failure on the elicitation of negative emotions. Three causal dimensions that Weiner (1985, 1986, 2000) addressed were considered for testing the association between different types of verbal criticism and message recipients' feelings of hurt and anger (Hareli & Hess, 2008). The results showed that verbal messages that include a combination of internal and uncontrollable causes evoke the most intense anger and hurtful feeling (Hareli & Hess, 2008). Other empirical studies that have tested attributions, types of negative social events, and message recipients' emotional responses have also shown connections between attribution types and people's emotional reactions to events and their causes (Karasawa, 2001; Kim & Niederdeppe, 2014; Neumann, 2000; Zhang & Min, 2013).

The following questions were addressed based on these previous outcomes: 1) What consequences may we expect when Native Americans confront messages that indicate causes of their obesity are attributed to either internal or external obesity attributions, and 2) if attributing process plays roles as one of the main appraisals that evoke anger, to what extent is anger evoked among target message recipients in response to different attribution types?

Obesity is not necessarily associated with individuals' failure or negative events. However, it is associated with numerous serious physical illnesses (e.g., cardiovascular diseases,

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hypertension, metabolic syndrome, cancers, diabetes, and sleep apnea; Segula, 2014; Wyatt, Winters, & Dubbert, 2006). In addition, the prevalence of negative stigma (e.g., lazy, weak-willed, unsuccessful, unintelligent, lack self-discipline, and noncompliant with weight loss treatment) attached to obese people in various social settings threatens their psychological and sociological well-being (McElroy et al., 2004; Puhl & Heuer, 2010; Roehling, 1999). Therefore, obesity needs to be taken into account as a negative and undesirable health-related event that should be resolved.

With respect to causes of obesity, an imbalance between energy intake and expenditure was known to be the main cause of obesity and is associated with individuals' failure to control and be responsible for their weight (DeJong, 1980; Esparza, Fox, Harper, & Bennett, 2000). However, obesity is also caused by combinations of multiple factors. In addition to internal and controllable factors, other factors have been identified, including not only individual factors that are uncontrollable at the individual level (e.g., generics or metabolism issues), but also socioeconomic factors (e.g., income, education, race/ethnicity, geographic region, age, and gender) and environmental conditions (e.g., the prevalence of energy-dense food, the lack of healthy food access, government policies, food advertisements in media, the lack of weight maintenance facilities or programs in communities) (Finegood, Merth, & Rutter, 2010; Hill & Peters, 1998; Ogolen & Flanagan, 2008; Wakefield, Loken, & Hornik, 2010; Wang & Beydoun, 2007).

In the case of Native Americans' obesity, additional external factors could be addressed as possible causes of high obesity rates along with other factors stated above. Scholars have indicated that Native Americans' unique cultural and historical backgrounds are also intricately connected to the current health issue (Brave Heart, 2000; Duran, Duran, Brave Heart, & Yellow

Horse-Davis, 1998; Evans-Campbell, 2008; Sotero, 2006). The concept 'historical trauma' among Native Americans was proposed by Maria Yellow Horse Brave Heart (1998, 1999a, 1999b, 2000, 2003) provided a useful framework to identify causal relations between long-term massive assaults and their continuing negative impact on Native Americans and their communities in terms of health issues.

Scholars have incorporated the core proposition of historical trauma into Native Americans' health issues in the following way (Brave Heart, 2000; Evans-Campbell, 2008; Duran et al., 1998; Sotero, 2006). They argued that several historical tragedies (e.g., loss of homelands, forced relocations, massive depopulation by European explorers and settlers, deprivation of traditional food resources, prohibition of culturally and spiritually important ceremonies) have been intergenerationally transmitted to Native American descendants and persistently threatened well-being of the contemporary Native Americans' societies (Brave Heart, 2000; Evans-Campbell, 2008; Duran et al., 1998; Sotero, 2006; Whitbeck, Adams, Hoyt, & Chen, 2004).

Although many current Native Americans were not direct victims of these historical incidents, still, these traumas are ingrained in Native American societies as several forms of historical trauma responses, such as emotional discomfort, fear of White people, physical symptoms, and self-destructive behavior (Brave Heart, 2000; Sotero, 1996). Such historical tragedies then integrate with ongoing sociopolitical or economic structures of the current society and ecological systems (e.g., food scarcity, inadequate and insufficient government support and policies, contemporary discriminations and assault) to exacerbate Native Americans' health status and shorten their life expectancy (Brave Heart, 2000; Evans-Campbell, 2008; Evans-Campbell & Walters, 2006). Considering these cultural and historical contexts, the Native

Americans' obesity issue may result in complicated rationales. Not only do internal factors work, but numerous external factors have aggravated the current obesity problem. Thus, considering all potential factors, Native Americans' health issues associated with their body weights and compositions are determined by interactions among these factors that generate and exacerbate obesity (Hill & Peters, 1998).

Given that the researcher ultimately focuses on the effects of anger appeals in obesity prevention messages designed to target Native Americans, different attributions that address reasons why the specific group of people is obese may provoke different levels of anger. For example, as with self-attributions that concern a lack of social support, Native Americans may tend to attribute their obesity issues to external factors. Anger is accompanied when people have a belief that others are responsible for the negative health problem. Therefore, Native Americans may feel certain levels of anger due to their exposure to messages that blame external factors as primary causes of obesity, which matches their belief in obesity attributions. In addition, considering complex historical and cultural backgrounds that were intermingled with several external factors (e.g., food insecurity, losing traditional food resources, lack of healthy food access), anger rooted in these contexts may also be added in the course of processing external attribution to obesity among Native Americans.

In contrast, obese Native Americans may exhibit more intense anger in response to messages that criticize their lack of effort to control their weight (e.g., internal attribution, such as the intemperate dietary habit and the lack of physical activity, which implies laziness). These messages contradict the human tendency to seek reasons for negative outcomes from external factors by suggesting the core reason for pervasive obesity among Native Americans is their own fault. The discrepancy between attribution types between people and messages may provoke

perception of norm violations (Ohbuchi, Tamura, Quigley, Tedeschi, Madi, Bond, & Mummendey, 2004). As a result of this discrepancy, which is a cognitive component of anger, messages that state Native Americans' failure to control their health as the primary reason for the prevalence of obesity among their societies will cause much higher levels of anger.

Internal attribution may also intensify anger due to Native Americans' historical trauma responses. Like historical trauma proposed, some external obesity attributions (e.g., food insecurity, lacking healthy food accessibility) resulted in historical events committed by outside pressures. If messages, however, disregard this factor then state only internal factors as the main cause of increasing obesity rate among Native American societies, contextual anger would be added along with anger provoked by the discrepancy between Native Americans and messages' obesity attributions. The resulting higher levels of anger as the product of attribution types, may lead to formation of subsequent negative attitudes to the messages and their sources, as well as inhibit individuals' tendency to accept the recommended behaviors (Angie, Connelly, Waples, & Kligyte, 2011; Dillard & Shen, 2005; Karasawa, 2001; Rains & Turner, 2007; Nabi 1999, 2002).

Besides anger, empirical studies addressed that further message processing outcomes, such as message and message source evaluations, were expected due to attribution discrepancies between actors and observers (Bannister, 1986; Craven, Marsh, & Debus, 1991; Kaplan, 1974; Liden & Mitchell, 1985). For instance, a study (Bannister, 1986) focused on the fact that actors are more likely to attribute negative outcomes to external factors, while observers do not pay as much attention to external factors as actors do in the same attribution process (Kelly & Michela, 1980; Johnson & Nisbett, 1973). Thus, the researcher of the study predicted that negative evaluations on messages and message sources among actors (message recipients) will be caused due to the attribution discrepancy between their own attributions and those of observers

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(message sources) about actor's performances (Bannister, 1986). The outcome supported the prediction: Message recipients showed more negative evaluations on message accuracy and message sources' perceptiveness when they received messages attributing their negative performances to internal factors than external factors (Bannister, 1986).

Other studies (Kaplan, 1974; Liden & Mitchell, 1985) also provided similar outcomes. If message sources' attributions about individuals' poor performances did not match to those of message recipients, message recipients more negatively evaluated message sources (e.g., less credible, less fair, and less likable), messages (e.g., not helpful, less agreeable, poor), and future behavioral involvement related to the message (e.g., would not likely to follow the message recommendation) (Kaplan, 1974; Liden & Mitchell, 1985).

These empirical studies informed the study with potential influences of discrepancies between Native Americans' and obesity prevention messages' obesity attributions on further message processing outcomes. On the basis of the attribution process and previous studies that tested the assumption, the researcher of this study predicted that Native American study participants will be more likely to show negative responses to messages, message sources, and behavioral intentions when obesity messages state internal attributions. On the other hand, more favorable thoughts and evaluations on both messages and message sources, as well as greater message acceptance behaviors were expected if obesity prevention messages blame external factors as the fundamental causes of obesity prevalence among Native American societies.

## Obesity Attributions and Self-Discrepancy

Native Americans may experience various anger-related negative emotions due to the incompatibility of obesity attributions to which they and others subscribe (Higgins, 1987). The self-discrepancy theory (Higgins, 1987) indicated that incongruency among different types of

self-representations, or those of others is associated with different clusters of emotions, either dejection- or agitation-related emotions. In the self-discrepancy theory, Higgins (1987) suggested that there are two cognitive dimensions where a variety of self-status is assessed. The first cognitive dimension that the theory proposed was 3 domains of the self (actual, ideal, and ought self) (Higgins, 1987). The second dimension was the standpoints of the self, which includes the personal standpoint and the standpoint of significant others to oneself as core elements (Higgins, 1987). The main postulation of the theory was that an individual experiences emotional discomforts in situations due to conflicts between or among elements in either 3 domains of the self or 2 standpoints of the self (Higgins, 1987).

For example, a discrepancy between actual self versus ideal or ought self-generated a psychological perception of the absence of positive outcomes that therefore makes them feel dejection-related emotions (Higgins, 1987). If individuals felt a discrepancy because of the mismatch between the current states of their actual attributions from their own individual standpoints and their beliefs about what others consider is their own duty or obligation to attain, this discrepancy evoked agitation-related emotions, such as resentment, uneasiness, tension, and irritation (Higgins, 1987; Higgins, Shah, & Friedman, 1997).

With respect to this study context, different obesity attributions may result in emotional discomfort caused by the discordance between two different standpoints of self. Both internal and external obesity attributions were related to a conflict between an internal representation of others' standards or values for the self and the internal representation of one's own standards or values (Moretti & Higgins, 1999). As the actor-observer hypothesis explained (Jones & Nisbett, 1972), Native Americans may be more likely to attribute their current and actual obesity issue to external causes, including government policies or lack of facilities in their communities to

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maintain a healthy life. Therefore, if obesity prevention messages' obesity attributions concur with their own standpoints, Native Americans may experience relatively less discrepancy. However, if they perceive that the messages attribute their obesity issues to individuals' responsibility and believe that the individual should exert more effort to resolve the issue, message recipients will be more likely to experience emotional distress and the desire to reduce the discrepancy (Moretti & Higgins, 1999).

Numerous empirical studies (e.g., 'actual self' versus 'ideal self' and the 'ought self'; Bissell & Rask, 2010; Higgins, Klein, Strauman, 1985; Moretti & Higgins, 1999; Scott & O'Hara, 1993; Strauman, 1989) tested different associations between types of self-discrepancies and various negative emotions, and many have examined the emotional outcomes of discrepancy in the conflict between or among the 3 domains of self. However, relatively few studies addressed the consequences of the discrepancy caused by conflicts between different standpoints of the self. The researcher of this study assumed that obesity prevention messages may cause self-discrepancy due to various obesity attributions that evoke a conflict between two standpoints of the self.

Furthermore, the discrepancy that is created by the obesity prevention messages will generate different levels of negative agitation-related emotions that are elicited by pain or threats they anticipate others will inflict on them (Higgins, 1987). This circumstance postulated the following prediction: there is a mismatch between a Native Americans' tendency to attribute the individuals' actual selves (being obese or engaging in an unhealthy lifestyle that causes obesity) to external causes and perceptions of others' beliefs that individuals are responsible for obesity -related issues – and therefore individual-level efforts are necessary to resolve these problems.

These overviews of obesity attributions and the self-discrepancy theory indicated that

these two theoretical perspectives may work together to generate various degrees of anger and agitation-related negative emotions. The following hypotheses, therefore, were proposed based on the previous discussions on the effects of attributions of obesity on anger and agitation-related emotions in persuasive health messages targeted at Native Americans. These hypotheses focused on the direct effects of obesity attribution types on varying degrees in anger and anger-related negative emotional experience and further message processing outcomes.

> H1: An internal attribution of obesity in the obesity prevention message will lead to higher levels of anger about 1) message sources and 2) obesity attributions relative to an external attribution of obesity.

> H2: An internal attribution of obesity in the obesity prevention message will lead to higher levels of negative attitudes toward 1) the message, 2) the message topic, and 3) the recommended behavior relative to an external attribution of obesity.

> H3: An internal attribution of obesity in the obesity prevention message will lead to higher levels of unfavorable source evaluations on source's 1) expertise, 2) sociability, and 3) trustworthiness relative to an external attribution of obesity.

> H4: An internal attribution of obesity in the obesity prevention message will lead to greater levels of message rejection (lower in behavioral intentions) relative to an external attribution of obesity.

## Message Source and the Intergroup Sensitivity Effect

Inappropriate or negative aspects of groups' cultures and behaviors often are targets of criticism (Hornsey & Imani, 2004). Constructive and legitimate criticism play crucial roles in groups' lives; they encourage group members to consider the purpose and meaning of such criticism, re-evaluate their values, and change negative aspects of their behaviors to restore

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groups' reputations (Nemeth & Owens, 1996). However, not all criticism results in positive outcomes. Groups may reject, derogate, underestimate, or ignore criticism regardless of its quality, legitimacy, and logic (Hornsey, Oppes, & Svensson, 2002; Tekman, Hortacsu, & Ok, 2008).

As a key message factor that not only may associate with anger experience but also determines the success or failure of accepting criticism on problematic health issues, the influence of sources of criticism was also considered. A sheer volume of studies (e.g., Brinol & Petty, 2009; Feng & MacGeorge, 2010; Perloff, 2008; Petty & Cacioppo, 1984; Wilson & Sherrell, 1993) emphasized the significance of selecting appropriate message sources and their attributes (e.g., expertise, credibility, attractiveness, similarity, etc.) for achieving desirable outcomes in persuasion. In particular, similarities between recipients and sources increased the likelihood of persuasion effects; empirical studies have supported that individuals are more likely to be persuaded by message sources who share similarities in various aspects (Appiah, 2004; Anderson & McMillon, 1995; Feng & MacGeorge, 2010; Perloff, 2008; Silvia, 2005).

In addition to empirical findings from general persuasion studies, a more specific theoretical framework also validated these previous findings as well as supports predictions of this study that the message source who criticizes a group's issues would be the crucial message attribute to make criticism more acceptable. The intergroup sensitivity effect (ISE) (Hornsey & Imani, 2004) addressed a source factor with which people determine whether they will accept or reject criticism. According to the ISE, group membership is a crucial factor that leads to different reactions to the same criticism (Hornsey et al., 2002; Hornsey & Imani, 2004). Based on the source of the criticism, group members decided whether they accept or discount it (Hornsey & Imani, 2004; Tekman et al., 2008). In this case, group members are more likely to accept

criticism if it is raised within their groups (Tekman et al., 2008). In contrast, criticisms on the part of outgroup members were considered less fair, constructive, and legitimate than that initiated by in-group members (Hornsey et al., 2002; Tekman et al., 2008).

The ISE was rooted in the social identity theory (SIT; Tajifel & Turner, 1979) and the self-categorization theory (SCT: Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). These theoretical perspectives explained ways to identify "who we are" according to the groups to which people belong (Ashforth & Mael, 1989; Hornsey et al., 2002; Tajifel, 1978; Tajifel & Turner, 1979; Turner et al., 1987; Turner & Oakes, 1986; Turner & Reynolds, 2001). Individuals' self-identifications stemmed from groups and then lea them to accept and internalize the groups' norms, values, and emotions as their own (Ashforth & Mael, 1989). The nature and effect of social context that determines individuals' self-identifications have widely been used to explain group dynamics and intergroup relationships (Hornsey, 2008; Hogg, Turner, & Davidson, 1990). A key assumption of both theories was that people are prone to evaluate themselves in positive ways compared to the way they evaluate others who do not belong to the same group (Hornsay & Imani, 2004). Thus, if outgroup members trivialized their groups' values, identities, and natures, or threaten, derogate, or discriminate against them, they will exhibit a higher level of defensive reactions besides hostile group responses (Hornsey et al., 2002; Hornsey & Imani, 2004l; Schmitt, Silvia., & Branscombe, 2000).

The ISE has been tested in study contexts that compare the effects of sources of criticism (in-group members vs. outgroup members) on attitudes about both the criticism and its source, evaluations of the criticism's quality, and the level of individuals' agreement or disagreement with criticism, and have provided quite consistent results (Hornsey et al., 2002; Hornsey & Imani, 2004; Hornsey, Trembath, & Gunthorpe, 2004; Sutton, Elder., & Douglas, 2006). These

studies have suggested that greater sensitivity, such as exhibiting defensive mechanisms, derogating the value of criticism, denouncing the personality and fairness of the source of criticism, or showing a lower level of agreement with criticism, is shown when the source is identified as an outgroup member, while more favorable attitudes are associated with criticisms made by in-group members (Esposo, Hornsey., & Spoor, 2013; Hornsey et al., 2002; Hornsey et al., 2004; Hornsey & Imani, 2004; Rabinovich & Morton, 2010; Sutton et al., 2006; Tarrant & Campbell, 2007).

For example, in Hornsey and Imani's study (2004), study participants reported negative evaluations toward outgroup sources of criticism regarding multidimensional outgroup sources' traits (e.g., intelligence, trustworthiness, friendliness, open-mindedness, likability, interest, and respect) compared to ingroup sources of criticism. Criticisms stemming from outgroup members were also evaluated as less constructive, agreeable, and acceptable, whereas ingroup criticisms resulted in more positive evaluations of the same criticisms on the same criteria (Hornsey & Imani, 2004). Similar outcomes were reported from empirical studies based on the ISE (e.g., Esposo et al., 2013; Hornsey et al., 2004) in that ingroup vs. outgroup sources of criticisms caused differences in forming following evaluations (e.g., source and criticism evaluations, and behavioral intentions).

Along with evaluations on message as well as message sources, negative affective message process to the source of criticism and messages were also expected. Earlier, studies that have tested the ISE's main proposition have addressed several intergroup criticizing contexts that elicit anger. For example, individuals became angry when their egos, values, and/or identities are threatened (Hornsey & Imani, 2004). Additionally, situations where there was any interference that disturbs people's goal achievement or forces them to go against their wishes also evokes

negative feelings (Averill, 1982; Frijda, 1986; Nabi, 1999; Smith & Lazarus, 1990). Criticizing individuals, as well as groups' characteristics, values, or identities was a way to demand people to change something that is unsatisfactory or undesirable to society. Thus, this inherently threatens the shared identities of group members.

However, people do not like to receive unfavorable evaluations of themselves of their group by people who are outsiders, and therefore, they assume that such criticisms are biased (Hornsey & Imani, 2004; Perdue, Dovidio, Gurtman, & Tyler, 1990; Vivian & Berkowitz 1992, 1993). Accordingly, outgroup criticism threatens their identities and increases negative emotions that motivate them to protect themselves from such criticism by exhibiting negative affect, or rejecting or derogating the source of the criticism (Hornsey & Imani, 2004).

The same logic that previous studies have addressed in the context of the ISE can be applied to the current study context; Native American populations may show anger-related negative emotional responses to the criticism, as well as unfavorable evaluations of its sources and message when it derives from non- Native Americans. On the other hand, when the same criticism is proposed by the people identified as ingroup members, a level of anger and negative emotions will be attenuated compared to those created by outgroup members. On the basis of these discussions, the following research hypotheses were addressed:

H5: A non- Native American ethnic source in the obesity prevention message will lead to higher levels of anger about 1) message sources, and 2) obesity attributions relative to a Native American ethnic source.

H6: A non- Native American ethnic source in the obesity prevention message will lead to higher levels of negative attitudes toward 1) the message; 2) the message topic, and 3) the recommended behavior relative to a Native American ethnic source.

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H7: A non- Native American ethnic source in the obesity prevention message will lead to higher levels of unfavorable source evaluations on source's 1) expertise, 2) sociability, and 3) trustworthiness relative to a Native American ethnic source.

H8: A non- Native American ethnic source in the obesity prevention message will lead to greater levels of message rejection (lower in behavioral intentions) relative to a Native American ethnic source.

## Cognitive-Functional Model and Anger Activism Model:

## Constructive Views of the Role of Anger in Persuasion

Centering on anger appeals, message attributes that may share common properties evoked during Native Americans' obesity prevention messages were discussed. The study further addressed how anger plays constructive roles as a factor that mediates the emotion evoked by these message factors on facilitating health message processing outcomes. Two models—the cognitive-functional model and the anger activism model—guided this study to increase our understanding of the role of anger in health messages that address a particular health issue among members of a specific ethnic group.

The cognitive-functional model (CFM; Nabi, 1999, 2002) proposed the potential effects of message-induced negative emotions on the direction and stability of persuasive outcomes (e.g., the subsequent information processing depth, attitude change, and message rejection or acceptance). As opposed to previous cognitive-centered information processing models, such as the elaboration likelihood model (Petty & Cacioppo, 1986) and the heuristic-systemic model of persuasion (Chaiken, 1980) that have taken into account the role of emotions as heuristic and subsidiary roles, Nabi (1999) placed emotions in the center of her model to explain the influence of discrete negative emotions on motivation and/or the ability to engage in message processing.

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The CFM was based on studies that address the relationship between appraisal patterns and action tendencies to each of these negative emotions (Nabi, 1999). As Lazarus (1991) stated, discrete emotions are elicited by each core relational theme and have their own unique goals and coping mechanisms to achieve those goals. Each of these emotions is associated with different goals and action tendencies (Lazarus, 1991). Thus, the CFM postulated that if persuasive messages include a core relational theme that evokes a particular discrete emotion, and message recipients perceive that theme, then message receivers experience the emotion and react to the message accordingly to cope (Nabi, 2002).

The mechanism was grounded in a relationship between the human perceptions of discrete emotions and their motivations for further message processing. If a message contains contents that reflect emotion's core relational theme, and if receivers perceive the theme, the message stimulates two types of motivations. First, message recipients are motivated to attend to or avoid the emotion-inducing stimulus based on the type of emotion they experienced (motivated attention; Nabi, 1999, 2002). The extent to which message receivers want to engage with the message is contingent on the type of emotions they experience (Nabi, 1999, 2002; Quick et al., 2009). For example, people are more likely to approach the message and be motivated to process the rest of the message when they feel anger than when they feel fear (Nabi, 2002). Second, people are also motivated to resolve emotionally related goals distinct from the avoidance or approach motivations (Nabi, 1999, 2002).

Motivated message recipients then expect to receive one of the following elements of information on the basis of message cues: previous experience with similar messages, or individual differences (Nabi, 2002). Depending on the subsequent message elements that provide further information, the message can reassure message recipients by achieving their emotion-

driven goals (Nabi, 1999). For instance, if the remainder of the information is either relevant or valid in reassuring message recipients, further message processing follows (Nabi, 1999, 2002). Subsequent information that causes uncertainty as to whether the message provides receivers with valid reassurance information also stimulates continuous information processing regardless of the type of emotions they experience (Nabi, 2002). On the other hand, if information fails to deliver information which is irrelevant to reassurance, message recipients are more likely to avoid the message that evokes anger (Nabi, 2002).

By focusing on the role of anger within a health message context, the CFM predicted that health-related messages which make receivers angry, under certain conditions, may result in more constructive message processing outcomes. Message elements that attempt to threaten one's ego, value, or identity, interfere with one's goals, or force one to go against one's wishes in order to persuade message recipients to engage in healthy behaviors or dissuade them from unhealthy behaviors are more likely to evoke anger (Averill, 1982; Frijda, 1986; Smith & Lazarus, 1990; Nabi, 1999).

Given the relation between the appraisal and coping mechanisms of anger, which was proposed by the CFM, feeling anger can also enhance message recipients' motivation to process the message deeply, and to eliminate or neutralize the anger by blaming or attacking its source (Frijda, 1986; Lazarus, 1991; Nabi, 1999; Smith & Lazarus, 1990). Consequently, if the health messages include the source, topic, and situation that causes anger, and also contain information that helps message recipients to resolve problematic situations, further systemic message processing will be facilitated, and therefore, the persuasive outcomes desired are expected (Miller & Quantip, 2017; Nabi, 1999, 2000).

The anger activism model (AAM) also posited the constructive aspects of anger in

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persuasion (Turner, 2007). The model's fundamental proposition was that anger might have beneficial effects on persuasive message processing (Ilakkuvan, Turner, Cantrell, Hair, & Vallone, 201). The AAM addressed that anger functions to stimulate people to resolve and/or control the situation that makes them angry to eliminate a threat (Lazarus 1991; Pfau, Szabo, Anderson, Morrill, Zubric, & Wan, 2001). To do so, people make efforts to develop self-defensive mechanisms by enhancing their analytical thinking about stimuli or situations, with which they attempt to overcome or repair situations to reduce frustration and restore equilibrium (Ilakkuvan et al., 2017; Lazarus 1991; Schwarz, 1990; Turner, 2007).

To achieve positive message processing outcomes, the AAM proposed other necessary considerations related to anger-driven message processing. First, messages should evoke an appropriate level of anger. Needless to say, too much anger causes adverse responses, such as misjudgment, avoidance, and aggressive reactions to an object (Lazarus, 1991; Pfau, Szabo, Anderson, Morrill, Zubric, & Wan, 2001; Turner, 2007). However, persuasive messages that elicit an optimal level of anger might lead to desirable outcomes, such as thoughtful message processing, willingness to think about the message, and the intention to engage in recommended actions to ameliorate problems (Turner, 2007). Thus, whether the anger leads to constructive or non-constructive outcomes is contingent primarily on the intensity of the anger experienced (Ilakkuvan et al., 2017).

Second, message features that enhance self-efficacy should be included in messages that evoke anger, with the goal of attenuating that anger (Ilakkuvan et al., 2017). Even if the message evokes an optimal level of anger successfully, if it contains no useful information or recommendations that make people believe that there is something they can do to resolve their anger, the anger will not lead to constructive outcomes (Nabi, 1999; Turner, 2007). Under these

two conditions, the message recipients are aligned with the message that elicits anger (Ilakkuvan et al., 2017). Empirical studies (Ilakkuvan et al., 2017; Turner, 2006) have supported the fundamental prediction of the AAM. Turner (2007) suggested that people who experience both a strong feeling of anger and self-efficacy showed the most positive attitudes about the topic and engage in commitment behavior and systematic message processing compared to those who have a lower level of anger and self-efficacy.

However, two issues remain. First, although the CFM and the AAM posited the way the power of anger functions in persuasive communication, few empirical studies have tested both models (Ilakkuvan et al., 2017; Nabi, 2002; Turner, 2006), and those that did test them were conducted by the researchers who developed these models. Second, despite two models proposing optimal levels of anger as a prerequisite of bringing constructive message processing outcomes, they did not specify all of the conditions or factors that evoke an optimal level of anger to facilitate message processing. The researcher of this study attempted to respond to these two issues that these models may overlook. First, to fill the void of lacking empirical studies, the fundamental assumption of these models was tested in the health message processing context. Second, the researcher also incorporated two message attributes that may generate optimal levels of anger among health message recipients by concerning the main targeted message recipients' sociocultural and biological aspects connected to obesity.

Based on the discussions stated above and adding precedent factors that may be associated with optimal levels of anger, the following prediction was proposed. If obesity prevention campaigns successfully induce optimal levels of anger as a result of employing different obesity attribution types and message sources, and further information that either reassures them that they can cope with their anger or enhance their ability to handle the anger-

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provoking situation, then messages with such attributes are likely to result in constructive responses. Thus, the researcher expected that anger may be intensified or reduced due to manipulating two message attributes.

The researcher of this study also expected that anger will mediate the effects of obesity attributions on various message processing outcomes. The core prediction of both the CFM and the AAM was that messages that induce a certain level of anger facilitate message recipients' information processing, along with constructive outcomes in attitudes and behavior (Nabi, 1999, 2002; Turner, 2006, 2007). The fundamental assumption of both models indicated that different levels of anger that Native Americans may experience due to the obesity attribution types and message sources may mediate the effects of these attributions on their message and source evaluations as well as rejection or acceptance of recommended behaviors in messages. Based on these predictions, the indirect effect of anger on message processing outcomes demonstrated by attitudes toward the message, source evaluations, and intention of message rejection was also tested.

H9: Anger about a) message sources and b) obesity attributions will mediate the relationship between obesity attribution types and message processing outcomes (attitudes toward the message, source evaluations, and message rejections).

H10: Anger about a) message sources and b) obesity attributions will mediate the relationship between message source types and message processing outcomes (attitudes toward the message, source evaluations, and message rejections).

In addition to the main effects of each message attribute, potential interactions between obesity attribution types and message sources were postulated. Two independent variables have not been tested in similar contexts to this study simultaneously. However, if each of these

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independent variables leads message recipients to feel and think in different ways, interacting

these two variables will also cause different message responses based on combinations of these

two message factors. Therefore, depending on how different types of obesity attributions and

message sources interplay with each other, Native Americans may experience varying levels of

anger as well as further message processing outcomes. Therefore, the following research

hypotheses were addressed to examine the interaction effects of two message factors on target

message recipients in terms of their 1) emotional responses to message sources and obesity

attributions, 2) attitudes on messages, 3) evaluations on message sources, and 4) behavioral

intentions to follow the recommended behavior.

> H11: There will be an interaction between attribution types and message sources on
>
> Native Americans' experience in varying levels of anger about 1) message sources
>
> and 2) obesity attributions.

> H12: There will be an interaction between attribution types and message sources on
>
> Native Americans' attitudes toward 1) the message; 2) the message topic, and 3) the
>
> recommended behavior.

> H13: There will be an interaction between attribution types and message sources on
>
> Native Americans' evaluations on message source's 1) expertise, 2) sociability, and
>
> 3) trustworthiness.

> H14:  There will be an interaction between attribution types and message sources on
>
> Native Americans' levels of message rejections (behavioral intentions).

> H15:  Anger about a) message sources and b) obesity attributions will mediate the
>
> relationship between interactions of obesity attribution types and message sources
>
> and message processing outcomes (attitudes toward the message, source

evaluations, and message rejections).

The research model (Figure 1) presented each of relations and directions that 15 research hypotheses proposed. The research included predictions and directions of the 1) main and interaction effects of two message attributes (obesity attributions and message sources) on negative emotions (anger and agitation-related emotions) and message processing outcomes (attitudes toward the message, the source evaluations, and message rejection) and 2) the indirect effects of message factors on these outcome variables through anger and agitation-related emotions.

Figure 1. Mediation model of anger appeal message processing
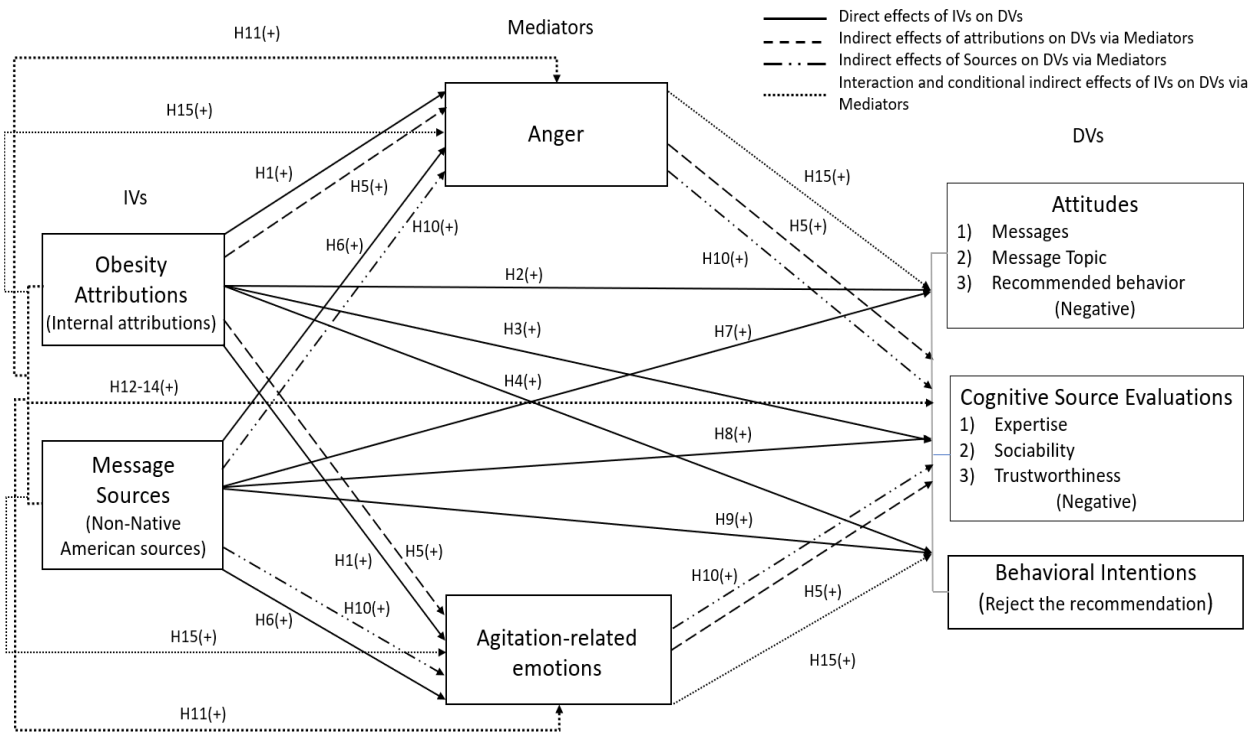


## Targeted Health Communication

Previous discussions on message attributes associated with anger and the anger's constructive role in health message processing among a specific group of message recipients can

be further elaborated based on a particular health message type. The concept 'targeted messages' (Kreuter & Lukwago, 2003; Kreuter, Strecher, & Glassman, 1999) addressed benefits of designing health communication by taking into account the targeted message recipients' traits to obtain desirable message processing outcomes. Before targeted messages were introduced, creating one message that may fit all potential message recipients was one of the most common strategies to inform, educate, and persuade people in health communication to enhance their health knowledge, promote positive attitudes, and encourage implementation of recommended behavior (Roberto, Krieger, & Beam, 2009). This "one-size-fits-all message strategy" has several advantages, such as it is relatively inexpensive, yet offers valuable information to recipients (Kreuter & Lukwago, 2003; Kreuter et al.,1999; Schmid, Rivers, Latimer, & Salovey, 2008). However, the lack of consideration for individuals' needs and interests has called for more specific messages that address unique characteristics of message recipients and message factors, which may be more appealing and bring desirable outcomes for individuals as they make health-related decisions (Kreuter & McClure, 2004; Kreuter & Lukwago, 2003; Kreuter et al.,1999; Williams-Piehota, Schneider, Pizarro, Mowad, & Salovey, 2003).

The result of these discussions has created a variety of messages that vary in accordance with the level of content personalization and the need for individual assessments (Kreuter et al., 1999; Roberto et al., 2009). Generic messages do not require message customization and individual assessments to define who the targeted message recipients will be (Kreuter & Lukwago, 2003; Kreuter et al., 1999). The polar opposite of general messages are personalized or tailored messages; which involve data-based assessments to identify and understand a single message recipient's unique interests, needs, and concerns in order to maximize message relevancy and the message's intended outcomes (Kreuter et al., 1999; Noar, Benac, &  Harris,

2007; Pope, Pelletier, & Guertin, 2018).

Targeted messages lie between these two message strategies. Targeted messages employ socio-demographics, such as race, ethnicity, culture, lifestyle, and other psychological or behavioral determinants which are shared among a group people, to define some population subgroups and create health communication specifically designed for the group (Kreuter et al., 1999; Kreuter & Lukwago, 2003; Roberto et al., 2009). Although these 3 types of message design strategies are fundamentally different, the latter two approaches have been presumed to have greater advantages over generic messages in terms of enhancing message relevance, where one can expect positive outcomes of health information processing (Gould, McEwen, Watter, Clough, & Zwan, 2012; Kreuter et al., 1999; Kreuter & Lukwago, 2003; Kreuter & Wary, 2003; Noar et al., 2007; Schmid et al., 2008).

In particular, when there is no significant variation among members of the sub-group on the key characteristics, targeted messages have been considered a better approach than other message strategies (Kreuter et al., 1999; Kreuter & Lukwago, 2003; Kreuter & Wary, 2003). The fundamental assumption of targeted messages was that communication with the given population who share sufficient homogeneities causes similar influences on people's knowledge, motivations, attitudes, and behaviors (Kreuter et al., 1999; Schmid et al., 2008). The effectiveness of the targeted messages has been tested in a variety of contexts where researchers believe that a specific group of people share a common characteristic associated with health issues.

These previous studies, by and large, have supported the effectiveness of targeted messages on a variety of message processing outcomes across different health issues: including cancer detection and prevention behaviors (Davis, Cummings, Rimer, Sciandra, & Stone, 1992;

Schneider, Salovey, Apanovitch, Pizarro, McCarthy, Zullo, & Rothman, 2001; Skinner, Strecher, & Hospers, 1994; Williams-Piehota, Schneider, Pizarro, Mowad, & Salovey, 2004), physical activity and dietary suggestions (Campbell, DeVellis, Strecher, Ammerman, DeVellis, & Sandler, 1994; Migneault, Dedier, Wright, Heeren, Campbell, Morisky, Rudd, & Friedman, 2012; Shepherd, 2002), smoking secession (Dijkstra, DeVries, Roijackers, & van Breukelen, 1998; Latimer, Krishnan-Sarin, Cavallo, Duhig, Salovey, & O'Malley, 2012; Lipkus, Lyna, & Rimer, 1999; Pechmann & Reibling, 2000), and other diseases (Herek, Gillis, Glunt, Lewis, Welton, & Capitanio, 1998; Shager, Cates Diehl, & Hartmann, 2011). By narrowing down message recipients' ethnicity and race, behavioral similarities, and sociocultural factors, numerous studies mentioned above have supported the notion that targeted messages are more effective than generic messages in terms of message credibility, relevancy, attractiveness, quality assessment, and behavioral outcomes.

Despite wide applications of targeted messages in numerous empirical studies, relatively few studies (e.g., Doorenbos, Jacobsen, Corpuz, Forquera, & Buchwald, 2011; Hanson, Winberg, & Elliott, 2012; Makosky, Cowan, Nollen, Greiner, & Choi, 2009; Vogeltanz-Holm, Holm, Plume, & Poltavski, 2009; Swartz, Noell, Schroeder, & Ary, 2006; Taualii, Nush, Bowen, & Forquera, 2010) tested impacts of targeted health communication on Native Americans as potential message recipients who may show a higher level of message reception to the targeted message. Native Americans are one of the most vulnerable populations for a variety of diseases and illnesses (Jones, 2006). Negative consequences associated with their current health problems further exacerbate persistent health disparities and cause lower life expectancies compared to other racial/ethnic groups in the United States (Jones, 2006). Therefore, health messages that are explicitly designed based on message factors that may appeal to Native Americans to reduce

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current health disparities and prevent rampant illnesses are needed (Jones, 2006; Mead, Cartwright, Jones, Ramos, Woods, & Siegel, 2008).

Furthermore, potential variabilities that may exist across different Native American tribes were also took into account. One of the most common ways to identify a targeted group is to employ a single demographic variable, such as ethnicity or race, or at best, combining that variable with other demographics like sex or age. Hence, it has been a common approach to use ethnicity as a factor to define Native Americans as targeted message receivers. However, as of 2018, there are 567 Tribal entities that are recognized by the U.S. Federal Government (Indian Affairs Bureau, 2018). Each of these tribes shows differences in socio-cultural and historical backgrounds, lifestyles, and disease histories that may result in their current health concerns (Carter, Horowitz, Wilson, Sava, Sinnock, & Gohdes, 1989). Given these variabilities, targeted messages that merely rely on the one-dimensional variable, such as demographics, without consideration of other crucial factors among members of the segmented population, may decrease message effects (Slater, 1996).

The criticism, which raised a concern in a heavy reliance on demographics, indicated that a message broadly targeted to Native Americans may be easy to overlook the fact that each of Native American tribes has its own background and history that may influence one's current health-related issues (Campbell, 2008; Debo, 1984; Veil & Rodgers, 2010). Therefore, to design and examine effects of health messages targeting Native Americans, researchers should understand specific needs, interests, and concerns of people who become potential target message recipients and reflect their voices in the course of message design (Dutta-Bergman, 2004; Kreuter & McClure, 2004). This process is necessary to understand which types of messages might be more appealing among the target people in order to attenuate message

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rejection caused by a lack of understanding of the population's members.

Therefore, anger-driven obesity prevention messages that target specific Native American Tribes in Oklahoma were designed. The study researcher paid special attention to design and test the effects of obesity prevention messages is Cheyenne & Arapaho Tribes (C&A Tribes) in Oklahoma. Initial messages were proposed and created by the researcher of this study by reviewing message factors associated with Native Americans' obesity problem. Tribal members' suggestions and requests were also incorporated in order to elaborate these initial messages to ahdere to the fundamental logic that the targeted messages have proposed. Through these processes, the researcher was able to design health messages and test their effects on the basis of in-depth knowledge on how the potential target message recipients think about the specific health issue as well as message factors the study plans to utilize.

Finally, previous studies (e.g., Butt & de Run, 2011; Daley et al., 2009; Flynn, Worden, Secker-Walker, Badger, & Geller, 1995; Kreuter, Oswald, Bull, & Clark, 2000; Kreuter & Wary, 2003) examined the effects of target messages on the basis of comparisons message processing outcomes between control groups (a group of the same sub-population receives non-targeted messages) or other message conditions (a group of the same sub-population receives individual and/or tailored messages) and experimental conditions. However, to make a valid argument, which in this case is targeted messages are more effective than other message strategies among the group of people, studies can also compare responses to the targeted messages between the targeted message group and untargeted one. Thus, people who are not considered targeted message recipients and share heterogeneous characteristics, which are in relation to the factor utilized for segmenting a sub-population, should show different message processing outcomes to those of targeted message recipients. In this study context, the comparison group could be any

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race and/or ethnic groups who do not identify themselves as Native Americans. Therefore, non-Native Americans were recruited and exposed the targeted obesity prevention messages to the Native American Tribes to test the core assumption of targeted messages and their outcomes. The following research hypothesis assessed both main and interaction effects of these two message factors on the basis of comparisons between two participant groups.

H16: Across attribution types, message sources, and a combination of an attribution type and the message source, Native Americans will show different message responses in terms of 1) anger, 2) message attitudes, 3) source evaluations, and 4) message rejection behaviors compared to non-Native Americans.

Table 1 summarized the full list of 16 research hypotheses that were derived from early discussions in this chapter.

Table 1. Summary of research hypotheses

| Predictors | Hypotheses |
| --- | --- |
| Obesity Attributions | H1: An internal attribution of obesity in the obesity prevention message will lead to higher levels of anger about 1) message sources and b) obesity attributions relative to an external attribution of obesity. |
| | H2: An internal attribution of obesity in the obesity prevention message will lead to higher levels of negative attitudes toward 1) the message, 2) the message topic, and 3) the recommended behavior relative to an external attribution of obesity. |
| | H3: An internal attribution of obesity in the obesity prevention message will lead to higher levels of unfavorable source evaluations on source's 1) expertise, 2) sociability, and 3) trustworthiness relative to an external attribution of obesity. |
| | H4: An internal attribution of obesity in the obesity prevention message will lead to greater levels of message rejection (lower in behavioral intentions) relative to an external attribution of obesity. |
| Message Sources | H5: A non- Native American ethnic source in the obesity prevention message will lead to higher levels of anger about 1) message sources, and 2) obesity attributions relative to a Native American ethnic source. |

| | |
|---|---|
| | H6: A non- Native American ethnic source in the obesity prevention message will lead to higher levels of negative attitudes toward 1) the message; 2) the message topic, and 3) the recommended behavior relative to a Native American ethnic source. |
| | H7: A non- Native American ethnic source in the obesity prevention message will lead to higher levels of unfavorable source evaluations on source's 1) expertise, 2) sociability, and 3) trustworthiness relative to a Native American ethnic source. |
| | H8: A non- Native American ethnic source in the obesity prevention message will lead to greater levels of message rejection (lower in behavioral intentions) relative to a Native American ethnic source. |
| Mediation Effects of Anger | H9: Anger about a) message sources and b) obesity attributions will mediate the relationship between obesity attribution types and message processing outcomes (attitudes toward the message, source evaluations, and message rejections). |
| | H10: Anger about a) message sources and b) obesity attributions will mediate the relationship between message source types and message processing outcomes (attitudes toward the message, source evaluations, and message rejections). |
| Obesity Attributions × Message Sources | H11: There will be an interaction between attribution types and message sources on Native Americans' experience in varying levels of anger about 1) message sources and 2) obesity attributions. |
| | H12: There will be an interaction between attribution types and message sources on Native Americans' attitudes toward 1) the message; 2) the message topic, and 3) the recommended behavior. |
| | H13: There will be an interaction between attribution types and message sources on Native Americans' evaluations on message source's 1) expertise, 2) sociability, and 3) trustworthiness. |
| | H14: There will be an interaction between attribution types and message sources on Native Americans' levels of message rejections (behavioral intentions). |
| | H15: Anger about a) message sources and b) obesity attributions will mediate the relationship between interactions of obesity attribution types and message sources and message processing outcomes (attitudes toward the message, source evaluations, and message rejections). |
| Targeted Message effects | H16: Across attribution types, message sources, and a combination of an attribution type and the message source, Native Americans will show different message responses in terms of 1) anger, 2) message attitudes, 3) source evaluations, and 4) message rejection behaviors compared to non-Native Americans. |

# Chapter 3. Method

## Design

An experiment was employed for testing research hypotheses. A 2 (obesity attributions: internal/external) × 2 (source of criticism: Native Americans/non- Native Americans) × 2 (message recipients: Native Americans /non- Native Americans) × 2 (Message replication: a total number of messages that each participant was exposed) mixed design was created. Obesity attributions and message replications were within-subject factors, whereas the source of criticism and message recipients were between-subject factors.

Study participants were assigned to one of these criticism conditions with a different source of messages (Native American doctor with a Native American targeted professional health association or non-Native American doctor with a non- Native Americans specific health institution). Participants in one of these source conditions read two messages addressing different obesity attribution types: one addressed internal obesity attributions, whereas the other mentioned external obesity attributions.

The mixed design was created based on the following reasons. Unlike the message sources' effects, obesity attributions have not widely been employed and tested in health message processing studies. The obesity attribution was also selected as the significant message features of this study based on systematic reviews of attribution theories and unique historical events that Native Americans have experienced in terms of obesity issues. Therefore, obesity attribution was treated as a within-subjects factor in order to increase the amount of variance that are associated with outcome variables as a result of attribution types by reducing the amount of error variance (e.g., individual differences or experimental conditions) (Grabe & Westley, 2003; Leshner, 2014).

Reducing error variance is also associated with the following advantage in that relatively fewer participants were required to detect a given effect size compared to treat all factors as between-subjects (Leshner, 2014). Furthermore, recruiting relatively fewer study participants helped the researcher to cope with numerous limitations (e.g., limited accessibility to potential study participants, high dropout rates, study budgets, time, etc.) during data collections of Cheyenne and Arapaho Tribal members in fields. Additionally, instead of exposing all 6 messages that were associated with obesity attributions (a within-subjects factor), it was determined that each participant should read only two messages, exposing them to both levels of obesity attribution). By doing so, threats to validity, such as sensitization effects and fatigue, would be reduced (Grabe & Westley, 2003).

**Stimulus Materials**

Two independent variables (obesity attributions and sources of criticisms) in this study were both two-level message factors, and they were manipulated in the following ways:

*Obesity attributions*: Obesity attributions, internal or external, were operationalized as the causes of Native Americans' obesity problem. Internal obesity attributions indicated that the primary causes of obesity stem from individual factors. Based on previous studies (DeJong, 1980; Esparza et al., 2000), the 3 message factors for internal obesity attributions were personal food selection and eating habits, lack of physical exercise, and lack of knowledge needed to maintain a healthy weight. External obesity attributions included 3 uncontrollable environmental conditions: food insecurity and inaccessibility of healthy foods, lack of government policies that support obesity prevention, and the lack of weight maintenance facilities or programs in Native-American communities (Finegood et al., 2010; Hill & Peters, 1998; Ogolen & Flanagan, 2008; Wakefield et al., 2010; Wang & Beydoun, 2007). Each of these internal and external attributions

were presented in separate stimuli.

*Source of criticism*: Source of criticisms was operationalized as the ethnicity of message sources who criticize Native Americans' obesity issue. Based on the intergroup sensitivity effect (ISE), message sources' ethnicities were defined as ingroup (Native Americans) and outgroup (non-Native Americans) message sources. Specifically, message sources were manipulated into one of the following types: First, ingroup message sources were Native American doctors who delivered obesity prevention messages provided by a health organization whose primary concern is Native Americans health issues. Outgroup message sources were White doctors, along with a health organization for whom Native Americans' health issues are not one's main concern.

A total of 6 different doctors' pictures were used to manipulate doctors' ethnicities; Three of them were Native Americans, and the rest of them were White doctors. All 6 doctors' photos were searched via online websites on hospitals or tribe-affiliated medical institutions. Pseudo names were given to these doctors since they are all medical doctors who are currently working in the medical profession. Three Native American doctors' photos were associated with a health organization that mainly focuses on health problems associated with the specific ethnic group only (Native American Medical Association). Non-Native American doctors' pictures were presented with a health institution that did not consider Native American health issues as its primary concern, but instead targeted obesity issue associated with all ethnicities and racial groups (Obesity Medicine Association). Since this message source was a between-subjects factor, each participant was assigned to either one of these source conditions. Therefore, they read two messages, both delivered via either 1) Native American doctors and the Native American-specific health organization or 2) Non-Native American doctors (White) and the Non-Native American-specific health organization health organization. Other attributes may be

associated with these doctors but not message manipulation factors (e.g., age, sex, attires, picture sizes, etc.) were controlled.

Additionally, to maximize participants' perceived differences in sources in terms of their ethnicities, inclusive languages (e.g., "we," "us," or "our") to refer to ingroup critics, and exclusive language (e.g., "they," "them," or "their") to refer to outgroup critics were used, based on previous studies that addressed the effects of message sources on message processing outcomes (Hornsey & Imani, 2004; Hornsey et al., 2002, 2004). For example, if the message source was a Native American doctor with the Native American specific health institution, 'we' was used for emphasizing the fact that the doctor shares the same ethnicity to targeted message recipients. On the other hand, the term 'they' was utilized when sources were non- Native Americans to accentuate a differentiation between the targeted message recipients and the message source.

A total of 12 stimuli were created based on 2 levels of 2 message factors: 1) three messages with each one of 3 internal obesity attributions derived from a Native American source; 2) three messages with each one of 3 internal obesity attributions derived from a non-Native-American source; 3) three message with each one of 3 external obesity attributions derived from a Native American source, and 4) three message with each one of 3 external obesity attributions derived from a non-Native-American source. Each message was designed and created as a printed public service announcement format. Participants were randomly assigned to either a Native American message source or non-Native American message source condition; they read two messages that one with internal attribution and another one with external attribution.

Attribution theories and the ISE guided these twelve initial messages by solely

considering the roles of these two independent variables on cognitive and affective message processing outcomes. Despite the fact that this study was designed only for Native Americans, these initial messages did not consider whether these message factors and ways of manipulations are acceptable to and relevant to targeted study populations. Additionally, the researcher had no prior experience or knowledge of Native American tribes. These limitations required the researcher to request opinions and thoughts about the study's materials from representatives of the targeted message recipients' group or people familiar with the group.

Therefore, the researcher of this study invested considerable time and effort into modify these initial messages by considering the targeted message recipients' perspectives and opinions. A variety of people participated in these stimuli modification processes, including a research scientist who is an expert in studies on Oklahoma Native American Tribes and members of Tribes in Oklahoma. Through multiple meetings over eight months, the researcher incorporated knowledge and understanding of Oklahoma Native American Tribes' cultures and histories with additional information regarding their endeavors for combating obesity-related health problems. Such knowledge added significant insights to modify those initial stimuli to reproduce more acceptable messages by bringing in targeted message recipients' culture, history, and other factors related to the current obesity issues. The entire stimuli creation process was one of the most meaningful and unique parts of this study. Therefore, it is worthwhile to fully describe each step that the researcher underwent to create the final stimuli that fulfilled the study's objectives but also reflected the perspective of the targeted study population. The full description is provided in the following chapter 4: Study preparation and data collection processes.

## Sample Size

A power analysis was conducted with G*Power to determine the sample size necessary

for comparisons of levels of between groups factor for repeated measures. Assuming a small to moderate effect size ($f = 0.20$), a total of 212 participants (N=212) in 4 between-subject conditions (106 for each of two message recipients' groups and 53 for each of these following conditions: 1) Native American participants with Native American doctors as message sources, 2) Native American participants with non-Native American doctors as sources, 3) Non-Native American participants with Native American doctors as message sources, and 4) Non-Native American participants with non-Native American doctors as message sources) with 2 repeated measures (internal and external obesity attributions) was the minimum sample required (alpha = 0.05, 1- $\beta$ = 0.80).

Because some participants may be dropped due to withdrawal or incomplete responses, approximately 10-15% more participants were recruited. A total of 118 Native American participants were recruited and randomly assigned to one of two experimental conditions based on the source factor (59 for Native American source conditions and 59 for non- Native American message source conditions). In terms of non-Native American participants, 129 participants were recruited and assigned to either one of these two source conditions randomly (65 for Native American source conditions and 64 for non- Native American message source conditions). The final analysis excluded 6 responses that were collected from Native American participants due to study incompletion. A total of 8 non-Native American participants' responses were eliminated due to study incompletions.

**Procedure**

Two groups of populations were sampled: members of Cheyenne and Arapaho Tribes in Oklahoma aged between 18 to 80, and non-Native American participants who were in the same age group to those of Cheyenne and Arapaho Tribal members. Due to several limitations and

variations that may be associated with two study participants' groups (e.g., participants' accessibility, recruiting processes, regions where Cheyenne and Arapaho Tribal members mainly reside, internet accessibility, and perceptions on academic research, preference on a certain data collection type, etc.), two different data collection strategies and study procedures were employed.

*Study procedures for Cheyenne and Arapaho Tribal members*: Cheyenne and Arapaho study participants were recruited through visiting a variety of community festivals and health fairs that were held in Cheyenne and Arapaho Nation areas. With the permission of the Tribal Health Board Chairman and assistance of the current Chief of the Arapaho Tribe, data were gathered at 3 different community festivals from August 16 in 2019 to September 1st in 2019. The first community festival where the study initiated the first data collection was 'Headstart' on August 16, 2019, at Concho, Oklahoma; this was the community health fair that provided free medical examinations and health-related consultants to tribal children and parents. The second event where data were collected was the 87th Annual Barefoot Playground Powwow at Canton, Oklahoma, from August 23-25, 2019. The data collection was finalized at the 77th Annual Cheyenne & Arapaho Labor Day Powwow held in Colony, Oklahoma, from August 30 to September 2, 2019.

Across all 3 data collection areas, a designated place and equipment (e.g., table, chairs, lights, and etc.) were provided by the Arapaho Tribe. The Arapaho Chief also made several announcements to encourage the Cheyenne and Arapaho Tribe members to participate in the heath study. In both instances, participants were given information about the study via an informed consent form and then made their decision to participate in the study.

Participants who agreed to join the study were given either an iPad or printed study

materials for an individual study session. Due to low internet coverage and lack of Wi-Fi accessibility at the Labor Day Powwow location, the researcher and the researcher's advisor decided to switch the data collection mode from iPad to printed study materials. Therefore, participants in this study at the health fair and Barefoot Powwow accessed study materials and questionnaires via iPads, whereas approximately half of the entire Cheyenne and Arapaho study participants who were recruited at the Labor Day Powwow accessed the same study materials via the printed version. In order to minimize discrepancies raised by the two study modes, the researcher ensured both modes were as identical as possible. For example, printed versions were created based on screenshots of each of the online study pages for identical study materials and environments that iPad participants experienced. The stimuli and the items that were used to assess a single concept were all randomly presented on the study's website through a randomization process.

All participants were randomly assigned to one of two experimental conditions, which differed on the source of criticism (ingroup sources vs. outgroup sources). Participants were briefly informed about the study procedures then read two messages in random orders. A set of questionnaires followed the reading of each message. These questionnaires inquired about participants' emotions, attitudes, thoughts/feelings, and behavioral intentions on messages, the message topic, message sources, and the recommended behavior. Once they read and answered questions after the first message, the second message appeared. Participants answered the same set of questions after seeing the second message. At the last stage of the study, participants provided additional information on their dietary and exercise habits, obesity-related scales (e.g., weights, heights, obesity or overweight diagnoses experiences), and demographic information. Once the study participants finished reading two messages and answering questions, they were

debriefed, thanked, and compensated with a $10 gift card.

The entire study was initially planned to take approximately 15 minutes. However, due to several individual and external factors that had influenced the study procedures (e.g., low internet signal, iPad proficiencies, reading skills, and other individual participants' issues that impacted reading study materials and questionnaires in a given amount of time, etc.), some of these participants took more than 15 minutes. Through these 3 data collection opportunities, a total of 118 Cheyenne and Arapaho Tribal members participated in the study.

The researcher of this study encountered several unexpected issues in the middle of data collection. Therefore, the researcher, key Tribal members, and others closely associated with this study worked to resolve these problems. Chapter 4 described how these people worked together in a series of meetings to ensure both the research and the Tribal parties benefited from the agreed upon resolutions.

*Study Procedures for non-Native American populations*: Recruitment of non- Native Americans between ages 18-80 was conducted online. In this study context, a non-Native American was defined as anyone who does not identify their primary ethnicity as Native American/Alaska Native. To recruit eligible participants, an online study company (Qualtrics) that provides participant panels was used. The company required detailed information about the parameters of what type of participants the study needs to be recruited and provides a quote based on that information. The company then sent the link for the study's website to the panels who met the criteria and compensated them for completing the study out of the money the panel company was given. A total of 129 non-Native American participants were recruited via the panel management company from September 30 to November 1, 2019. All aspects of the study except data collection procedures were identical (including total questionnaires, stimuli,

experimental procedures, instructions, and the website participants accessed to receive stimuli and related questionnaires). The difference in data collection was the method of recruitment.

## Dependent Variables

### *Anger*

The levels of anger that participants experienced due to obesity attributions and message source types were measured as the core dependent variable as well as a mediator of this study (Nabi, 2002). After reading each of 2 obesity prevention messages, study participants were asked to what extent they felt anger toward the 1) obesity attributions (internal and external obesity attributions that are mentioned across obesity prevention messages) and 2) sources of messages (Native American doctors and non-Native American doctors) while reading these messages. The level of message recipients' agitation-related negative emotions (i.e., agitation, resentment, uneasiness, and irritation) was also added with a modified version of emotional frequency questionnaires that have been used in studies that evaluated agitation-related negative emotions based on the SDT (Higgins, Shar, & Friedman, 1997; Roney, Higgins & Shar, 1995). Participants were asked to indicate the extent to which they experienced anger and agitation-related emotions while they watched an obesity prevention message (Higgins, Shar, & Friedman, 1997; Roney, Higgins & Shar, 1995). All items were measured based on 7-point Likert scales that ranged from 1 = "not at all" to 7 = "extremely" were used to measure each emotion.

Exploratory Factor Analysis (EFA) using a Principal Component Analysis (PCA) with a Varimax rotation was conducted to determine the structure of these 5 items. These 5 items were extracted as a single factor based on EFA; the single factor was comprised of all 5 items that intend to measure anger and agitation-related negative emotions toward both message sources as well as obesity attributions. Both anger and agitation-related emotions shared the same

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underlying structures used to assess those negative emotions even though the two measures had been selected based on two theoretical frameworks. The initial Eigenvalue of the single factor for message sources was 4.45, and the factor accounted for 88.90% of the variation in the measured variables. The initial Eigenvalue of the single factor for obesity attributions was 4.41, and the factor accounted for 88.10% of the variation in the measured variables. Cronbach's alpha among these 5 items on message sources and obesity attributions were $\alpha = .97$ and $\alpha = .97$, respectively. Based on these EFA outcomes, these 5 items were combined and renamed as a measure for assessing 'anger' about 1) message sources and 2) obesity attributions, which then entered data analysis.

*Attitudes toward messages*

Attitudes toward messages were operationalized as the level of message recipients' feelings/thoughts about the obesity prevention message in this study context. Three message-related factors were used to measure message attitudes. Three attitudes were 1) overall message, 2) the message topic (obesity), and 3) the recommended behavior that provided information about how to receive help on obesity issues. All 3 attitudes were measured based on previous studies that did so in the context of the CFM and ISE (Hornsey & Imani, 2004; Nabi, 2002). Participants were asked the following question: "To what extent do you feel/think that the message/message topic/recommended behavior is either: 1) acceptable or unacceptable; 2) positive or negative; 3) favorable or unfavorable; 4) right or wrong; 5) good or bad, and 6) wise or foolish?" Answers were measured with 7-point semantic differential scales anchored with opposing adjectives (Hornsey & Imani, 2004; Nabi, 2002).

EFA provided outcomes showing that 6 items that measured each of these 3 attitudinal dimensions were composed as a single factor. Eigenvalues for single factors for

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attitudes on the 1) message, 2) message topic, and 3) recommendation were 5.23, 4.84, and 4.91, respectively. For attitudes on the message, the single factor accounted 87.47% out of the total variance. The single factor for the message topic attitudes accounted for 80.66% of the variation in the measured variables. The total variance for the factor that measured attitude toward the message recommendation was 81.83%. Cronbach's alpha coefficients for each of the 6 items measured 3 attitudes were: attitudes on the message: α = .97; attitudes on the message topic: α = .95; attitudes on the recommendation: α = .96

*Message Sources Evaluations*

The level of message recipients' feelings/thoughts about the source of the obesity prevention message was assessed using McCroskey's "B" and "C" scales (1966). These scales included a total of 17 items based on 3 source dimensions: expertise, sociability, and trustworthiness (Miller et al., 2007). According to a previous study, 6 items measured sources' credibility (i.e., "The source of the message is an expert/inexpert; intelligent/unintelligent; qualified/unqualified; board/narrow; inexpert/expert, and unintelligent/intelligent (reverse coded)). Six items assessed sources' sociability (i.e., "The source of the message is friendly/unfriendly; nice/awful; good-natured/irritable; cheerful/gloomy; pleasant/unpleasant, and unsympathetic/sympathetic (reverse coded), and 5 items measured sources' trustworthiness (i.e., "The source of the message is honest/dishonest; good/bad; valuable/worthless; selfish/unselfish, and sinful/virtuous (reverse coded): Miller et al., 2007). (Miller et al., 2007).

These previous items were modified to meet the current study context. For assessing each of these 3 dimensions, 5 items were employed. Source's experise was measured by 5 items including: expert/inexpert; qualified/unqualified; intelligent/unintelligent; unconvincing/ /convincing; respectable/disrespectable. Sources' sociabitliy also included 5 items: friendly

/unfriendly; considerate/inconsiderate; likable/unlikable; pleasant/unpleasant, and unsympathetic/sympathetic. Five items that were chosen for measuring sources' trustworthiness were: reliable /unreliable, untrustworthy/trustworthy, valuable/worthless, good/bad, dishonest, honest. All items were assessed on 7-point semantic differential measures anchored with opposing adjectives.

Five items that measured the 3 cognitive source evaluation dimensions were extracted as single factors according to EFA outcomes. An eigenvalue for the single factor on source expertise was 4.31, and the factor explained 86.12% of the total variations in the measured variables. The eigenvalue for the single factor on source sociability was 4.15, and the factor accounted for 83.02% of the total variance. An eigenvalue of source trustworthiness single factor was 4.32, and the factor accounted for 86.46% of the total variance. Cronbach's alpha values were α = .96 (source expertise), α = .95 (source sociability), and α = .96 (source trustworthiness).

*Behavioral Intentions*

Behavioral intentions were operationalized as the degree of message recipients' intention to perform behaviors recommended to reduce weight. Two items were utilized to measure behavioral intentions. These 2 items were assessed on different response scales. First, Dillard and Shen's (2005) single item of behavioral intention was used. Participants were asked to report the likelihood that in the following week they would engage in a behavior that was recommended to maintain or reduce weight loss on a scale with 0 = "definitely will not" and 100 = "definitely will" (Dillard & Shen, 2005; Miller et al., 2007). Second, a self-reported measurement was used to assess participants' intention to comply with the recommended behavior (Block & Keller, 1995). The self-reported measurement that was asked by 7-point Likert scales anchored with 1 = "very unlikely" to 7 = "very likely" was used to assess participants' intention to follow the

behavior recommended reducing weight.

EFA was performed to assess the amount of variances these 2 items share. A single factor was extracted with the eigenvalue of 1.84 The factor also accounted for 92.00 % of the variations in the measured variables. Since these 2 scales were assessed by different response scales (0-100 and 7-point Likert scales), standardized Z-scores for each item were computed first. Standardized-Z sores then used to combine these 2 items, which relied on two different scales. These Z-scores utilized for testing reliability between 2 items were based on a Pearson's correlation analysis, and the correlation score between 2 items was statistically significant ($r$ = .84).

## Additional Variables

### *Ethnic identity and Other-Group orientations*

Participants' level of ingroup and outgroup orientations were assessed as pre-measures. These measures treated these existing in/outgroup orientations among participants as potential variables that should be measured in order to interpret study results based on the study manipulation. If these 2 sets of premeasures show significant relationships with each of the outcome variables, Native Americans' existing orientations toward both ingroups and outgroups should be controlled to test source effects that were generated in the course of the study process.

The Multigroup Ethnic Identity Measure (MEIM) (Phinney, 1992; Roberts, Phinney, Masse, Chen, Roberts, & Romero, 1999) was employed as a means of assessing levels of ingroup and outgroup orientations among the main study populations. The original measures include 4 components of ethnic identity, including affirmation and belonging, ethnic identity achievement, ethnic behaviors, and other ethnic group orientation (Phinney, 1992; Roberts et al., 1999). A total of 13 out of 20 items were selected and modified for this study. Seven items were

excluded because they asked similar or too specific questions. Seven out of 13 questions asked participants' levels of ingroup orientation. These questions measured Cheyenne and Arapaho Tribal members' levels of attaching value and significance to their ethnic identity. Questions are: "I understand pretty well what my ethnic membership means to me," "I have a strong sense of belonging to my own ethnic group," "I have spent time trying to find out more about my own ethnic groups, such as its history, traditions, and customs," "I understand pretty well what my ethnic group membership means to me, in terms of how to relate to my own group and other groups," "I have often talked to other people in order to learn more about my ethnic group," "I feel strong attachment towards my own ethnic group," and "I have often done things that will help me understand my ethnic background better." Seven-point Likert scales anchored with 1 = "*Strongly disagree*" to 7 = "*Strongly agree*." were used to assess these 7 items measuring the ingroup orientation. EFA was also performed to explore underlying structures among these 7 items. PCA with a Varimax rotation was used to extract initial factors then rotate initial factors. Seven items were extracted as a single factor, and the eigenvalue of this factor was 4.93. The factor explained 70.39% of the total variance. The internal consistency of the 7 items measured by Cronbach's alpha α = .92.

Six questions assessing outgroup orientations examined levels of inclusions or exclusion of others who do not share the same ethnicity as the targeted study participants. These items included the following questions: "I sometimes feel it would be better if different ethnic groups didn't try to mix together (reversed)," "I often spend time with people from ethnic groups other than my own," " I like meeting and getting to know people from ethnic groups other than my own," " I enjoy being around people from ethnic groups other than my own," "I am involved in activities with people from other ethnic groups," "I didn't try to become friends with people from

other ethnic groups (reversed)." These 6 items were assessed on 7-point Likert scales anchored with 1 = "*Strongly disagree*" to 7 = "*Strongly agree.*"

The same EFA was performed to assess underlying structures among 6 items that measured outgroup orientations. The outcome provided two factor solutions. Factor 1 was composed of 4 items, which are "I like meeting and getting to know people from ethnic groups other than my own.", "I often spend time with people with ethnic groups other than my own," "I am involved in activities with people from other ethnic groups," and "I enjoy being around people from ethnic groups other than my own." The rotated eigenvalue of this first factor was 2.74 and accounted for 43.61% of the measured variables. Therefore, the researcher of this study named this factor as 'other group contact orientation.' The second factor included 2 items, which are "I sometimes feel it would be better if different ethnic groups didn't try to mix together," and "I don't try to become friends with people from other ethnic groups." The second factor was called 'other group integrated orientation,' and the rotated eigenvalue of this second factor was 1.64. The second factor explained 27.27% out of the total variance. A cumulative percentage of the variance of these two factors was 72.88% ($\alpha$ = .85). A Pearson's correlation analysis was performed to test reliability between 2 items of the second factor. The outcome showed that the relationship between these 2 items was statistically significant ($r$ = .58).

*Health and Obesity involvement*

Participants' levels of involvement with health and obesity issues were measured. Nine items were created for this study for assessing involvement levels on both overall health issues and obesity issues specifically. To ask individual study participants' levels of involvement in health issues, 9 items were utilized in that: "To what extent are health issues are a) interesting, b) relevant, and c) important to 1) you, 2) Cheyenne and Arapaho Tribes, and 3) the entire Native

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American society?" The same types of questions were used for assessing individuals' levels of obesity involvement. Nine questions were stated in the following ways: "To what extent are obesity issues are a) interesting, b) relevant, and c) important to 1) you, 2) Cheyenne and Arapaho Tribes, and 3) the entire Native American society?" Wordings were changed when the same measures were provided with non-Native American study participants. For instance, the targeted Tribes' names were replaced by "your racial group" by considering multiple races answer the same question. The term "the entire Native American society" was also replaced by "the entire United States." Each of these nine questions was randomly presented and answered on 7-point Likert scales anchored with 1 = "Not at all" to 7 = "Extremely."

EFA using PCA and a Varimax rotation was conducted to test whether these 9 items measured these intended concepts, which are health and obesity involvement. In terms of health involvement, a single factor was extracted with the eigenvalue score of 5.53, and Cronbach's alpha was $\alpha = .92$. The single factor accounted for 61.48% of the variations of the measured variables.

The same EFA was applied for the obesity involvement scales. The factor analysis extracted 2 factor solutions. The first factor's rotated eigenvalue was 3.68, and it accounted for 40.90% of the total variance. Six items that measured individuals' thoughts on relevancy, interesting, and importance of obesity issues on Cheyenne and Arapaho Tribes, and the entire Native American populations, were composed of the first factor. Cronbach's alpha coefficient among these 4 items was $\alpha = .90$. The second factor was composed of 3 questions that asked levels of self-involvement on obesity issues. The rotated eigenvalue of the second factor was 3.04, and it explained 33.74% of the total variations of the measured variables. A cumulative percentage of the variance of these two factors was 74.63%. The internal consistency among

these 3 items was $\alpha$ = .90. The first factor was renamed as 'obesity other-involvement,' and the second factor as 'obesity self-involvement.'

*Demographics*

At the last stage of the study procedure, participants provided demographic information, including their sex, age, education, income levels, and current employment status. Non-Native Americans were also asked about their ethnicities. Dietary and exercise habits were composed of 7 questions that ask frequency of consuming certain types of foods (e.g., vegetables and fruits, microwavable foods, fast foods, and delivery foods, and nutritional supplements), engaging the physical exercise, checking their weight, or consulting weight issues with doctors per week on average. All questions were assessed on 7-point Likert scales anchored with 1 = "*Never*" to 7 = "*Always*." Previous obesity or overweight diagnosis experiences, weight, and heights were also asked.

On the basis of the EFA outcomes stated above, some changes were reflected in the proposed research model. The original research model treats anger and agitation-related emotions as two separated emotions that may vary due to obesity attributions and message source types. Since the EFA resulted in one factor solution, the emotions are combined with a single mediator called 'anger.' Since anger about two separate message factors, which are message sources and obesity attributions, were measured, the anger is treated as two mediators in the revised research model. The following adjustment was reflected in the following revised research model (Figure 2).

Figure 2. Mediation model of anger appeal message processing (Revised model for testing research hypotheses)
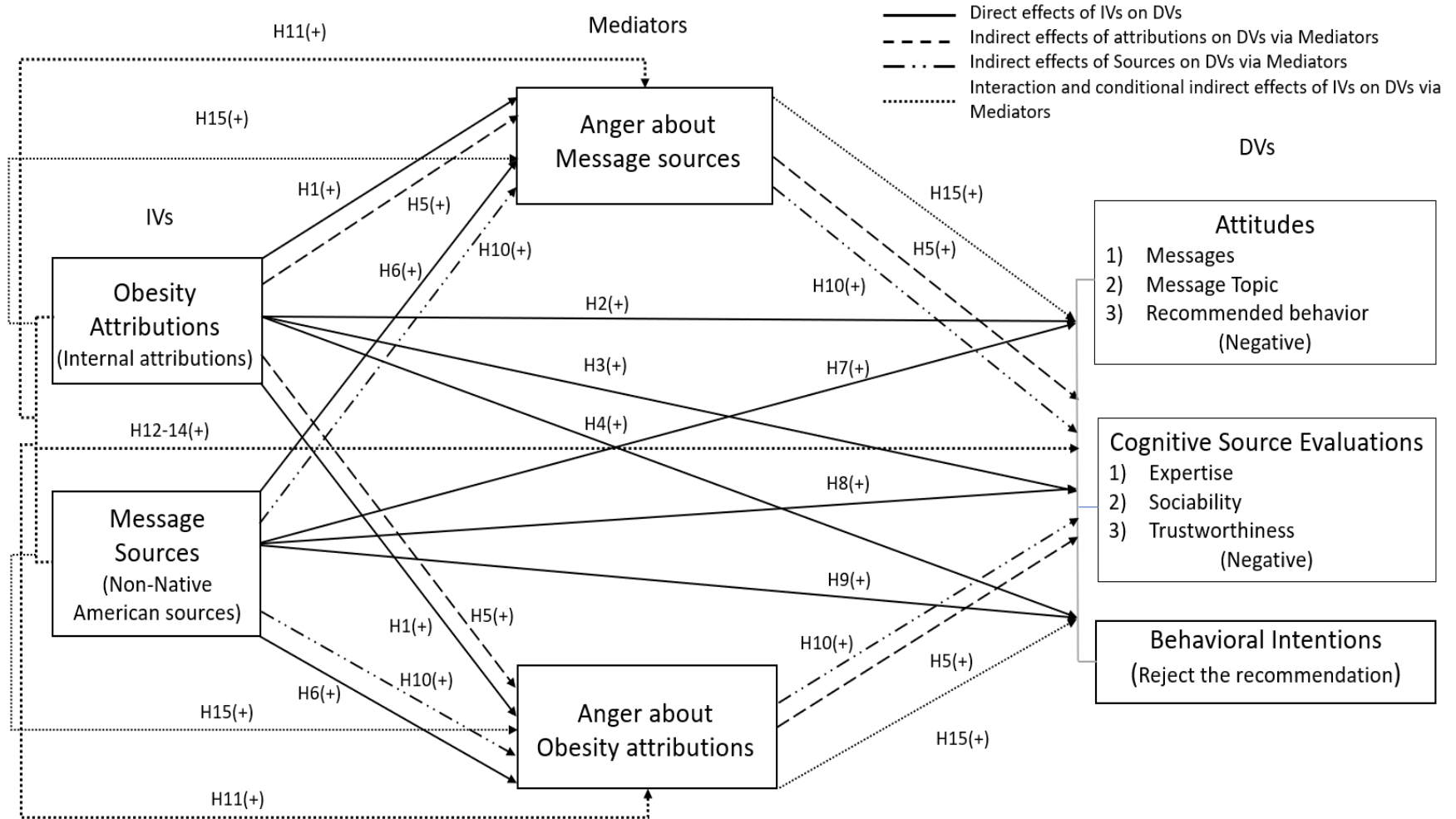
**Participants' characteristics**

*Cheyenne and Arapaho Participants*: Out of 118 Cheyenne and Arapaho study participants, 112 data were utilized for data analyses. In terms of participants' sex, 28.6% (n = 32) were male, and 69.6 % (n = 78) were female. Two participants (1.8%) did not specify their sex. The average age among 106 participants who provided their age was 40.05, ranging from 18 to 80 years old (SD = 14.76).

Education levels were followed: 30.4 % (n = 34) received a high school diploma or equivalent, 20.5% (n = 23) attended some college but did not graduate, 0.5% (n = 23) attended some high school, 17.9% (n = 20) received technical school's degree, 7.1% (n = 8) received Bachelor's degree, 6.3% (n = 7) received associate's degree, 5.4% (n = 6) received Master's degree 3.6% (n = 4), 2.7% (n = 3) preferred not to answer, 0.9% (n = 1) selected other but did not specify highest grade they completed. 5.4% (n = 6) did not answer the question.

Income distribution was as followed: $0 – 9,999 15.2% (n = 17), $10,000 – 19,999 20.5% (n = 23), $20,000 – 29,999 12.5% (n = 14), $30,000 – 39,999 10.7% (n = 4), $40,000 – 49,999 5.4% (n = 6), $50,000 – 59,999 5.4% (n = 6), $60,000 – 69,999 2.7% (n = 3), $70,000 – 79,999 1.8% (n = 2), $80,000 – 89,999 1.8% (n = 2), $90,000 – 99,999 0.9% (n = 1), $100,000 or more 0.9% (n = 1). 19.6% (n = 22) of participants preferred not to answer. Three participants (2.7%) did not answer the question.

Regarding current employment status, 41.1% (n = 46) participants are full-time employers. 13.4% (n = 15) of participants preferred not to answer and 12.5% (n = 14) of participants were currently not employed but seeking work. Other participants' employment statements were: 8.0% (n = 9) were students, 7.1 % (n = 8) were either retired or not employed but not seeking jobs, 6.3% (n = 7) were employed part time. 13.4% (n = 15) of participants

preferred not to answer this question, and 4.5% (n = 5) did not answer this question. About half of participants (50%, n = 56) have been diagnosed as either obese or overweight, and 41.1% (n = 46) have not been diagnosed as having either one of these health issues. 5.4% (n = 6) preferred not to answer this question, and 3.6% (n = 4) did not answer the question.

*Non-Native American Participants*: A total of 121 non-Native American study participants' characteristics are summarized as follows. Of 121 participants, 25.6% were male (n = 31) and 74.4% were female (n = 90). Non-Native American study participants' mean age was 47.62, ranging from 21 to 78 years old (SD = 17.02).

For race/ethnicity, 72.7% (n = 88) responded they are White, 17.5 (n = 21) responded as Black or African American, and 4.1% (n = 5) were both Hispanic or Latino and Asian. One respondent (0.8%) preferred not to answer and one person (0.8%) did not answer the question.

Education levels were followed: 21.5% (n = 26) said received high school diploma or equivalent, 21.5% (n = 26) attended some college but did not graduate, 20.7% (n = 25) received associate's degree, 19.8% (n = 24) received bachelor's degree, 6.6% (n = 8) attended technical school, 5.8% (n = 7) received master's degree, 1.7% (n = 2) attended some high school 1.7% (n = 2), and 0.8% (n = 1) received terminal degree. One person (0.8%) preferred not to answer, and one person (0.8%) did not respond to the question.

Annual income distribution of non-Native American study participants was followed: $0 – 9,999 12.4% (n = 15), $10,000 – 19,999 13.2% (n = 16), $20,000 – 29,999 18.2% (n = 22), $30,000 – 39,999 13.2% (n = 16), $40,000 – 49,999 9.9% (n = 12), $50,000 – 59,999 9.1% (n = 11), $60,000 – 69,999 3.3% (n = 4), $70,000 – 79,999 2.5% (n = 3), $80,000 – 89,999 3.3% (n = 4), $90,000 – 99,999 2.5% (n =3), $100,000 or more 9.1% (n = 11). 3.3% (n = 4) of participants preferred not to answer.

Employment status were followed: 33.1% (n = 40) of participants are employed full-time currently. 26.4% (n = 32) are retired. Other participants' employment status were: not employed but not seeking work 13.2% (n = 16), employed part time 12.4% (n = 15), not employed and seeking work 8.3% (n = 10), student 4.1% (n = 5), and other 2.5% (n =3).

Regarding the history of obesity or overweight diagnose, 62.8% (n = 76) of participants answered they have not been diagnosed as either overweight or obese, while 37.2% (n = 45) were diagnosed as either one of the weight-related statuses. Table 2 showed a summary of all participants' demographics.

Table 2. Participant demographics

| Demographics | Native Americans (N=112) | | Non-Native Americans (N=121) | |
|---|---|---|---|---|
| | Category | Frequency (%) | Category | Frequency (%) |
| Gender | Male | 32 (28.6) | Male | 31 (25.6) |
| | Female | 78 (69.6) | Female | 90 (74.4) |
| | Others | - | Others | - |
| | No answer | 2 (1.8) | No answer | - |
| Age | Mean = 40.05 (SD = 14.76) Min – Max: 18 – 80 | | Mean = 47.61 (SD = 17.02) Min – Max: 21 – 78 | |
| Ethnicity | Native Americans | 112 (100) | White | 88 (72.7) |
| | | | Black or AA | 21 (17.4) |
| | | | Hispanic or Latino | 5 (4.1) |
| | | | Asian | 5 (4.1) |
| | | | Native Hawaiian/Pacific Islander | - |
| | | | Other | - |
| | | | Prefer not to answer | 1 (0.8) |
| | | | No answer | 1 (0.8) |
| Education | Some high school | 20(17.9) | Some high school | 2 (1.7) |
| | High school diploma | 34 (30.4) | High school diploma | 26 (21.5) |
| | Technical school | 8 (7.1) | Technical school | 8 (6.6) |
| | Some college | 23(20.5) | Some college | 26 (21.5) |
| | Associate's degree | 6 (5.4) | Associate's degree | 25 (20.7) |
| | Bachelor's degree | 7 (6.3) | Bachelor's degree | 24 (19.8) |

| | | | | |
|---|---|---|---|---|
| | Master's degree | 4 (2.7) | Master's degree | 7 (5.8) |
| | Terminal Degree | - | Terminal Degree | 1 (0.8) |
| | Other | 1 (0.9) | Other | - |
| | Prefer not to answer | 3 (2.7) | Prefer not to answer | 1 (0.8) |
| | No answer | 6 (5.4) | No answer | 1 (0.8) |
| Income | $0 – 9,999 | 17 (15.2) | $0 – 9,999 | 15 (12.4) |
| | $10,000 – 19,999 | 23 (20.5) | $10,000 – 19,999 | 16 (13.2) |
| | $20,000 – 29,999 | 14 (12.5) | $20,000 – 29,999 | 22 (18.2) |
| | $30,000 – 39,999 | 12 (10.7) | $30,000 – 39,999 | 16 (13.2) |
| | $40,000 – 49,999 | 6 (5.4) | $40,000 – 49,999 | 12 (9.9) |
| | $50,000 – 59,999 | 6 (5.4) | $50,000 – 59,999 | 11 (9.1) |
| | $60,000 – 69,999 | 3 (2.7) | $60,000 – 69,999 | 4 (3.3) |
| | $70,000 – 79,999 | 2 (1.8) | $70,000 – 79,999 | 3 (2.5) |
| | $80,000 – 89,999 | 2 (1.8) | $80,000 – 89,999 | 4 (3.3) |
| | $90,000 – 99,999 | 1 (0.9) | $90,000 – 99,999 | 3 (2.5) |
| | $100,000 or more | 1 (0.9) | $100,000 or more | 11 (9.1) |
| | Prefer not to answer | 22 (19.6) | Prefer not to answer | 4 (2.3) |
| | No answer | 3 (2.7) | No answer | - |
| Employment Status | Employed full time | 46 (41.1) | Employed full time | 40 (33.1) |
| | Student | 9 (8.0) | Student | 5 (4.1) |
| | Retired | 8 (7.1) | Retired | 32 (26.4) |
| | Not employed-seeking work | 14 (12.5) | Not employed-seeking work | 10 (8.3) |
| | Employed part time | 7 (6.3) | Employed part time | 15 (12.4) |
| | Not employed-not seeking work | 8 (7.1) | Not employed-not seeking work | 16 (13.2) |
| | Other | - | Other | 3 (2.5) |
| | Prefer not to answer | 15 (13.4) | Prefer not to answer | - |
| | No answer | 5 (4.5) | No answer | - |
| Obesity/overweight Diagnosed history | Yes | 56 (50.0) | Yes | 45 (37.2) |
| | No | 46 (41.1) | No | 76 (62.8) |
| | Prefer not to answer | 6 (5.4) | Prefer not to answer | - |
| | No answer | 4 (3.6) | No answer | - |

# Chapter 4. Study Preparation and Data Collection Processes

## Stimuli Creation Processes

This dissertation went through multiple unique stages for the study preparation. According to Pompper (2005), studies focused on a group of people who are differed in terms of social and biological status to those of researchers should incorporate the target people as co-investigators through the entire research process. Pompper (2005) indicated that in multicultural/intercultural study contexts, roles of study participants should not be limited to provide data. Rather, participants should involve in every research stage as people can bring insights and values that researchers easily overlook due to ignorance on unique aspects that are only shared among study participants. Given the following conditions this study possesses, the researcher of this study also acknowledged the significance of collaborations with the target study population through the entire study processes.

First, the main study participants, who were two specific Native American Tribes in Oklahoma, have identified as an ethnic minority that has distinct aspects of culture and history compared to the majority of people in the United States. Furthermore, each Tribe has also shown variabilities depending on places where each Tribe originally came from and influences of different cultures, histories, and relationships with other Tribes as well as other ethnicities on their previous and current life (Debo, 1984). Second, this is the first time that the study researcher had been exposed and had direct contact with Native Americans. Potential issues may result in the researcher's inexperience and lack of knowledge needs for collaborations with members of the targeted message recipients or anyone who are familiar with the target populations' cultures into the entire study development and stimuli creation procedures.

Therefore, this researcher spent more than eight-months creating study stimuli. During

the period, several people were involved in the process as resources for providing valuable insights on preparing more acceptable messages for the target message recipients. These people were experts in health communication research, Native American studies, a non-message target audience yet sharing the same ethnic identity to the target message group, and delegators of the target message recipients. This chapter describes detail information on the entire journey for the study preparation processes. The process is composed of 3 sub-stages based on time frames when the stimulus has initially been created and modified and who were main people involved in each of these 3 sub-processes.

*Initial stimuli design (from April 2018 to August 2018):* Initial study stimuli were originated from two classes (Health Communication and Affective Processes), where the researcher proposed as the final class project for both classes. At this stage, the researcher proposed Native Americans as the main study participants yet did not specify a certain Tribe as the targeted study population. Based on two independent variables, which are message sources and obesity attributions, the researcher designed 12 stimuli under the guidance of these class instructors. Neither Native Americans nor non- Native Americans who are knowledgeable in this research context were involved.

The main purpose of the initial stimuli development stage was to manipulate independent variables based on theories on which this study posited. Message sources were manipulated based on message sources' ethnicities. Multiple websites, such as the Association of American Indian Physicians (AAIP), Indian Health Service (IHS), Native American Center for Health Professions (NACHP), were searched as sources for providing 3 Native American doctors' photos. Three non- Native American doctors' photos were selected via hospital websites. To minimize factors that may result in confounding, all of these doctors shared the same sex,

occupations, and similar in attires and age. All non- Native American doctors shared the same ethnicity/race (White). As a part of source manipulations, two organizations were also determined along with doctors' ethnicities. To select a well-known health-related organization where concerns of Native American health issues are the primary mission, the IHS was selected as obesity prevention messages were provided. As a Native American specific health organization, Obesity Medicine Association was selected and associated with White doctor's photos.

The next step was to manipulate obesity attributions. A total of 6 obesity attributions were selected based on previous studies (DeJong, 1980; Esparza et al., 2000; Finegood et al., 2010; Hill & Peters, 1998; Ogolen & Flanagan, 2008; Wakefield et al., 2010; Wang & Beydoun, 2007). Three attributions out of these 6 emphasized that the primary causes of obesity stem from individual factors, whereas the rest are focused more on external ones. All these original 6 attributions that the researcher initially found did not specifically associate with Native Americans' obesity issues. Therefore, the researcher modified these general obesity attributions to target-specific obesity attributions to enhance perceived message relativeness among targeted message recipients. For instance, all messages included "Native Americans" at the beginning of all attributions in order to emphasize that the main message target is Native Americans. Furthermore, to accentuate obesity is a significant health threat to Native Americans compared to other races and ethnic groups, all messages applied comparative sentence format, such as: "Native Americans are more obese than other racial and ethnic groups." Additionally, each stimulus added either 'We' or 'They' as pronouns to emphasize the source's relationship with the target message recipients depending on who the message source is.

*Inclusion of targeted message recipients as co-message creators (August 2018 –*

*September 2019)*: Two people joined this second stage. Their distinct roles in this stage were to add constructive insights and provide critical reviews on these initial stimuli as either a Native American or an expert in Studies on Oklahoma Native American tribes. One of these two people was an undergraduate student at the University of Oklahoma. The student identified his main ethnicity as Native American and has affiliated with a Native American tribe in Oklahoma. The student is also a core member of the Native American Student Associations at the University of Oklahoma and has had lots of experiences in contacting multiple tribal members in Oklahoma. Mainly, the undergraduate student offered his opinions and thoughts on message features, such as languages, photos, and attributions.

First, the researcher asked the student to confirm whether all 3 Native American doctors' pictures provided enough clues to recognize their ethnicity as Native Americans. The student stated all 3 photos would work for most Native Americans in terms of identifying these doctors' ethnicity as the same as theirs. However, he expressed the following concern; for the younger generation like him, seeing not full-blood Native Americans are more common than seeing full-blood Native Americans. Therefore, physical appearances sometimes are not the primary factor for those young Native American people to recognize others' ethnicities. On the other hand, for elders, physical features may be still significant criteria to discern and perceive who is Native American and who is not. The student suggested meeting more Native Americans, including elders, to confirm the manipulation will work for other Native Americans.

Second, the researcher sought the student's opinions on the legitimacy of the institution, the IHS, as the ingroup message source. The student confirmed that many Native Americans, based on his knowledge, rely on the IHS if they are living in tribal nation areas regarding their health problems. Except for the IHS, the student was not knowledgeable on other Native

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American health or physician-related institutions' names. The third inquiry was to assure that the term 'Native American' that the initial stim used is appropriate to indicate the main study population. The researcher found different ways (e.g., indigenous people, American Indians, Native Americans) call this specific ethnic group across literature. Which one of these terms is the one that the targeted study populations are preferred to be called was unclear and varies across tribes and individuals. The student suggested, therefore, to hold the term 'Native American' until the researcher found the ultimate study targets or tribe and reflects their opinions.

The second person involved in the second process was a research scientist at the Department of Anthropology, University of Oklahoma. The research scientist has long been dedicated his time to research activities regarding Native American issues. Due to his long been collaboration with several Native American tribes in Oklahoma, he also has valuable resources and connections with several key tribal members. In addition, he is an expert in working with many tribal Health Boards to deal with many significant health-related issues among those tribal members. The study researcher and the advisor then asked the research scientist to provide some guidance and advises on the study plan and stimuli. Instead of giving suggestions, the research scientist suggested the researcher and the advisor to attend one of the tribes' Health Board Meetings to meet them in person to seek their opinions on this study.

*Collaborations with the targeted Native American Tribe (September 2019 – December 2019)*: In this final stage, a specific targeted Tribe was determined. Furthermore, key members in the targeted Tribe engaged in messages modification/revision processes. With the help of the research scientist, the researcher and the researcher's advisor attended Cheyenne and Arapaho Tribes' monthly Health Board Meetings held in Concho, Oklahoma, on October 4, 2018. The

researcher introduced the study idea and explained the significance of future collaboration with Tribal members to combat one of the main health issues for which the Tribe is striving. The initial stimuli were presented with the overall study plan, procedures, and expected implications and application of the study outcomes for designing future Tribal specific obesity prevention campaigns.

In this meeting, Health Board Members agreed on their needs for creating and testing obesity prevention messages, which are exclusive to Cheyenne and Arapaho Tribes. Board members, therefore, acknowledged the value of this study and approved the collaboration. However, Health Board members requested some major revisions on study stimuli in order to adjust original messages to become more acceptable to Cheyenne and Arapaho people. First, Health Board Members made suggestions in that changing one of Native Americans doctors' pictures was necessary since the specific doctor will be unlikely to be thought of as Native Americans to Cheyenne and Arapaho Tribes members. Accordingly, an alternative Native American doctor's photo was prepared. The research scientists presented the new photo at another monthly Health Board Meetings on behalf of the study researcher; the new picture was approved and substituted one of 3 Native American doctors' photos.

Second, some language that the original stimuli used was revised. Health Board Members pointed out the inappropriateness of using the term 'Native Americans' as a means of referring to a specific ethnic group. The Chairman of Cheyenne and Arapaho Health Board expressed his concern in that Cheyenne and Arapaho Tribal members may feel discomfort to be called Native Americans. Rather, he suggested using American Indians. Additionally, a request was made on ways of stating obesity attributions that intend to evoke anger and anger-related emotions. One of the original statements said: "Native Americans make the wrong food choices, so we tend to

be more obese than other races or ethnicities." Board Members warned Cheyenne and Arapaho Tribal members might feel offended due to this strong accusation, thereby rejecting to continue study participation.

By accepting suggestions that were raised delegates of the main targeted study population, the researcher of this study adjusted the term Native Americans to American Indians. Attributions were also restated into somewhat indirect ways. For instance, the same internal attribution related to food choice was revised into: "American Indians often choose food that is affordable, but not healthy, so we tend to be more obese than other races and ethnicities (See and compare stimuli in Appendix A and B). Other attributions were also revised until Board members and the researcher reached mutual agreement on the appropriacy of revised messages for both parties.

The IHS members in the Clinton service unit also attended the meeting. The acting chief executive officer dissuaded using the IHS as an internal message source. The Chief's argument was based on the reasoning that using a real institution that provides actual medical care and services for Cheyenne and Arapaho Tribal members may raise confusion among potential study participants because those participants may treat the message as the real one, not as study stimuli. Later, the IHS was replaced by American Indian Medical Association.

Given that all these suggestions and requests, several major revisions/modifications were continued over a two-month period. The research scientist took a significant role as a delegate to present revised stimuli on behalf of the study researcher. The final stimuli were approved by the Chairman of Cheyenne and Arapaho Health Board on December 6, 2018. The Chairman issued a Tribal support letter for the research activity in Cheyenne and Arapaho Nation on the same day. Minor revisions were continued until the final stimuli were approved by dissertation

committee members.

## Data Collection Processes

The main study participant of this study was members of Cheyenne and Arapaho Tribes in Oklahoma, who are currently living in Cheyenne and Arapaho Nation areas and aged between 18 and 80. To become eligible study participants, they identified their main ethnicity as Native Americans and tribal affiliations with Cheyenne and Arapaho Tribes in Oklahoma. Compared to approaching non- Native Americans, accessing and recruiting Cheyenne and Arapaho participants to the study were relatively restricted due to the limitation of geographical areas where Cheyenne and Arapaho people mainly reside. Concerning this limitation, data collation among Cheyenne and Arapaho Tribal members was conducted in fields, whereas non-Native American data collection was conducted via a website.

Cheyenne and Arapaho Health Board's Chairman allowed the researcher to recruit study participants in a variety of Tribal festivals and fairs held in Cheyenne and Arapaho Nation areas. During data collections, the researcher had unique experiences in interacting with many Tribal members, including the Chief of Arapaho. All interactions played significant roles in completing successful data collections. Several issues raised in the course of data collection processes were also discussed and resolved by interactions with these key research partners in Tribes. This section provides a full description of the entire data collection process and key enablers supporting the field experiment.

*Head Starts Health Fair*: The first data collection was conducted on August 16, 2019, in Concho, Oklahoma. Head Starts was a Tribal health fair that specifically targeted preschool children and their parents for receiving free medical examinations. A person in charge of the fair provided facilities for setting up a study booth. The researcher brought signs of informing people

on the study participation opportunity with a $10 gift card as compensation. The first data collection was challenging due to the following reasons. First, the study had not been informed to study participants in advance; therefore, most of the health fair participants did not know what the study was about. Second, this study environment made parents difficult to spend a minimum of 15 minutes for the study since they had to see many medical practitioners in a given amount of time. Data from 4 individuals were collected through this health fair.

*87ᵗʰ Annual Barefoot Park Powwow*: The next community festival where the researcher continued on data collection was the Barefoot Park Powwow. Powwows are social gatherings where indigenous people coming from different communities meet to socialize, renew their friendships and cultures, and reinforce their Indian identity (Mattern, 1996). Given that the size and meaning of Powwows to Cheyenne and Arapaho traditions and people, Powwows were the perfect places for meeting people and recruiting study participants.

The Barefoot Powwow was held from August 23-25, 2019, in near the Canton, Oklahoma. Data were collected via two different places. First, the researcher visited a Canton community gym. At the gym, a group of Cheyenne and Arapaho Trial members played a traditional game called 'Hand-game.' At the place, the researcher met the Chief of Arapaho Tribe and received his full support for data collection activities. The chief helped the researcher to find a place for the study and provided all necessary facilities with the researcher, including a table and chairs. He also made several announcements to Cheyenne and Arapaho people at the gym for informing the study participation opportunity. The second place where the data were collected was the main playground for the Barefoot Powwow. With the Chief of Arapaho Tribe and other Cheyenne and Arapaho Tribal members' help, a study booth was prepared for recruiting participants at the playground. As he did at the gym, the Arapaho Chief made

several announcements for encouraging Cheyenne and Arapaho Tribal members' study participation.

Anyone who wanted to join the study was asked their Tribal membership status first. Once their membership was confirmed as Cheyenne and Arapaho Tribes, eligible participants were informed, signed on the consent form, and used iPads to start their individual study sessions. All additional instructions on proceeding the experiment were provided via iPads. Once participants read messages and answered all questions that associated with these two messages, they were debriefed, thanked, and received $10 gift cards as compensation. Data collection at the Barefoot Powwow continued on two consecutive days from August 23-24, 2019. For both days, the Chief of Arapaho Tribe and other Tribal members played key roles in supporting all data collection settings. A more significant contribution of the Chief was to provide a hospitable data collection environment. Data from 54 participants were collected through two days in the Barefoot Powwow.

*77th Annual Cheyenne & Arapaho Labor Day Powwow*: The second Powwow was held in Colony, Oklahoma, from August 30 to September 2, 2019. Data were collected through two days of the Labor Day Powwow from August 31 to September 1, 2019. Before collecting data at the Labor Day Powwow, the Arapaho Chief and the Chairman of Cheyenne and Arapaho Health Board wanted to discuss several issues and concerns that were raised among Cheyenne and Arapaho Tribal members who joined previous data collections. The Arapaho Chief, the researcher, and the advisor discussed these issues in advance. Detailed agendas that were discussed and negotiated among 3 people are followed.

The first issue was associated with the total amount of time that Barefoot Powwow study participants spent for the study completion. The issue mainly resulted in 1) lacking iPad

proficiency among participants, especially elders, 2) poor internet connection at the Powwow playground, and 3) a total number of questions. Two of these 3 issues were also identified by the researcher at the study scene. Many study participants were seniors at the first Powwow, thereby showing a lack of proficiencies in using iPads. Poor internet signals at the Powwow exacerbated this issue; participants experienced disconnections frequently while seeing messages and answering questions, thereby spending more time for completing study sessions than they were informed.

Therefore, the original data collection devices, which were iPads, were replaced by paper-copied study materials. Changing data collection mode was inevitable; without changes, no other options were existed to resolve these two issues, especially since there were no internet or Wi-Fi services were available at the Powwow area. To maintain consistency between two study modes, paper-based stimuli were created based on screenshots for each page of online study websites to provide identical study materials. This process also ensured the same randomization process by following the online website's randomization systems.

In terms of complaints on a total number of questions, none of the changes were made since the Chief of Arapaho Tribe well-understood the significance of maintaining the same study material through the entire data collection process. Although there was no reduction or modification on the total number of questions, providing detail information with future participants in that they may spend more than the estimated time indicated in the inform consent due to individual differences was suggested.

The second issue brought up by the Arapaho Chief was that the study participants thought the same questions were repeated. The researcher assumed that this issue was stemmed from ways of each question phrased. All questionnaires varied and asked different concepts or

dimensions. For example, cognitive source evaluations had 3-dimensions, including source expertise, source sociability, and source trustworthiness. Although each dimension was presented in the separate pages, they utilized the same instruction and question, which is "I thought/felt that the message source is either…" Asking different dimensions based on identical ways, therefore, made participants feel they repeated to answer the same question. One of the possible solutions, the researcher provided further information with participants in terms of the purpose of each question, emphasizing differences among questions, and asking participants to pay attention to each question carefully before answering questions.

The third issue was the manner in which Cheyenne and Arapaho Tribal members reacted to questions asking about their emotions. Questions asking study participants' anger-related negative emotional reactions to message sources and obesity attributions were intended to assess degrees of experiencing 5 different negative emotions. Therefore, participants were guided to answer these questions based on 7-points Likert scales that anchored with 1 = "not at all" to 7 = "extremely" to indicate their strength of negative feeling. However, the Arapaho Chief explained that gauging degrees on emotions was counterintuitive to Cheyenne and Arapaho people. Rather, Cheyenne and Arapaho people tend to express their emotional experiences in a dichotomous way, such as expressing whether they are angry or not. Therefore, ways their emotional experiences rooted in continuous scales brought confusion among some of the previous participants on how to answer these questions. The researcher assumed that this unexpected issue might stem from a distinct characteristic of the targeted study population. The advisor and the researcher thought the best way to resolve the issue was allowing people to simply circle each one of 5 emotions they felt regardless of the strength of feelings if participants show difficulties in answering questions anchored with Likert scales.

Conversations on these subjects continued for approximately one-hour for finding desirable solutions for both researchers and Tribal members. Open conversations between two researchers and the Tribal delegate yielded desirable solutions for not only taking account of the target participants' concerns but also maintaining the study's coherency. They also promoted a better understanding of each other, thereby creating a more hospitable environment for continuing the study.

Data collections at the 2019 Labor Day Powwow maintained identical settings to those of the past two previous data collections. The only difference between these two settings was that participants at the Labor Day Powwow were provided their own paper-printed study materials. Once potential participants indicated their intentions of the study participation, their Tribal memberships were identified. Study participants were informed on the study and detail information on questions and procedures then received paper-based experiment materials. The paper-based materials, as the researcher expected, helped participants to reduce the time they took for completing the study, as well as maximize the flexibility in controlling individuals' study sessions under their own controls. Once they completed their sessions, they were debriefed, thanked, and compensated with a $10 gift card. The total 58 participants participated in the study at the Labor Day Powwow. Through all 3 data collection opportunities, the researcher collected data from 118 Cheyenne and Arapaho Tribal members.

Given that data collection opportunities are limited, and the targeted populations are hard-to-reach people, the entire data collection period took a remarkably shorter time than planned schedules originally. All of this was a tribute to full support and hospitality of the Arapaho Chief, the Chairman of Health Board, and Cheyenne and Arapaho Tribal members who welcomed this research activity. All these collaborations and dialogues emphasize the

significance of pursuing mutual benefits that both researchers and study participants expect from academic research activities. Furthermore, these experiences provided valuable lessons for the researcher in that extra endeavors are required for study preparations when studies target human subjects who share few similarities with researchers across a variety of aspects.

# Chapter 5. Results

## Analysis

A Generalized Linear Model (GLM) based on a regression approach was employed to test research hypotheses 1 through 15. Fifteen hypotheses predicted Native American study participants' emotional (anger), attitudinal, cognitive, and behavioral responses to obesity prevention messages stated different obesity attribution types (internal and external obesity attributions) and message sources (ingroup and outgroup message sources). The type of obesity attribution was a within-subjects factor, and a message source was a between-subjects factor. Outcome variables were measured from 2 mediators (anger directed at message sources and obesity attributions) and 7 dependent variables (attitudes on 1) messages, 2) the message topic, and 3) the recommendation; cognitive source evaluations on 1) expertise, 2) sociability, and 3) trustworthiness; behavioral intentions).

The main purposes of testing 15 research hypotheses are followed. First, the main effects of each obesity attribution type and messages source on two mediators (anger about message sources and obesity attributions) and dependent variables (attitudes toward messages, the message topic, and the message recommendation; evaluation of sources' expertise, sociability, and trustworthiness; behavioral intentions) were examined. Second, indirect effects obesity attributions and message sources on each of the 7 dependent variables mediated by each mediator (anger about message sources and obesity attributions) were estimated.

Third, the interaction effects of obesity attribution types and message sources on the 2 mediators (anger about message sources and obesity attributions) and 7 dependent variables (attitudes toward messages, the message topic, and the message recommendation; evaluations of sources' expertise, sociability, and trustworthiness; behavioral intentions) were analyzed. Fourth,

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conditional indirect effects of interaction between obesity attributions and message sources on each dependent variable mediated by anger about message sources and obesity attribution each were also computed.
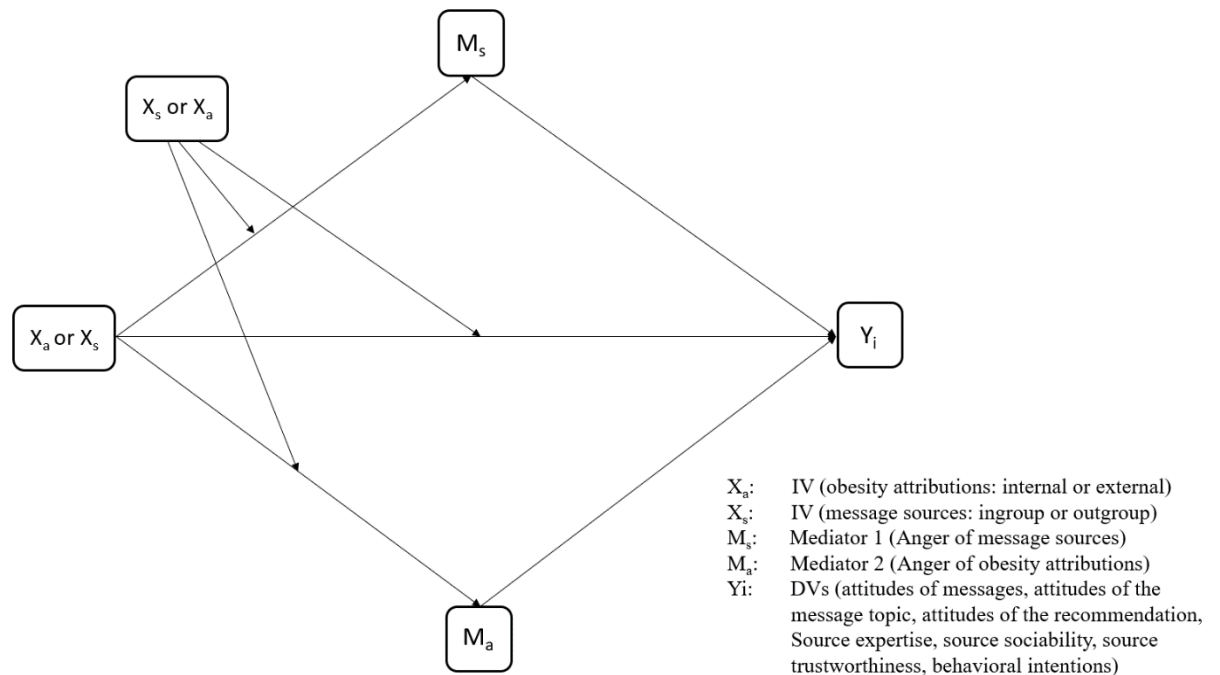
Unstandardized B scores were calculated for the main effects of obesity attributions and message sources on mediating variables (anger of message sources and obesity attributions) and dependent variables (attitudes toward messages, the message topic, and the message recommendation; evaluations of sources' expertise, sociability, and trustworthiness; behavioral intentions) each. Interactions of obesity attribution types and message sources on the same mediators and dependent variables each were estimated in the same way. Each B score indicated that changes in the dependent variable's value relative to a unit change of independent variables. Statistical inference of these value changes of dependent variables as a result of a unit change of independent variable were tested against 0 with t-tests.

Estimators (B scores) that were associated with each of the main effects of obesity attributions and message sources on the anger mediators, and each dependent variable were used to compute indirect and conditional indirect effects. Indirect and conditional indirect effects on the dependent variables were quantified as products of each unstandardized B score that indicate 1) main effects of obesity attributions and message sources on mediating variable and 2) main effects of mediating variables on each dependent variable. Bootstrap procedures were applied to compute indirect and conditional indirect effects, as well as infer their statistical significance (Hayes, 2009, 2013; Preacher, Rucker, & Hayes, 2007). A total of 112 Native American participants were resampled 10,000 times to estimate a sampling distribution of both indirect and conditional indirect effects. Statistical significance of these effects was inferred based on 95% bootstrap Confident Intervals (CI) by locating 2.5th and 97.5th percentiles of the distribution of

10,000 bootstrap estimations.

SAS Enterprise Guide 7.1 was used to create syntaxes for conducting a series of Proc Mixed procedures for testing fifteen research hypotheses. Figure 3 provided a conceptual diagram that visualizes relationships among independent variables, mediators, and dependent variables that are stated in 15 research hypotheses.

Figure 3. Conceptual diagram for the mediation model of anger appeal message processing



$X_a$:  IV (obesity attributions: internal or external)
$X_s$:  IV (message sources: ingroup or outgroup)
$M_s$:  Mediator 1 (Anger of message sources)
$M_a$:  Mediator 2 (Anger of obesity attributions)
$Y_i$:  DVs (attitudes of messages, attitudes of the message topic, attitudes of the recommendation, Source expertise, source sociability, source trustworthiness, behavioral intentions)

Two independent variables, which are obesity attributions and message sources, were denoted as '$X_a$' and '$X_s$' respectively in the conceptual diagram. One of these independent variables altered the strengths and directions of the effects of another independent variable on mediators and dependent variables each. Both independent variables had two levels. Therefore, dummy variables were created for entering these independent variables into multiple regression models. Regarding obesity attributions, external attributions were coded as '1', and internal obesity attributions were coded as '0'. In terms of message sources, outgroup message sources were coded as '1', while ingroup message sources were coded as '0'. Outcomes that were

generated by these dummy variables were interpreted as mean differences of mediators or dependent variables due to one unit increase of independent variables. Two mediators ($M_a$: anger toward on message sources; $M_s$: anger toward on obesity attributions) were directly affected by independent variables. Each mediator also had a direct influence on each dependent variable ($Y_i$).

Figure 4 represented a statistical diagram stemming from the conceptual model. This statistical diagram provided overviews of the data analysis process that defines what each of the coefficients stands for and how they were computed.

Figure 4. Statistical diagram for data analyses for the mediation model of

anger appeal message processing
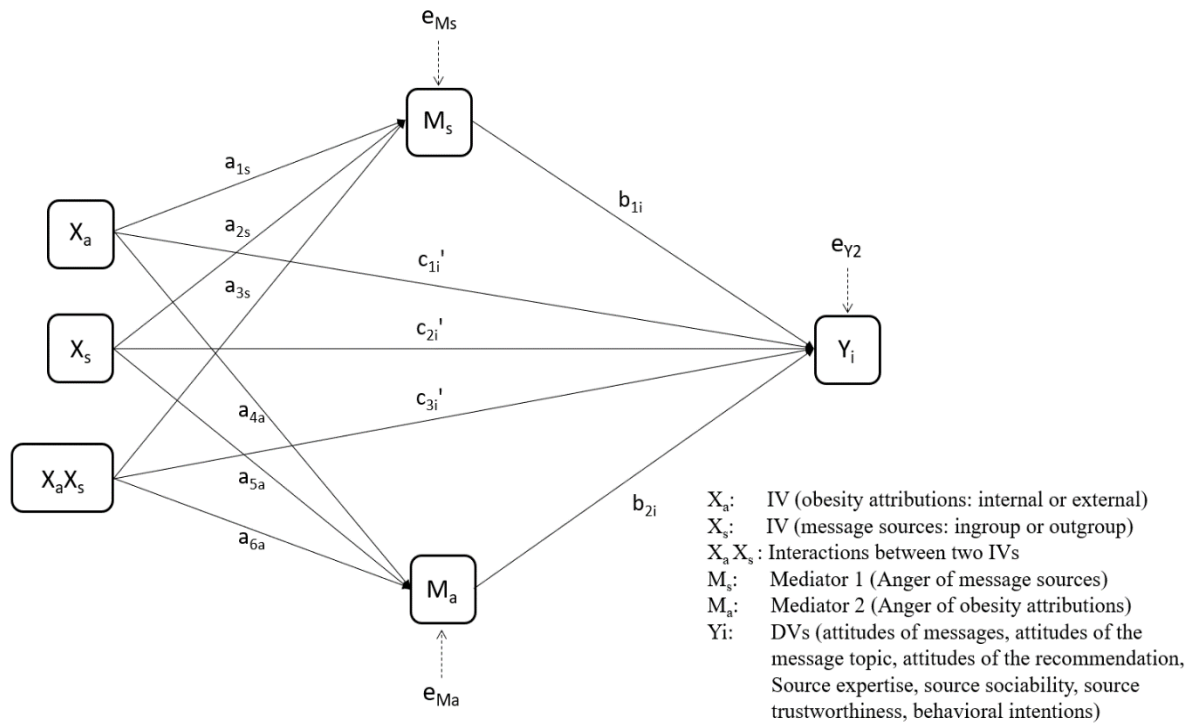


In addition to the statistical diagram, regression equations associated with computing direct, indirect, and conditional indirect effects were also addressed.

$$M_s = i_1 + a_{1s}X_a + a_{2s}X_a + e_{ms} \tag{1}$$

$$M_a = i_2 + a_{4a} X_a + a_{5a} X_a + e_{ma} \tag{2}$$

$$Y_i = i_3 + c_{1i}' X_a + c_{2i}' X_s + b_{1} M_s + b_{2} M_a + e_{Yi} \tag{3}$$

Equation (1) and (2) stated the direct effects of either obesity attribution types or direct effects of message sources on two mediators ($M_s$: anger of message sources and $M_a$: anger of attributions). The equation (3) indicated the total of the direct effects of two independent variables (obesity attributions and message sources) on each dependent variable (attitudes toward messages, the message topic, and the message recommendation; evaluations of sources' expertise, sociability, and trustworthiness; behavioral intentions). $i_1$, $i_2$, and $i_3$ are regression constants, and $e_{ms}$, $e_{ma}$, $e_{Yi}$ are errors associated with each of the outcome variables. These 3 regression models did not include any interaction term because they only concern the main effects of either obesity attribution types or message sources. Therefore, regression coefficients ($a_{1s}$, $a_{2s}$, $a_{4a}$, $a_{5a}$, $c_{1i}'$, $c_{2i}'$, $b_{1i}$, $b_{2i}$), were interpreted as the overall effects that each of the independent variables has on dépendent variables.

For instance, $a_{1s}$ and $a_{4a}$ indicated the main effects of obesity attribution types on 1) anger about message sources and 2) anger about obesity attributions. $a_{2s}$ and $a_{5a}$ represented the main effects of message source types on 1) anger about message sources and 2) anger about obesity attributions. $c_{1i}'$ and $c_{2i}'$ indicated the main effects of obesity attribution types and message sources on each dependent variable, respectively. $b_{1i}$ and $b2i$ referred to the direct effect of 1) anger about message sources on each dependent variable and 2) anger about obesity attributions on each dependent variable. Indirect effects were estimated by the following mathematical procedures:

$$a_{1s} \times b_{1i}$$

$$a_{2s} \times b_{1i}$$

$$a_{4a} \times b_{2i}$$

$$a_{5a} \times b_{2i}$$

To test interaction effects of obesity attribution types and message sources on each mediator and dependent variable, interaction terms ($a_{3s}X_aX_s$, $a_{6a}X_aX_s$, $c_{3i}{'}X_aX_s$) were added to these previous equations (1), (2), and (3):

$$M_s = i_1 + a_{1s}X_a + a_{2s}X_s + a_{3s}X_aX_s + e_{ms} \qquad (4)$$

$$= i_1 + (a_{1s} + a_{3s}X_s)\, X_a + a_{2s}X_s + e_{ms}$$

$$M_a = i_2 + a_{4a}X_a + a_{5a}X_s + a_{6a}X_aX_s + e_{ma} \qquad (5)$$

$$= i_2 + (a_{4a} + a_{6a}X_s)\, X_a + a_{5a}X_s + e_{ms}$$

$$Y_i = i_3 + c_{1i}{'}X_a + c_{2i}{'}X_s + c_{3i}{'}X_aX_s + b_{1M_s} + b_{2M_a} + e_{Yi} \qquad (6)$$

In equations (4), (5), and (6), regression coefficients ($a_{1s}$, $a_{2s}$, $a_{4a}$, $a_{5a}$, $c_{1i}{'}$, $c_{2i}{'}$) associated with each independent variable the effects of $X_a$ (obesity attributions) or $X_s$ (message sources) were conditional when $X_s = 0$ or $X_a = 0$. The conditional indirect effects of obesity attributions and message sources on dependent variables through two mediators each, $M_s$ or $M_a$, were stated in the following equations:

$$M_{s(att)} = (a_{1s\,+\,a3as}X_a)\, b_{1i} \qquad (7\text{-}1)$$

$$M_{a(sor)} = (a_{2s\,+\,a3as}X_s)\, b_{1i} \qquad (7\text{-}2)$$

$$M_{s(att)} = (a_{4a\,+\,a6as}X_a)\, b_{2i} \qquad (8\text{-}1)$$

$$M_{a(sor)} = (a_{4a\,+\,a6as}X_s)\, b_{2i} \qquad (8\text{-}2)$$

Equations (7-1) and (8-1) showed interactions of a unit changes of obesity attribution types and message source types on each dependent variable, mediated by anger about message

sources ($M_s$). Equations (7-2) and (8-2) represented interactions effects of a unit change of message source types and obesity attribution types on each dependent variable through anger of obesity attributions ($M_a$).

Hypothesis 16 tested targeted message effects. Data were collected from Native Americans and non-Native Americans. Both groups responded to the same obesity prevention messages that targeted Native Americans. The effects of the targeted messages were examined based on comparisons between Native Americans' and Non-Native Americans' reactions to these messages. Therefore, testing hypothesis 16 included all data the researcher obtained from both Native American and non-Native American study participants.

First, targeted message effects were examined in order to see the main effect of message recipients' ethnicities on anger about message sources and obesity attributions, as well as each dependent variable (attitudes toward messages, the message topic, and the message recommendation; evaluations of sources' expertise, sociability, and trustworthiness; behavioral intentions). Next, 2-way interactions of 1) obesity attribution types and message recipients' ethnicities and 2) message sources' ethnicities and message recipients' ethnicities on each mediator (anger about message sources and obesity attributions) and attitudes toward messages, source evaluations, and behavioral intentions were assessed. Last, analyses tested 3-way interaction effects of message recipients' ethnicities, obesity attribution types, and message source types on 1) 2 mediators (anger about message sources and obesity attributions) and 2) 7 dependent variables (attitudes toward messages, the message topic, and the message recommendation; evaluation of sources' expertise, sociability, and trustworthiness; behavioral intentions) each.

For testing the hypothesis 16, a series of $2 \times 2 \times 2$ mixed analysis of variance (ANOVA)

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were performed. Both message recipients' ethnicities (Native Americans and Non-Native

Americans) and message sources (Native American doctors and Non-Native Americans doctors)

were between-subjects factors, and the type of obesity attributions (internal and external obesity

attributions) were within subjects factors. A total of 233 study participants' data (Native

Americans: 112; Non-Native Americans: 121) were used for mixed ANOVAs.

*Hypotheses Testing*

Hypotheses 1 to 15 focused on Native Americans' responses to obesity attributions and

message source types. Data analyses for testing these fifteen hypotheses included 112 Native

American study participants' responses. Pearson's correlation analyses were performed in

advance to examine relationships between outcome variables and pre-measures to conduct an

analysis of interest. Among these pre-measures, those that had significant relations with each

dependent variable were entered as control variables at the early data analysis step. Table 3

presents Pearson's correlation analyses outcomes.

Table 3. Intercorrelations among key variables (Native American participants)

| Mediators & Dependent Variables | Ingroup Orientation | Outgroup Orientation (Contact) | Outgroup Orientation (Involvement) | Health Involvement | Obesity Self-Involvement | Obesity Other Involvement |
|---|---|---|---|---|---|---|
| $M_s$ | -.18 | -.04 | .04 | -.10 | -.06 | -.15 |
| $M_a$ | -.23* | -.09 | -.02 | -.02 | .03 | -.09 |
| $Att_{mes}$ | .10 | .00 | -.15 | .20* | .17 | .31** |
| $Att_{top}$ | .12 | .05 | -.14 | .10 | .08 | .21* |
| $Att_{rec}$ | .13 | .11 | -.13 | .24* | .15 | .29** |
| $SE_{exp}$ | .09 | .10 | -.12 | .09 | .11 | .18 |
| $SE_{soc}$ | .04 | .04 | -.14 | .04 | .08 | .16 |
| $SE_{tr}$ | .07 | -.02 | -.12 | -.01 | .07 | .14 |
| BI | -.14 | .11 | -.16 | .15 | .29** | .26** |

*$p < .05$, **$p < .01$, ***$p < .001$

$M_s$: Anger of message sources; $M_a$: Anger of obesity attributions; $Att_{mes}$: Attitudes of messages; $Att_{top}$: Attitudes of the message topic (obesity); $Att_{rec}$: Attitudes of the recommended behavior; $SE_{exp}$: Cognitive source evaluation of source expertise; $SE_{soc}$: Cognitive source evaluations of source sociability; $SE_{tr}$: Cognitive source evaluations of source trustworthiness; BI: Behavioral Intentions

*The main effects of obesity attributions on mediating and outcome variables*: Hypotheses 1 through 4 predicted the main effects of obesity attribution types on 2 mediators (anger about message sources and obesity attributions) and 7 dependent variables (attitudes toward messages, the message topic, and the recommendation; cognitive source evaluations of expertise, sociability, and trustworthiness; behavioral intentions) each. Four hypotheses postulated that internal obesity attributions would lead to higher levels of anger about message sources and obesity attributions, as well as bring negative influences on dependent variables. Obesity attributions had two levels (Internal and external). Internal attributions were coded as '0,' and external attributions were coded as '1'. Regression coefficients were interpreted as the amount of unit change in each outcome variable as a result of one unit increase in obesity attribution types ($X_a = 1$ : external obesity attributions) compared to reference variable ($X_a = 0$ : internal obesity attributions).

H1 predicted that internal obesity attributions, compared to external obesity attributions, would generate relatively higher levels of anger about both message sources and obesity attributions. Two Proc Mixed procedures estimated the amount of mean difference of anger about message sources and obesity attributions that are caused by different attribution types. No statistically significant unit changes for anger about obesity message sources ($a_{1s} = -.01$, $t = -.56_{1,111}$, $p = .577$) and anger about obesity attributions was detected ($a_{4a} = -.05$, $t = -2.52_{1,110}$, $p = .794$). The outcome indicated that obesity attribution types were not significant message attributes to evoke different levels of anger about message sources and obesity attributions. Therefore, H1 was rejected.

H2 proposed the following prediction: Native American participants would show more negative attitudes toward 1) messages, 2) the message topic (obesity), and 3) the recommended

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behaviors when they read messages that state internal obesity attributions versus external obesity attributions. Three Proc Mixed procedures were applied to test significant differences in the mean of these 3 dependent variables. Outcomes showed that no statistically significant differences of means of attitudes toward 1) messages ($c_{1mes}' = -.02$, $t = -.14_{1,107}$, $p = .886$), 2) the message topic ($c_{1top}' = .01$, $t = .07_{1,107}$, $p = .945$), and 3) the recommendation ($c_{1rec}' = .01$, $t = .01_{1,108}$, $p = .993$) as a result

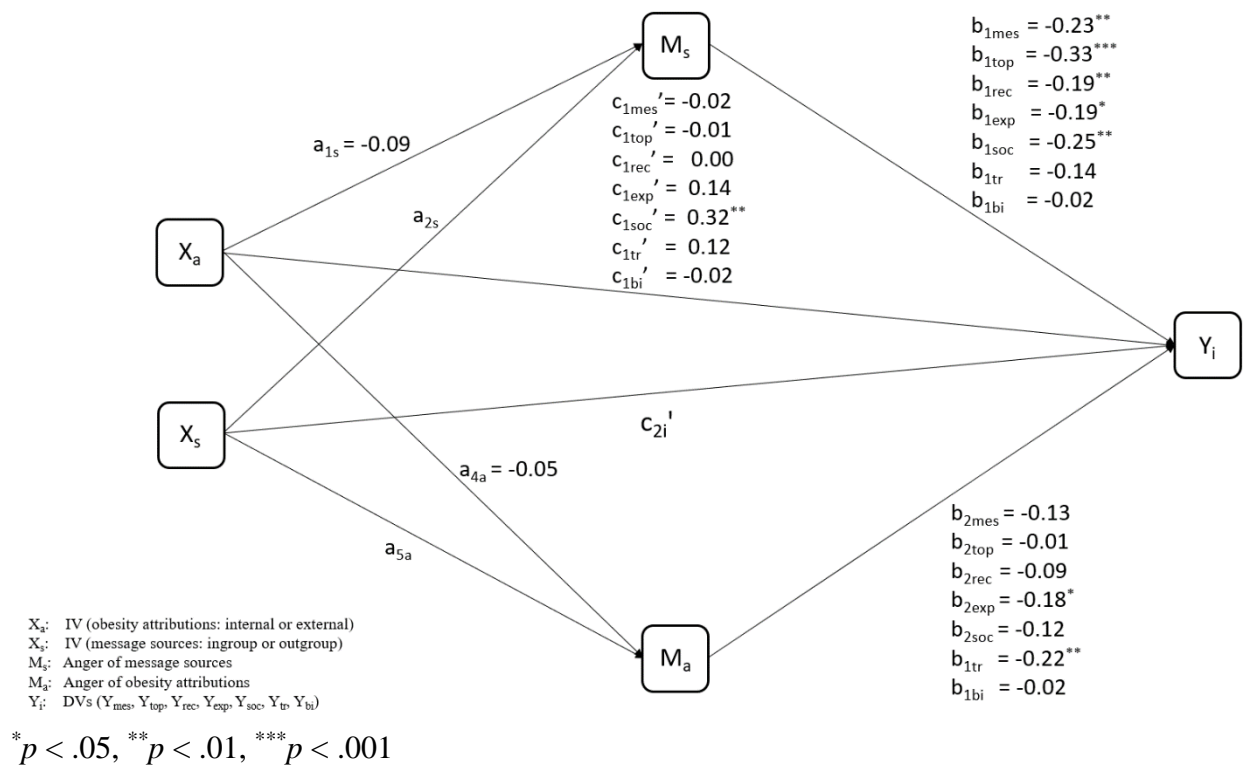of a unit change of obesity attribution types were detected. Therefore, H2 was rejected.

H3 expected more unfavorable source evaluations (expertise, sociability, and trustworthiness) among Native American study participants when obesity prevention messages stated internal obesity attributions instead of external obesity attributions. Three Proc Mixed analyses provided outcomes in that obesity attribution types did not result in statistically significant mean differences in source expertise ($c_{1exp}' = .14$, $t = 1.10_{1,107}$, $p = .276$) and source trustworthiness ($c_{1tr}' = .12$, $t = -1.01_{1,106}$, $p = .317$). On the other hand, the effect of obesity attribution types on source sociability was statistically significant ($c_{1soc}' = .32$, $t = 2.64_{1,106}$, $p < .01$) when holding all other variables constant. The outcome indicated that one unit increase of obesity attributions ($X_a = 1$: external obesity attributions) was significantly associated with the increase of the mean of source sociability, which was about 0.32 units on a scale of '1' (Not sociable at all) to '7' (Extremely sociable). Native American study participants evaluated message sources are more sociable in the amount of 0.32 points on average when obesity prevention messages attributed their obesity issue to external factors rather than internal factors. Therefore, H3 was partially supported.

H4 predicted that internal obesity attributions would lead to higher levels of intention to reject to follow the recommended behavior. H4 was rejected; a Proc Mixed analysis outcome

revealed that attributions types did not bring a significant difference in mean scores on Native American study participants' intentions to reject the recommended behavior ($c_{1bi}' = -.02$, $t = -.30_{1,103}$, $p = .763$).

Figure 5 showed unstandardized regression coefficients that are associated with each of the direct effects of obesity attribution types on 2 mediators (anger about message sources and obesity attributions) as well as 7 dependent variables (attitudes toward messages, the message topic, and the recommendation; cognitive source evaluations of expertise, sociability, and trustworthiness; behavioral intentions).

Figure 5. Main effects of obesity attribution types on mediating and dependent variables



$X_a$:  IV (obesity attributions: internal or external)
$X_s$:  IV (message sources: ingroup or outgroup)
$M_s$:  Anger of message sources
$M_a$:  Anger of obesity attributions
$Y_i$:  DVs ($Y_{mes}$, $Y_{top}$, $Y_{rec}$, $Y_{exp}$, $Y_{soc}$, $Y_{tr}$, $Y_{bi}$)

$^*p < .05$, $^{**}p < .01$, $^{***}p < .001$

*The main effects of message sources on mediating and outcome variables*: Hypotheses 5 through 8 predicted the main effects of message source types on 2 mediators (anger about message sources and obesity attributions) as well as on 7 dependent variables (attitudes toward messages, the message topic, and the message recommendation; evaluations of sources' expertise, sociability,

and trustworthiness; behavioral intentions). These 4 hypotheses predicted that non-Native American doctors (outgroup message sources) would lead to higher levels of anger about message sources and obesity attributions than Native American doctors (ingroup message sources). In addition, hypotheses also predicted that non-Native American doctors would result in more negative attitudes, unfavorable source evaluations, and lower levels of intentions to follow the recommendation compared to Native American doctors among Native American study participants. The message source variable was recoded as a dummy variable: ingroup message sources were coded as '0,' and outgroup message sources were coded as '1.' Each of the regression coefficients associated with the effects of message source types on outcome variables indicated that the amount of unit changes of dependent variables was made as a result of a unit change of message source types. A series of Proc Mixed procedures were performed to test four research hypotheses.

H5 stated that Native American study participants would experience higher levels of anger about message sources and obesity attributions when message sources were outgroup members ($X_s = 1$: Non-Native American doctors). The association between message source types and anger about message sources was statistically significant ($a_{2s} = 1.15$, $t = 3.94_{,111}$, $p < .001$). A unit increased of message source types ($X_s = 1$: non-Native American message sources) increased the mean of anger toward message sources by 1.15 units (on a scale of 1 (not angry at all) to 7 (extremely angry)). Similarly, increasing one unit of message sources ($X_s = 1$: non-Native American message sources) caused the anger about obesity attributions to rise 0.94 units (on a scale of 1 (not angry at all) to 7 (extremely angry)). The unit increase was statistically significant ($a_{4a} = .94$, $t = 2.99_{1,109}$, $p = .004$). The outcomes supported the H5.

H6 predicted that outgroup message sources (non-Native American doctors) would result

in more negative attitudes on 1) messages, 2) the message topic, and 3) the recommended behavior among Native American message recipients. Three Proc Mixed procedures calculated variations of the mean scores of 3 attitudes when messages sources were either ingroup or outgroup members. Results revealed that a unit increase of message sources ($X_s = 1$: non-Native American message sources) was significantly associated with units decrease of attitudes toward messages ($c_{2mes}' = -.94$, $t = -3.62_{1,112}$, $p < .001$), attitudes toward the message topic ($c_{2top}' = -.68$, $t = -2.74_{1,107}$, $p < .001$), and attitudes toward the recommendation ($c_{2rec}' = -1.05$, $t = -4.49_{1,113}$, $p < .001$). When obesity prevention messages used non-Native American doctors, the mean of attitudes toward messages, the message topic, and the recommendation decreased about 0.94 units, 0.68 units, and 1.05 units respectively on a scale of 1 (Not positive at all) to 7 (Extremely positive). Therefore, H6 was supported.

H7 predicted that Native American study participants would more unfavorably evaluate message sources' expertise, sociability, and trustworthiness when message sources were non-Native American doctors (outgroup message sources). Analyses supported H7. When message sources were only concerned, one unit increase of message source types ($X_s = 1$: non-Native American message sources) was significantly associated with units decrease of source expertise ($c_{2exp}' = -1.01$, $t = -3.98_{1,116}$, $p < .001$), source sociability ($c_{2soc}' = -1.05$, $t = -3.84_{1,115}$, $p < .001$), and source trustworthiness ($c_{2tr}' = -1.04$, $t = -4.05_{1,115}$, $p < .001$). These results indicated that non-Native American message sources led to more unfavorable evaluations on sources' expertise sociability, and trustworthiness by decreasing 1.01, 1.05, and 1.04 units respectively (based on scales of 1 (Not at all) to 7 (Extremely) compared to Native American message sources.

H8 predicted that outgroup message sources would decrease Native American study participants' behavioral intentions to follow the recommended behavior. However, there was no

statistically significant influence of message source types on changing the mean of participants'

behavioral intentions ($c_{2bi'} = .12$, $t = .73_{1,111}$, $p = .468$). H8 was rejected. Figure 6 summarized the

outcomes of the main effects of message source types on the mediating and dependent variables.

Figure 6. Main effects of message source types on mediating and dependent variables



$^*p < .05$, $^{**}p < .01$, $^{***}p < .001$
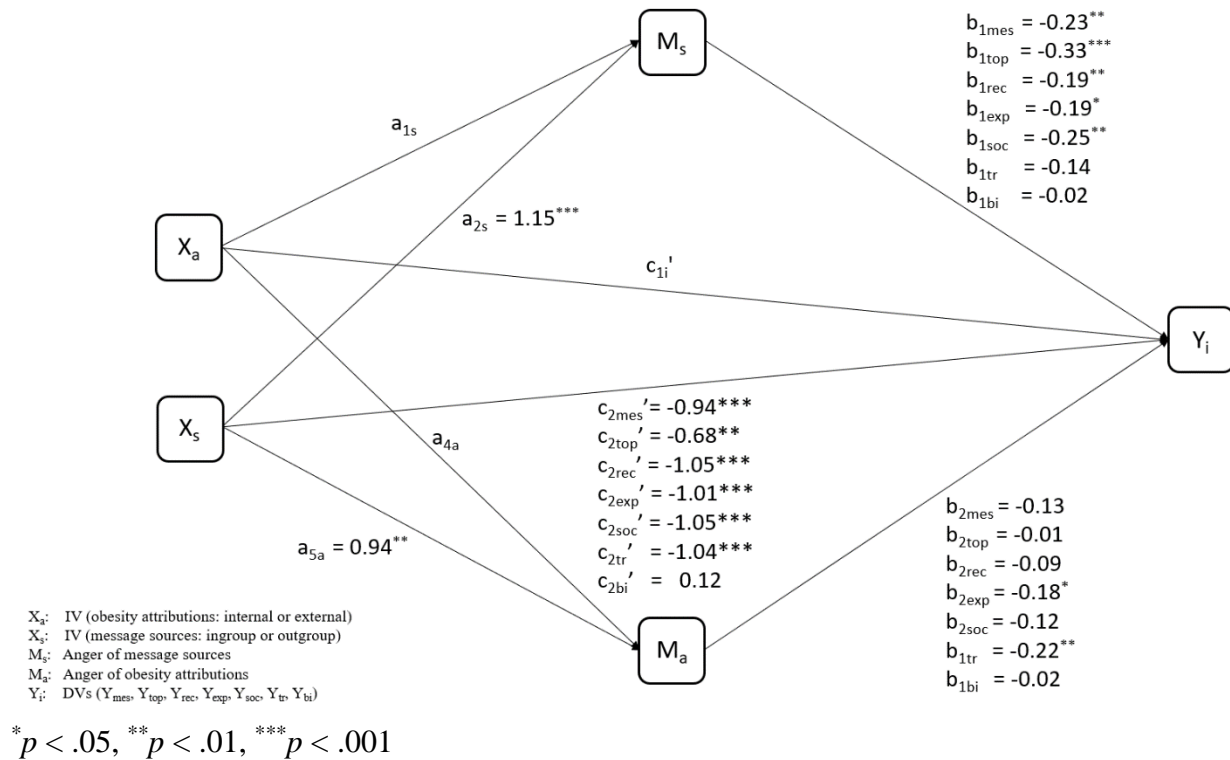
*Mediation analysis 1 (Indirect effects of obesity attribution types on dependent variables,*

*mediated by about message sources and obesity attributions):* H9 predicted two indirect effects.

First, hypothesis 9 predicted significant indirect effects from obesity attribution types on each

dependent variable (attitudes toward messages, the message topic, and the message

recommendation; cognitive source evaluations of expertise, sociability, and trustworthiness;

behavioral intentions), mediated by anger toward message sources. The second prediction of H9

was that there would be significant indirect effects from obesity attribution types on the same set

of dependent variables, mediated by anger about obesity attributions. Indirect effects were

computed by the multiplication of two direct paths ($X_a \rightarrow M_s \rightarrow Y_i$: $a_{1s} \times b_{1i}$, $X_a \rightarrow M_a \rightarrow Y_i$: $a_{4a} \times b_{2i}$) based on 10,000 bootstrapped samples. Testing the statistical significance of each of these indirect effects was done based on 95% bootstrap CI.

First, the indirect effects of obesity attributions types on Native American message recipients' attitudes toward 1) messages, 2) the message topic, and 3) the recommended behavior through anger of message sources were computed. Outcomes indicated that none of these indirect effects was significantly different from 0 ($a_{1s} \times b_{1mes}$ = .02, 95%CI = -0.057 to 0.111; $a_{1s} \times b_{1top}$ = .00, 95%CI = -0.015 to 0.026; $a_{1s} \times b_{1rec}$ = .03, 95%CI = -0.079 to 0.163). The mean scores of the 3 attitudes' dimensions (attitudes toward 1) messages, 2) the message topic, and 3) the recommended behavior) were not significantly changed due to obesity attribution types that were influenced by anger about message sources, which in turn, affected 3 attitudes.

Second, the indirect effects of obesity attribution types on each of the 3 cognitive source evaluation dimensions (expertise, sociability, and trustworthiness) mediated by anger about message sources were computed. Results revealed that none of these indirect effects was significantly different from 0 (expertise: $a_{1s} \times b_{1exp}$ = .03, 95%CI = -0.065 to 0.130; sociability: $a_{1s} \times b_{1soc}$ = .02, 95%CI = -0.043 to 0.088; trustworthiness: $a_{1s} \times b_{1soc}$ = .02, 95%CI = -0.062 to 0.125).

The indirect effect of obesity attribution types on behavioral intention scores via anger about message source was not statistically significant ($a_{1s} \times b_{1bi}$ = .00, 95%CI = -0.016 to 0.028).

Table 4 presented each of the indirect paths and outcomes that are associated with each mediation analysis when a mediator was the anger toward message sources.

Table 4. Indirect effects of obesity attributions on dependent variables,

mediated by anger of message sources

| Indirect effects<br>IV → Mediator → DVs (Direct effects of IV on Anger of Sources × Direct effects of Mediator × DVs) | B | SE<br>(Boot) | Boot 95% CI<br>[LL, UL] |
|---|---|---|---|
| Obesity attributions → Anger of sources → Attitudes on messages ($a_{1s} \times b_{1mes}$) | 0.02 | 0.04 | [-0.057, 0.111] |
| Obesity attributions → Anger of sources → Attitudes on the message topic ($a_{1s} \times b_{1top}$) | 0.00 | 0.01 | [-0.015, 0.026] |
| Obesity attributions → Anger of sources → Attitudes on the recommendation ($a_{1s} \times b_{1rec}$) | 0.03 | 0.06 | [-0.079, 0.163] |
| Obesity attributions → Anger of sources → Source expertise evaluation ($a_{1s} \times b_{1exp}$) | 0.03 | 0.05 | [-0.065, 0.130] |
| Obesity attributions → Anger of sources → Source sociability evaluation ($a_{1s} \times b_{1soc}$) | 0.02 | 0.03 | [-0.043, 0.088] |
| Obesity attributions → Anger of sources → Source trustworthiness evaluation ($a_{1s} \times b_{1tr}$) | 0.02 | 0.05 | [-0.062, 0.125] |
| Obesity attributions → Anger of sources → Behavioral intentions ($a_{1s} \times b_{1bi}$) | 0.00 | 0.01 | [-0.016, 0.028] |

The second mediator, which is anger about obesity attributions, was included for testing
another set of indirect effects that H9 predicted. No statistically significant outcomes were found
for obesity attributions on attitudes toward 1) messages, 2) the message topic, and 3) the
recommendation mediated by anger toward obesity attributions (message attitudes: $a_{4a} \times b_{2mes}$
= .00, 95%CI = -0.033 to 0.043; message topic attitudes: $a_{4a} \times b_{2top}$ = .00, 95%CI = -0.020 to
0.034; recommendation attitudes: $a_{4a} \times b_{2rec}$ = .00, 95%CI = -0.026 to 0.29). Since 0 was within
95% CIs of all 3 attitudes, all of these 3 indirect effects were not statistically significant.

Indirect effects of obesity attribution types on 3 source evaluations (expertise, sociability,
and trustworthiness) mediated by anger about obesity attributions were also not significantly
different ($a_{4a} \times b_{2exp}$ = .01, 95%CI = -0.030 to 0.052; $a_{4a} \times b_{2soc}$ = .01, 95%CI = -0.336 to 0.080;
$a_{4a} \times b_{2tr}$ = .01, 95%CI = -0.336 to 0.059). Because 0 was within 95% CIs of all 3 source
evaluation dimensions, indirect effects on 3 source evaluations were not statistically different
from 0 at 95% confidence level.

The indirect effect of obesity attribution types on behavioral intentions mediated by anger
toward obesity attributions was not significantly different from 0 ($a_{4a} \times b_{2bi}$ = .00, 95%CI = -
0.020 to 0.034). Table 5 summarized these outcomes of the indirect effects of obesity attributions
on dependent variables mediated by anger about obesity attributions.

Table 5. Indirect effects of obesity attributions on dependent variables,

mediated by anger of obesity attributions

| Indirect effects<br>IV → Mediator → DVs (Direct effects of IV on Anger of Attributions × Direct effects of Mediator × DVs) | B | SE<br>(Boot) | Boot 95% CI<br>[LL, UL] |
|---|---|---|---|
| Obesity attributions → Anger of attributions → Attitudes on messages ($a_{4s} \times b_{2mes}$) | 0.00 | 0.01 | [-0.033, 0.043] |
| Obesity attributions → Anger of attributions → Attitudes on the message topic ($a_{4s} \times b_{2top}$) | 0.00 | 0.01 | [-0.020, 0.034] |
| Obesity attributions → Anger of attributions → Attitudes on the recommendation ($a_{4s} \times b_{2rec}$) | 0.00 | 0.01 | [-0.026, 0.029] |
| Obesity attributions → Anger of attributions → Source expertise evaluation ($a_{4s} \times b_{2exp}$) | 0.01 | 0.02 | [-0.030, 0.052] |
| Obesity attributions → Anger of attributions → Source sociability evaluation ($a_{4s} \times b_{2soc}$) | 0.01 | 0.03 | [-0.336, 0.080] |
| Obesity attributions → Anger of attributions → Source trustworthiness evaluation ($a_{4s} \times b_{2tr}$) | 0.01 | 0.02 | [-0.035, 0.059] |
| Obesity attributions → Anger of attributions → Behavioral intentions ($a_{4s} \times b_{2bi}$) | 0.00 | 0.01 | [-0.020, 0.034] |

Overall, H9 was rejected. Analyses outcomes showed that the indirect effects of obesity attribution types on dependent variables via two mediators each were not significantly different from 0 at 95% CIs. Obesity attribution types did not cause significant differences on participants' attitudes, source evaluations, as well as behavioral intentions as a result of the effects of obesity attribution types on anger about sources and anger about obesity attributions, which in turn significantly affected some of those dependent variables (attitudes toward messages, attitudes toward the message topic, attitudes toward the recommendation, source expertise, source sociability, and source trustworthiness).

*Mediation analysis 2 (Indirect effects of message source types on dependent variables, mediated by anger about message sources and obesity attributions)*: H10 proposed statistically significant indirect effects of message source types on a series of dependent variables mediated by anger about message sources and obesity attributions. These indirect effects were computed by multiplying 1) the direct effects of message source types on anger about message sources and obesity attributions and 2) the direct effects of one of those mediators on each dependent variable ($a_{2s} \times b_{1i}$, $a_{5a} \times b_{2i}$). Ten thousand bootstrapped samples were requested to estimate each of these multiplications. Statistical inferences on the significance of these indirect effects were made based on 95% bootstrap CI.

First, message source types on attitudes toward 1) messages, 2) the message topic, and 3) the message recommendation mediated by anger about message sources were computed. Of 3 attitudes outcomes, indirect effects of message sources on attitudes toward messages and the message recommendation were statistically different from 0 (attitude towards messages: $a_{2s} \times b_{1mes} = -.26$, 95%CI = -0.479 to -0.075; attitude towards the recommendation: $a_{2s} \times b_{1rec} = -.40$, 95%CI = -0.657 to -0.189). If a source type had the direct effect of increased anger about message sources in the participants, then the participants' attitudes toward obesity prevention messages decreased by 0.26 units and their attitude toward following the recommended behavior decreased 0.40 units on a scale of 1 (Not positive at all) to 7 (Extremely positive). The indirect effect of message source types on attitudes toward the message topic was not statistically significant ($a_{2s} \times b_{1top} = -.02$, 95%CI = -0.137 to 0.081).

Second, indirect effects of message source types on Native American study participants' evaluations of message sources' 1) expertise, 2) sociability, and 3) trustworthiness when mediated by anger about message sources were analyzed. Across all 3 source evaluations, bootstrap estimations of 3 indirect effects were located between LLCL and ULCL with 95% confidence. These outcomes indicated that the indirect effects of message source types on 3 dimensions of source evaluations through anger toward message sources were statistical significant ($a_{2s} \times b_{1exp} = -.32$, 95%CI = -0.550 to -0.128; $a_{2s} \times b_{1soc} = -.20$, 95%CI = -0.399 to 0.043; $a_{2s} \times b_{1tr} = -.30$, 95%CI = -0.555 to -0.105). The means scores of evaluations of source expertise, source sociability, and source trustworthiness decreased 0.32 units, 0.20 units, and 0.30 units on a scale of 1 (Not positive at all) to 7 (Extremely positive) when mediated by anger toward message sources and when the anger was significantly affected by message source types.

Last, the indirect effect of message sources on behavioral intentions was examined. The

outcome showed that the indirect effect was not significantly different from 0 at the 95% CI ($a_{2s} \times b_{1bi}$ = -.02, 95%CI = -0.143 to 0.080). Thus, the indirect effect is statistically not significant. Table 6 summarized all mediation analysis outcomes when type of message source was the independent variable, and anger about the message source mediated the independent variable's effect on dependent variables.

Table 6. Indirect effects of message sources on dependent variables,

mediated by anger of message sources

| Indirect effects | B | SE (Boot) | Boot 95% CI |
| IV → Mediator → DVs (Direct effects of IV on Anger of Sources × Direct effects of Mediator × DVs) | | | [LL, UL] |
| --- | --- | --- | --- |
| Message sources → Anger of sources → Attitudes on messages ($a_{2s} \times b_{1mes}$) | -0.26* | 0.10 | [-0.479, -0.075] |
| Message sources → Anger of sources → Attitudes on the message topic ($a_{2s} \times b_{1top}$) | -0.02 | 0.05 | [-0.137, 0.081] |
| Message sources → Anger of sources → Attitudes on the recommendation ($a_{2s} \times b_{1rec}$) | -0.40* | 0.12 | [-0.657, -0.189] |
| Message sources → Anger of sources → Source expertise evaluation ($a_{2s} \times b_{1exp}$) | -0.32* | 0.11 | [-0.550, -0.128] |
| Message sources → Anger of sources → Source sociability evaluation ($a_{2s} \times b_{1soc}$) | -0.20* | 0.09 | [-0.399, -0.043] |
| Message sources → Anger of sources → Source trustworthiness evaluation ($a_{2s} \times b_{1tr}$) | -0.30* | 0.12 | [-0.555, -0.105] |
| Message sources → Anger of sources → Behavioral intentions ($a_{2s} \times b_{1bi}$) | -0.02 | 0.06 | [-0.143, 0.080] |

*$p < .05$

The second mediator was anger about obesity attribution. The indirect effects of message sources on 3 attitudes dimensions (attitude toward messages, the message topic, and the recommendation) mediated by anger about obesity attributions were calculated. Outcomes revealed that none of these indirect effects were statistically significant (attitudes toward messages: $a_{5a} \times b_{1mes}$ = -.07, 95%CI = -0.217 to 0.054; attitudes toward the message topic: $a_{5a} \times b_{1top}$ = -.06, 95%CI = -0.151 to 0.022; attitudes toward the recommendation: $a_{5a} \times b_{1rec}$ = .01, 95%CI = -0.129 to 0.143) since the value of 0 was located in the 95% CIs for all 3 attitudes. In terms of Native Americans study participants' evaluations of message sources' 1) expertise, 2) sociability, and 3) trustworthiness, there were no statistically significant indirect effects of message sources on evaluations of source expertise ($a_{5a} \times b_{2exp}$ = -.09, 95%CI = -0.244 to 0.044) and source trustworthiness ($a_{5a} \times b_{2tr}$ = -.10, 95%CI = -0.254 to 0.039). Two bootstrap CIs associated with source expertise and source trustworthiness each included 0 in between both

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LLCIs and ULCIs. On the other hand, the indirect effect of message source types on evaluating source sociability through anger about obesity attributions was statistically significant ($a_{5a} \times b_{2soc}$ = -.18, 95%CI = -0.336 to -0.050). The outcome showed that a decrease by 0.18 units of source sociability scores on scale 1 (Not sociable at all) to 7 (Extremely sociable) as a result of a one unit increase of message sources ($X_s$ = 1: outgroup message sources) mediated by the higher levels of anger toward obesity attributions.

An indirect effect of message source types on behavioral intention, which was mediated by anger of obesity attributions, was tested. The indirect effect, however, was not significantly different from 0 at a 95% confidence interval ($a_{5a} \times b_{2bi}$ = -.06, 95%CI = -0.152 to 0.025). The following table (Table 7) summarized these outcomes of mediation analyses.

Table 7. Indirect effects of message sources on dependent variables,

mediated by anger of obesity attributions

| Indirect effects<br>IV → Mediator → DVs (Direct effects of IV on Anger of Attributions × Direct effects of Mediator × DVs) | B | SE<br>(Boot) | Boot 95% CI<br>[LL, UL] |
|---|---|---|---|
| Message sources → Anger of attributions → Attitudes on messages ($a_{5s} \times b_{2mes}$) | -0.07 | 0.07 | [-0.217, 0.054] |
| Message sources → Anger of attributions → Attitudes on the message topic ($a_{5s} \times b_{2top}$) | -0.06 | 0.04 | [-0.151, 0.022] |
| Message sources → Anger of attributions → Attitudes on the recommendation ($a_{5s} \times b_{2rec}$) | 0.01 | 0.07 | [-0.129, 0.143] |
| Message sources → Anger of attributions → Source expertise evaluation ($a_{5s} \times b_{2exp}$) | -0.09 | 0.07 | [-0.244, 0.044] |
| Message sources → Anger of attributions → Source sociability evaluation ($a_{5s} \times b_{2soc}$) | -0.18* | 0.07 | [-0.336, -0.050] |
| Message sources → Anger of attributions → Source trustworthiness evaluation ($a_{5s} \times b_{2tr}$) | -0.10 | 0.07 | [-0.254, 0.039] |
| Message sources → Anger of attributions → Behavioral intentions ($a_{5s} \times b_{2bi}$) | -0.06 | 0.04 | [-0.152, 0.025] |

*$p < .05$

To summarize these results, H10 was partially supported. In terms of anger about message sources, the indirect effects of source types on dependent variables were significant except for Native American study participants' attitudes on the message topic and behavioral intentions. Overall, Native Americans showed higher levels of anger about message sources when message sources were non-Native Americans. When feeling more intense anger about sources, Native Americans' attitudes and source evaluation scores decreased significantly. However, when anger about obesity attributions was a mediator, indirect effects of message

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source types were only significant when participants evaluated levels of source sociability.

*Interactions between obesity attributions and sources of criticism on mediating and outcome variables*: Hypotheses 11 to 14 proposed interactions between obesity attribution types and message sources on 2 mediating variables (anger about message sources and obesity attributions) and 7 dependent variables (attitudes toward 1) messages, 2) the message topic, and 2) the message recommendation; evaluation of sources' 1) expertise, 2) sociability, and 3) trustworthiness; behavioral intentions). Proc Mixed procedures were performed to test research hypotheses that predicted statistically significant changes in mean scores of independent variables as a result of interactions between types of obesity attributions and message sources.

H11 predicted significant interactions of obesity attribution types and message sources on anger of message sources and obesity attributions. Proc Mixed procedures predicted changes in anger about message sources and obesity attributions due to the following types of interactions between two independent variables: 1) Internal obesity attributions coming from ingroup message sources ($X_a = 0$, $X_s = 0$); 2) Internal obesity attributions coming from outgroup message sources ($X_a = 0$, $X_s = 1$); 3) External obesity attributions coming from ingroup message sources ($X_a = 1$, $X_s = 0$); and 4) External obesity attributions coming from outgroup message sources ($X_a = 1$, $X_s = 1$). Four indicators that were obtained from analyses of these interactions between obesity attribution types and message sources were compared.

First, the mean score for anger about message sources was significantly changed depending on the interactions between obesity attributions and message sources ($a_{3s} = -.75$, $t = -2.27_{1,110}$, $p = .025$). The combination of internal obesity attributions ($X_a = 0$) and non-Native American sources ($X_s = 1$) evoked the highest levels of anger about message sources ($X_{a0} X_{s1} = 3.52$) on scale 1 (Not angry at all) to 7 (Extremely angry). The combination of external obesity

attributions ($X_a = 1$) and outgroup message sources ($X_s = 1$) ($X_{a1} X_{s1} = 3.06$ on scale 1 (Not

angry at all) to 7 (Extremely angry)), external obesity attributions ($X_a = 1$) and ingroup message

sources ($X_s = 0$) ($X_{a1} X_{s0} = 2.89$ on scale 1 (Not angry at all) to 7 (Extremely angry)), and

internal obesity attributions ($X_a = 0$) and ingroup message sources ($X_s = 0$) ($X_{a0} X_{s0} = 2.01$ on

scale 1 (Not angry at all) to 7 (Extremely angry)) were followed (Figure 7). Contrary to the effect

of anger about message sources on interactions between obesity attribution types and message

sources did not result in significant changes of anger about obesity attributions ($a_{6s} = -.33$, $p$

$= .326$). These results partially supported H11.

Figure 7. Interactions of obesity attributions and message sources on

anger about message sources (Negative)
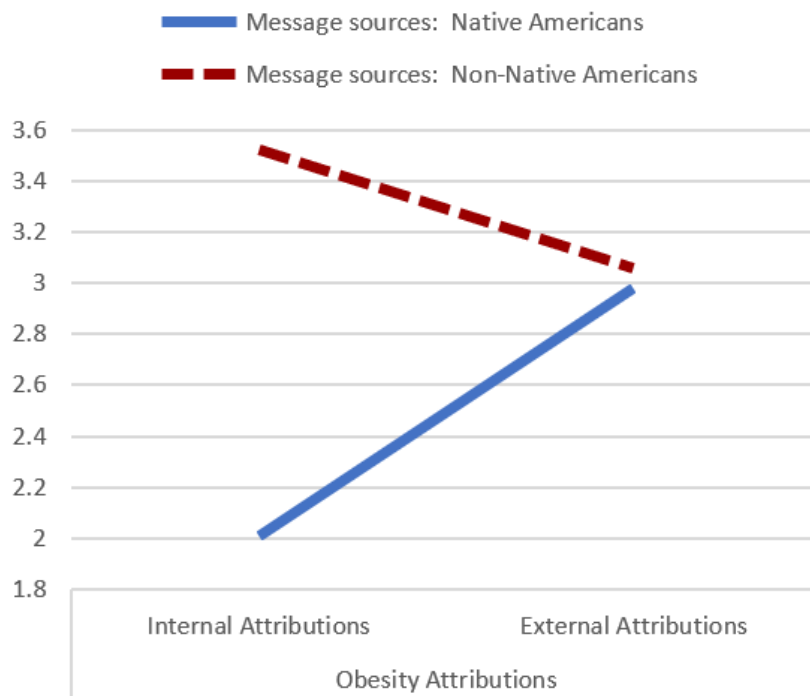


H12 predicted significant interactions of obesity attributions and message sources on

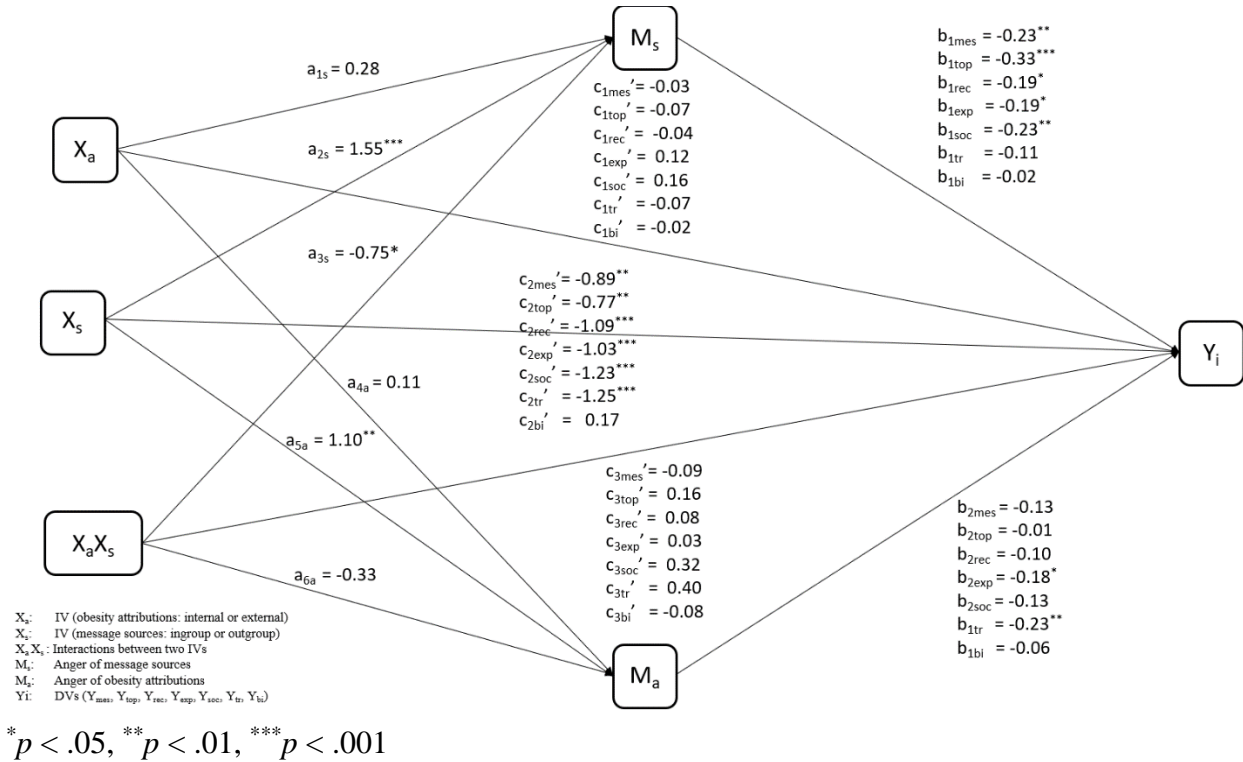attitudes toward 1) messages, 2) the message topic, and 3) the recommendation. Outcomes

revealed no statistically significant interactions between obesity attribution types and message sources on the change of the mean of attitudes toward messages($c_{3mes}´ = -.09$, $t = -.34_{1,108}$, $p = .732$), attitudes toward the message topic ($c_{3top}´ = .16$, $t = .56_{1,108}$, $p = .579$), and attitudes toward the recommendation ($c_{3rec}´ = .08$, $t = .35_{,109}$, $p = .728$). Thus, H12 was rejected.

H13 hypothesized that obesity attributions and message sources would significantly interact with participants' evaluations of message sources' 1) expertise, 2) sociability, and 3) trustworthiness. Outcome showed that interactions of obesity attributions and message sources were not statistically significant (sources' expertise: $c_{3exp}´ = .03$, $t = .12_{1,108}$, $p = .904$; sources' sociability: $c_{3soc}´ = .32$, $t = 1.31_{1,107}$, $p = .194$; sources' trustworthiness: $c_{3tr}´ = .40$, $t = 1.63_{1,108}$, $p = .106$). H13 was rejected.

H14 predicted that obesity attributions and message sources would interact with behavioral intentions. The outcome revealed that there was no statistically significant interaction between obesity attributions and message sources on changing the mean of behavioral intentions ($c_{3bi}´ = -.08$, $t = -.59_{1,103}$, $p = .556$). Thus, H14 was rejected. Figure 8 summarized outcomes of the tests for hypotheses that predicted interactions between obesity attributions and message sources on mediating and dependent variables.

Figure 8. Interactions of obesity attributions and message sources

on mediating and dependent variables

$^*p < .05,\ ^{**}p < .01,\ ^{***}p < .001$

H15 predicted that interactions between obesity attributions and message sources would generate differences in mean changes of participants' attitudes (toward 1) messages, 2) the message topic, and 3) the recommendation), source evaluations (of 1) expertise, 2) sociability, and 3) trustworthiness), and behavioral intentions mediated by anger about message sources and obesity attributions each. For testing H15, conditional indirect effects were computed for quantifying interactions between obesity attributions and message sources on each dependent variable, mediated by two mediators each (anger about message sources and anger about obesity attributions). Once each of the conditional indirect effects was computed, comparisons among these conditional indirect effects were made to examine significant differences among these values to find if H15 was supported.

Computing conditional indirect effects involved multiple steps. First, the interactions of

obesity attributions and message sources on anger about sources ($a3_{as}$) and anger about obesity

attributions ($a6_{as}$) were computed. Specifically, the following 4 combinations of obesity

attribution types and message sources were considered. First, the effect of a unit increases of

obesity attributions ($X_a = 1$: external obesity attributions) on 1) anger about message sources and

2) anger about obesity attributions changing due to message source types ($X_s = 0$: ingroup

message sources; $X_s = 1$: outgroup message sources) were estimated. Second, the effects of a

unit increase of message sources ($X_s = 1$, outgroup message sources on 1) anger of message

sources and 2) anger of obesity attributions changing due to obesity attribution types ($X_a = 1$:

internal obesity attributions; $X_a = 1$; external obesity attributions were computed. Therefore, 4

possible combinations of obesity attribution types and message sources on each of two mediating

variables (anger about message sources and obesity attributions) were computed (a total of 8,

across two mediating variables).

Second, the direct effects of anger of message sources and anger of obesity attributions

on each of 7 dependent variables were computed. Third, 2 indicators that were computed

in the first and the second step were multiplied for computing conditional indirect effects. The

following figure 9 simplified these 3 steps stated above.

Figure 9. Steps (1 through 3) for computing conditional indirect effects
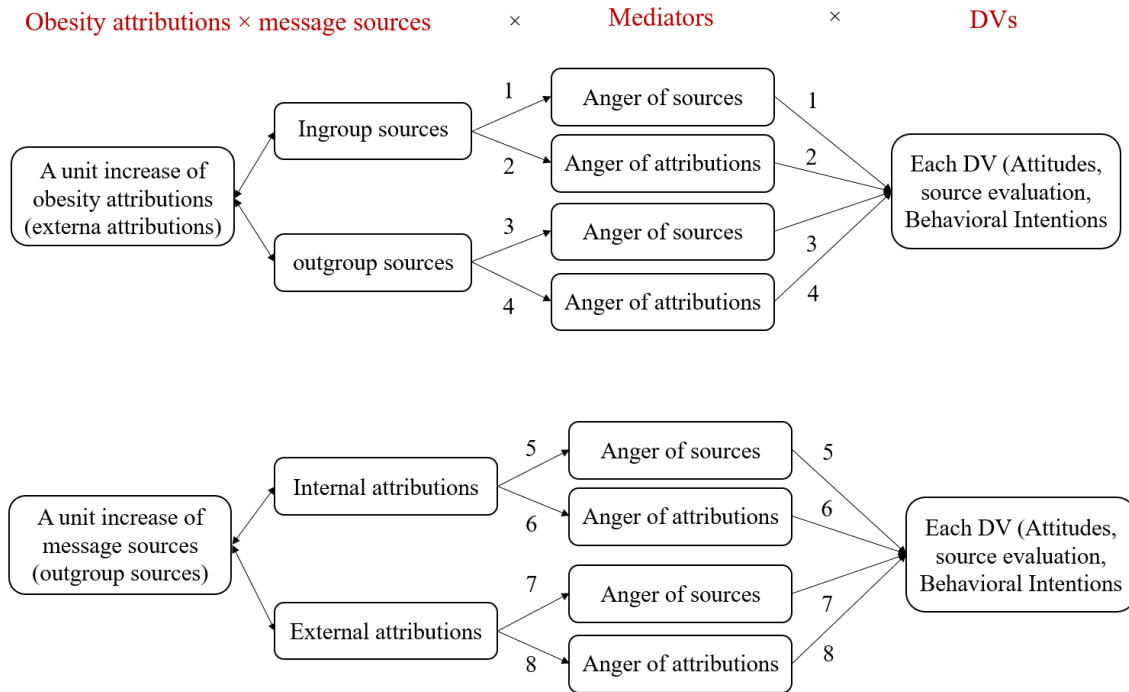


The next step was to compare these conditional indirect effects. The outcomes of these comparisons among conditional indirect effects indicated which types of interactions of obesity attributions and message sources resulted in significant units' changes of each dependent variable, by mediating anger of message sources and anger of obesity attributions each. Comparisons were made based on mediating variables. Figure 10 showed pairs of comparisons between conditional indirect effects that shared the same mediator.

Figure 10. Comparisons between conditional indirect effects
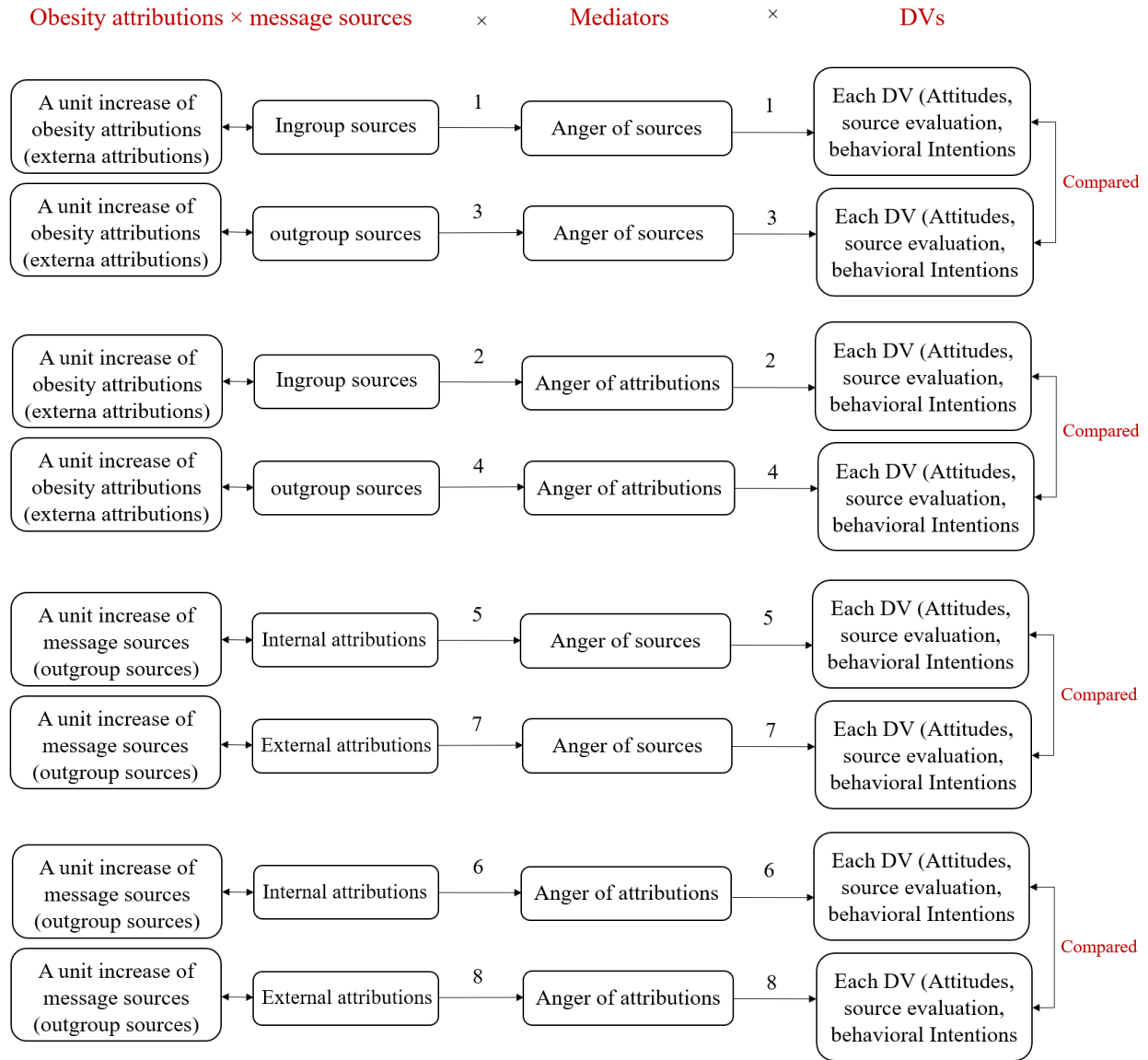


The following equations were applied for computing differences among conditional indirect effects that were mediated by the same mediator based on the statistical diagram (Figure 4).

Figure 4. Statistical diagram for data analyses for the mediation model of

anger appeal message processing
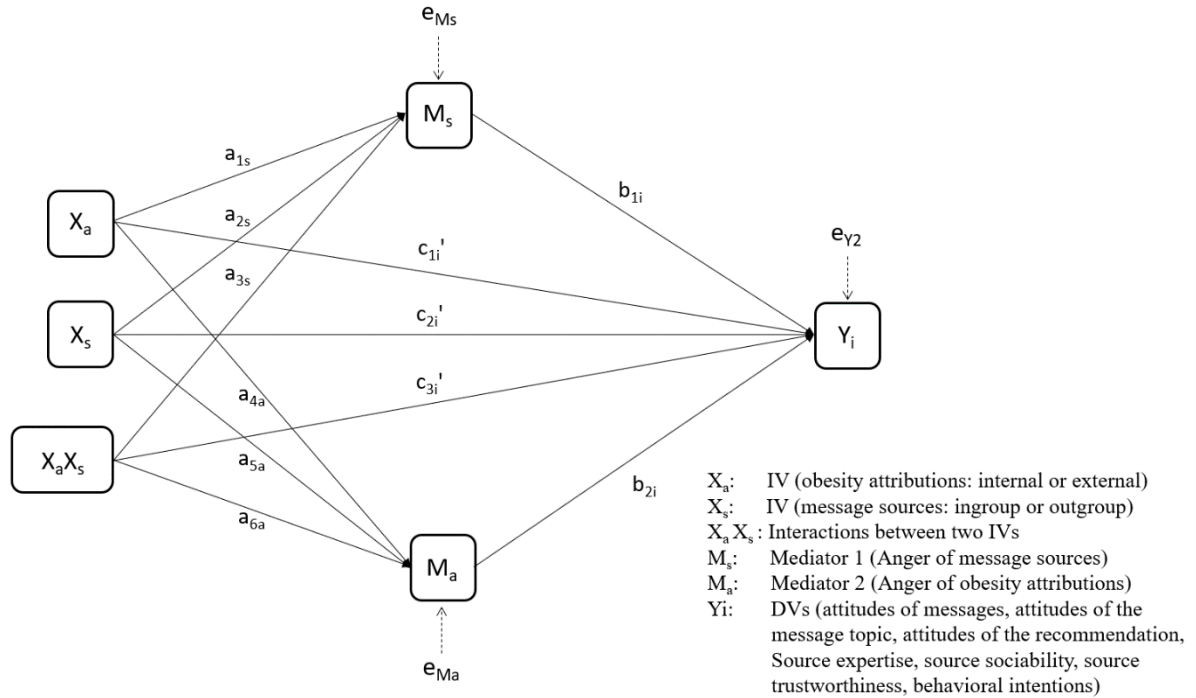


$$M_{s(att1sor1)} - M_{s(att1sor0)} = (a_{1s} + a_{3s}X_s)\, b_{1i} - a_{1s} \times b_{1i}\ = a_{3s}X_s \times b_{1i} \qquad (9\text{-}1)$$

$$M_{s(sor1att1)} - M_{s(sor1att0)} = (a_{2s} + a_{3s}X_s)\, b_{1i} - a_{2s} \times b_{1i}\ = a_{3s}X_s \times b_{1i} \qquad (9\text{-}2)$$

$$M_{a(att1sor1)} - M_{a(att1sor0)} = (a_{4a} + a_{6a}X_a)\, b_{2i} - a_{4a} \times b_{2i} = a_{6a}X_a \times b_{2i} \qquad (10\text{-}1)$$

$$M_{a(sor1att1)} - M_{a(sor1att0)} = (a_{5a} + a_{6a}X_a)\, b_{2i} - a_{5a} \times b_{2i}\ = a_{6a}X_a \times b_{2i} \qquad (10\text{-}2)$$

Dummy variables were created for regression analyses. One levels of each categorical

independent variable was coded as '0' ($X_a = 0$: internal obesity attributions; $X_s = 0$: ingroup

message sources). If interaction terms included independent variables' levels that were coded as

0, the interaction term is automatically ruled out because multiplying any number by 0 is always

0. Therefore, $M_{s(att1sor0)}$ in equation 9-1 and $M_{s(sor1att0)}$ in equation 9-2 were ruled out because both

ingroup message sources (denoted as 'sor0') and internal attributions (denoted as 'att0') in each of

equations were coded as 0. In these cases, two equations (9-1 and 9-2) ultimately yielded the

same outcome. Equations 10-1 and 10-2 followed the same logic. In the final step, testing a statistical significance for differences between conditional indirect effects as made on the basis of bootstrap CI at 95% confidence level.

*Conditional indirect effects of obesity attributions and message sources on each dependent variable, mediated by anger about message sources*: The difference between conditional indirect effects of obesity attributions and message sources on attitudes toward 1) messages, the 2) message topic, and 3) recommendation, mediated by anger about message sources were examined. The following types of conditional indirect effects were compared. First, two conditional indirect effects that were derived by 1) the combination of external obesity attributions ($X_a = 1$) and non-Native American sources ($X_s = 1$) and 2) the combination of external obesity attributions ($X_a = 1$) and Native American sources ($X_s = 0$) were compared. Outcomes showed that these two conditional indirect effects differed by 0.19 units changes of attitudes on messages ($a_3 \times b1_{mes} = .19$), 0.25 units changes of attitudes on the message topic ($a_3 \times b1_{top} = .25$), and 0.16 units changes of attitudes on the recommended behavior ($a_3 \times b1_{rec} = .16$). All estimators lay between in the 95% CIs (95%CI for message attitudes = 0.022 to 0.411; 95%CI for the message topic attitudes = 0.028 to 0.532; and 95%CI for the recommendation attitudes = 0.016 and 0.362).

These results indicated that one unit increase of obesity attributions ($X_a = 1$: external obesity attributions) caused an increase of 0.19, 0.25, and 0.16 units of attitudes scores on messages, the topic, and the recommendation respectively on scale of 1 (Not positive at all) to 7 (Extremely positive), mediated by anger about message sources when message sources were outgroups members ($X_s = 1$) compared to ingroup members ($X_s = 0$). Second, two conditional effects that were derived by 1) the combination of non-Native American sources ($X_s = 1$) and

external obesity attributions ($X_a = 1$) and 2) the combination of non-Native American sources ($X_s = 1$) and internal obesity attributions ($X_a = 0$) were compared. The same outcome was obtained. One unit increase of message source ($X_s = 1$: outgroup message sources) increased the same amount of units of each of the message attitudes scores mediated by the same mediator (anger about message sources) when obesity attribution was an external obesity attribution ($X_a = 1$) rather than internal obesity attributions ($X_a = 0$).

Second, the difference between conditional indirect effects of obesity attributions and message sources on 3 source evaluation dimensions (expertise, sociability, and trustworthiness) mediated by anger about message sources were examined. Statistically significant differences between conditional indirect effects on source expertise ($a_3 \times b1_{exp} = .16$, 95%CI=0.009 to 0.355) and source sociability ($a_3 \times b1_{soc} = .19$, 95%CI = 0.022 to 0.403) were detected. The outcome indicated that the combination of external obesity attributions and outgroup message sources (Non-Native Americans) increased 0.16 units of source expertise ($a_3 \times b1_{exp} = .16$) and 0.19 units of source sociability ($a_3 \times b1_{soc} = .19$) scores compared to the combination of external obesity attributions and ingroup message sources (Native Americans) by reducing lower levels of anger toward message sources.

The same outcomes were detected: one unit increased in message sources ($X_s = 1$, outgroup message sources) increased the same amount in source expertise ($a_3 \times b1_{exp} = .16$) and sociability ($a_3 \times b1_{soc} = .19$) scores when outgroup message sources stated external obesity attributions ($X_a = 1$) compared to internal obesity attributions ($X_a = 0$). However, the difference between conditional indirect effects of obesity attributions and message sources on source trustworthiness mediated by anger of message sources were not statistically significant ($a_3 \times b1_{tr} = .11$, 95%CI = -0.000 to 0.271).

Third, the analysis found no statistically significant difference between conditional indirect effects of obesity attributions and message sources types on behavioral intention scores, mediated by anger about message sources ($a_3 \times b1_{bi} = .02$, 95%CI = -0.052 to 0.091). Tables 8 and 9 summarized the outcome of these analyses. Estimators for each of these conditional indirect paths and differences between these conditional indirect effects were presented by unstandardized regression coefficients (B). The tables also include bootstrap standard errors and bootstrap CIs at 95% confidence level.

Table 8. Interactions of obesity attributions and message sources on each dependent variable,

mediated by anger of message sources (One unit increase of obesity attributions $\times$ Message source types)

| Conditional indirect effects | B | SE (Boot) | Boot 95% CI [LL, UL] |
|---|---|---|---|
| Interaction → Mediator → DVs (Interaction effects of IVs on anger of sources $\times$ Direct effects of Mediator $\times$ DVs) | | | |
| Obesity attributions (1) $\times$ Message sources (0) → Anger of sources → Attitudes on messages ($a_{1s} \times b_{1mes}$) | -0.07 | 0.06 | [-0.203, 0.046] |
| Obesity attributions (1) $\times$ Message sources (1) → Anger of sources → Attitudes on messages ($a_{1s} + a_{3as}$) $\times b_{1mes}$ | 0.12 | 0.07 | [-0.006, 0.283] |
| ($a_{1s} + a_{3as}$) $\times b_{1mes}$ - ($a_{1s} \times b_{1mes}$) | 0.19* | 0.10 | [0.022, 0.411] |
| Obesity attributions (1) $\times$ Message sources (0) → Anger of sources → Attitudes on the message topic ($a_{1s} \times b_{1top}$) | -0.09 | 0.08 | [-0.258, 0.055] |
| Obesity attributions (1) $\times$ Message sources (1) → Anger of sources → Attitudes on the message topic ($a_{1s} + a_{3as}$) $\times b_{1top}$ | 0.16 | 0.10 | [-0.006, 0.372] |
| ($a_{1s} + a_{3as}$) $\times b_{1top}$ - ($a_{1s} \times b_{1top}$) | 0.25* | 0.13 | [0.028, 0.532] |
| Obesity attributions (1) $\times$ Message sources (0) → Anger of sources → Attitudes on the recommendation ($a_{1s} \times b_{1rec}$) | -0.06 | 0.05 | [-0.175, 0.037] |
| Obesity attributions (1) $\times$ Message sources (1) → Anger of sources → Attitudes on the recommendation ($a_{1s} + a_{3as}$) $\times b_{1rec}$ | 0.10 | 0.07 | [-0.004, 0.253] |
| ($a_{1s} + a_{3as}$) $\times b_{1rec}$ - ($a_{1s} \times b_{1rec}$) | 0.16* | 0.09 | [0.016, 0.362] |
| Obesity attributions (1) $\times$ Message sources (0) → Anger of sources → Source expertise evaluation ($a_{1s} \times b_{1exp}$) | -0.06 | 0.05 | [-0.172, 0.036] |
| Obesity attributions (1) $\times$ Message sources (1) → Anger of sources → Source expertise evaluation ($a_{1s} + a_{3as}$) $\times b_{1exp}$ | 0.10 | 0.067 | [-0.004, 0.246] |
| ($a_{1s} + a_{3as}$) $\times b_{1exp}$ - ($a_{1s} \times b_{1exp}$) | 0.165* | 0.090 | [0.009, 0.355] |
| Obesity attributions (1) $\times$ Message sources (0) → Anger of sources → Source sociability evaluation ($a_{1s} \times b_{1soc}$) | -0.07 | 0.06 | [-0.198, 0.045] |
| Obesity attributions (1) $\times$ Message sources (1) → Anger of sources → Source sociability evaluation ($a_{1s} + a_{3as}$) $\times b_{1soc}$ | 0.12 | 0.07 | [-0.007, 0.283] |
| ($a_{1s} + a_{3as}$) $\times b_{1soc}$ - ($a_{1s} \times b_{1soc}$) | 0.19* | 0.10 | [0.022, 0.403] |
| Obesity attributions (1) $\times$ Message sources (0) → Anger of sources → Source trustworthiness evaluation ($a_{1s} \times b_{1tr}$) | -0.04 | 0.04 | [-0.129, 0.027] |
| Obesity attributions (1) $\times$ Message sources (1) → Anger of sources → Source trustworthiness evaluation ($a_{1s} + a_{3as}$) $\times b_{1tr}$ | 0.07 | 0.05 | [-0.007, 0.189] |
| ($a_{1s} + a_{3as}$) $\times b_{1tr}$ - ($a_{1s} \times b_{1tr}$) | 0.11 | 0.07 | [-0.000, 0.271] |
| Obesity attributions (1) $\times$ Message sources (0) → Anger of sources → Behavioral intentions ($a_{1s} \times b_{1bi}$) | -0.01 | 0.02 | [-0.042, 0.022] |
| Obesity attributions (1) $\times$ Message sources (1) → Anger of sources → Behavioral intentions ($a_{1s} + a_{3as}$) $\times b_{1bi}$ | 0.01 | 0.02 | [-0.035, 0.065] |
| ($a_{1s} + a_{3as}$) $\times b_{1bi}$ - ($a_{1s} \times b_{1bi}$) | 0.02 | 0.04 | [-0.052, 0.091] |

*$p < .05$

Table 9. Interactions of obesity attributions and message sources on each dependent variable,

mediated by anger of message sources (One unit increase of message sources × Obesity attribution types)

| Conditional indirect effects Interaction → Mediator → DVs (Interaction effects of IVs on anger of sources × Direct effects of Mediator × DVs) | B | SE (Boot) | Boot 95% CI [LL, UL] |
|---|---|---|---|
| Message sources (1) × Obesity attributions (0) → Anger of sources → Attitudes on messages ($a_{2s} \times b_{1mes}$) | -0.40 | 0.14 | [-0.716, -0.148] |
| Message sources (1) × Obesity attributions (1) → Anger of sources → Attitudes on messages ($a_{2s} + a_{3as}$) × $b_{1mes}$ | -0.21 | 0.10 | [-0.453, -0.051] |
| ($a_{2s} + a_{3as}$) × $b_{1mes}$ - ($a_{2s} \times b_{1mes}$) | 0.19 | 0.10 | [0.022, 0.411] |
| Message sources (1) × Obesity attributions (0) → Anger of sources → Attitudes on the message topic ($a_{2s} \times b_{1top}$) | -0.52 | 0.16 | [-0.849, -0.237] |
| Message sources (1) × Obesity attributions (1) → Anger of sources → Attitudes on the message topic ($a_{2s} + a_{3as}$) × $b_{1top}$ | -0.27 | 0.11 | [-0.512, -0.085] |
| ($a_{2s} + a_{3as}$) × $b_{1top}$ - ($a_{2s} \times b_{1top}$) | 0.25 | 0.13 | [0.028, 0.532] |
| Message sources (1) × Obesity attributions (0) → Anger of sources → Attitudes on the recommendation ($a_{2s} \times b_{1rec}$) | -0.34 | 0.13 | [-0.513, -0.104] |
| Message sources (1) × Obesity attributions (1) → Anger of sources → Attitudes on the recommendation ($a_{2s} + a_{3as}$) × $b_{1rec}$ | -0.18 | 0.09 | [-0.378, -0.037] |
| ($a_{2s} + a_{3as}$) × $b_{1rec}$ - ($a_{2s} \times b_{1rec}$) | 0.16 | 0.09 | [0.016, 0.362] |
| Message sources (1) × Obesity attributions (0) → Anger of sources → Source expertise evaluation ($a_{2s} \times b_{1exp}$) | -0.32 | 0.13 | [-0.584, -0.086] |
| Message sources (1) × Obesity attributions (1) → Anger of sources → Source expertise evaluation ($a_{2s} + a_{3as}$) × $b_{1exp}$ | -0.17 | 0.09 | [-0.360, -0.033] |
| ($a_{2s} + a_{3as}$) × $b_{1exp}$ - ($a_{2s} \times b_{1exp}$) | 0.17 | 0.09 | [0.009, 0.355] |
| Message sources (1) × Obesity attributions (0) → Anger of sources → Source sociability evaluation ($a_{2s} \times b_{1soc}$) | -0.40 | 0.14 | [-0.686, -0.161] |
| Message sources (1) × Obesity attributions (1) → Anger of sources → Source sociability evaluation ($a_{2s} + a_{3as}$) × $b_{1soc}$ | -0.21 | 0.10 | [-0.439, -0.054] |
| ($a_{2s} + a_{3as}$) × $b_{1soc}$ - ($a_{2s} \times b_{1soc}$) | 0.19 | 0.10 | [0.022, 0.403] |
| Message sources (1) × Obesity attributions (0) → Anger of sources → Source trustworthiness evaluation ($a_{2s} \times b_{1tr}$) | -0.23 | 0.12 | [-0.483, -0.023] |
| Message sources (1) × Obesity attributions (1) → Anger of sources → Source trustworthiness evaluation ($a_{2s} + a_{3as}$) × $b_{1tr}$ | -0.12 | 0.08 | [-0.306, -0.008] |
| ($a_{2s} + a_{3as}$) × $b_{1tr}$ - ($a_{2s} \times b_{1tr}$) | 0.11 | 0.07 | [-0.000, 0.271] |
| Message sources (1) × Obesity attributions (0) → Anger of sources → Behavioral intentions ($a_{2s} \times b_{1bi}$) | -0.04 | 0.07 | [-0.180, 0.098] |
| Message sources (1) × Obesity attributions (1) → Anger of sources → Behavioral intentions ($a_{2s} + a_{3as}$) × $b_{1bi}$ | -0.02 | 0.04 | [-0.109, 0.051] |
| ($a_{2s} + a_{3as}$) × $b_{1bi}$ - ($a_{2s} \times b_{1bi}$) | 0.02 | 0.04 | [-0.052, 0.091] |

*Conditional indirect effects of obesity attributions and message sources on each*

*dependent variable, mediated by anger about obesity attributions*: First, differences between

conditional indirect effects as a result of interactions between obesity attributions and message

sources on attitudes toward 1) messages, 2) the message topic, and 3) the recommendation,

mediated by anger about obesity attributions were examined. Outcomes revealed that none of

these differences were significantly different from 0 ($a_6 \times b_{2mes} = .03$, 95%CI = -0.040 to –0.160;

$a_6 \times b_{2top} = -.00$, 95%CI = 0.081 to 0.064; $a_6 \times b_{2rec} = .02$, 95%CI = -0.047 to 0.119). Therefore,

differences in conditional indirect effects were not statistically significant.

Second, differences between conditional indirect effects of obesity attribution types and

message sources on 3 source evaluation dimensions (expertise, sociability, and trustworthiness)

via anger about obesity attribution did not associated with significant changes the mean of unit

changes of source expertise ($a_6 \times b_{2exp} = .05$, 95%CI = -0.052 to 0.209), source sociability

($a_6 \times b_{2soc} = .03$, 95%CI = -0.035 to 0.157), and source trustworthiness ($a_6 \times b_{2tr} = .07$, 95%CI = -

0.064 to 0.240).

Unit changes of Native American participants' behavioral intentions did not result in

types of obesity attributions and message source types when the mediator was the anger about

obesity attributions ($a_6 \times b_{2bi} = .02$, 95%CI = -0.026 to 0.089). Zero was included in the 95% CI.

Tables 10 and 11 summarized the outcomes that indicate the entirety of conditional indirect

effects and their differences when a mediator was anger about obesity attributions.

Table 10. Interactions of obesity attributions and message sources on each dependent variable,

mediated by anger of obesity attributions (One unit increase of obesity attributions × Message source types)

| Conditional indirect effects<br>Interaction → Mediator → DVs (Interaction effects of IVs on anger of attributions × Direct effects of Mediator × DVs) | B | SE<br>(Boot) | Boot 95% CI<br>[LL, UL] |
|---|---|---|---|
| Obesity attributions (1) × Message sources (0) → Anger of attributions → Attitudes on messages ($a_{4s} \times b_{2mes}$) | -0.01 | 0.03 | [-0.076, 0.038] |
| Obesity attributions (1) × Message sources (1) → Anger of attributions → Attitudes on messages ($a_{4s} + a_{6as}$) × $b_{2mes}$ | 0.02 | 0.04 | [-0.034, 0.117] |
| ($a_{4s} + a_{6as}$) × $b_{2mes}$ - ($a_{4s} \times b_{2mes}$) | 0.03 | 0.05 | [-0.040, 0.160] |
| Obesity attributions (1) × Message sources (0) → Anger of attributions → Attitudes on the message topic ($a_{4s} \times b_{2top}$) | 0.00 | 0.02 | [-0.031, 0.040] |
| Obesity attributions (1) × Message sources (1) → Anger of attributions → Attitudes on the message topic ($a_{4s} + a_{6as}$) × $b_{2top}$ | -0.00 | 0.03 | [-0.056, 0.051] |
| ($a_{4s} + a_{6as}$) × $b_{2top}$ - ($a_{4s} \times b_{2top}$) | -0.00 | 0.03 | [-0.081, 0.064] |
| Obesity attributions (1) × Message sources (0) → Anger of attributions → Attitudes on the recommendation ($a_{4s} \times b_{2rec}$) | -0.01 | 0.02 | [-0.065, 0.033] |
| Obesity attributions (1) × Message sources (1) → Anger of attributions → Attitudes on the recommendation ($a_{4s} + a_{6as}$) × $b_{2rec}$ | 0.01 | 0.03 | [-0.039, 0.087] |
| ($a_{4s} + a_{6as}$) × $b_{2rec}$ - ($a_{4s} \times b_{2rec}$) | 0.02 | 0.04 | [-0.047, 0.119] |
| Obesity attributions (1) × Message sources (0) → Anger of attributions → Source expertise ($a_{4s} \times b_{2exp}$) | -0.02 | 0.04 | [-0.102, 0.052] |
| Obesity attributions (1) × Message sources (1) → Anger of attributions → Source expertise ($a_{4s} + a_{6as}$) × $b_{2exp}$ | 0.03 | 0.05 | [-0.047, 0.155] |
| ($a_{4s} + a_{6as}$) × $b_{2exp}$ - ($a_{4s} \times b_{2exp}$) | 0.05 | 0.07 | [-0.052, 0.209] |
| Obesity attributions (1) × Message sources (0) → Anger of attributions → Source sociability ($a_{4s} \times b_{2soc}$) | -0.01 | 0.03 | [-0.077, 0.036] |
| Obesity attributions (1) × Message sources (1) → Anger of attributions → Source sociability ($a_{4s} + a_{6as}$) × $b_{2soc}$ | 0.02 | 0.04 | [-0.030, 0.114] |
| ($a_{4s} + a_{6as}$) × $b_{2soc}$ - ($a_{4s} \times b_{2soc}$) | 0.03 | 0.05 | [-0.035, 0.157] |
| Obesity attributions (1) × Message sources (0) → Anger of attributions → Source trustworthiness ($a_{4s} \times b_{2tr}$) | -0.02 | 0.05 | [-0.121, 0.064] |
| Obesity attributions (1) × Message sources (1) → Anger of attributions → Source trustworthiness ($a_{4s} + a_{6as}$) × $b_{2tr}$ | 0.04 | 0.06 | [-0.058, 0.176] |
| ($a_{4s} + a_{6as}$) × $b_{2tr}$ - ($a_{4s} \times b_{2tr}$) | 0.07 | 0.08 | [-0.064, 0.240] |
| Obesity attributions (1) × Message sources (0) → Anger of attributions → behavioral intentions ($a_{4s} \times b_{2bi}$) | -0.01 | 0.02 | [-0.032, 0.024] |
| Obesity attributions (1) × Message sources (1) → Anger of attributions → behavioral intentions ($a_{4s} + a_{6as}$) × $b_{2bi}$ | 0.01 | 0.02 | [-0.020, 0.069] |
| ($a_{4s} + a_{6as}$) × $b_{2bi}$ - ($a_{4s} \times b_{2bi}$) | 0.02 | 0.03 | [-0.026, 0.089] |

Table 11. Interactions of obesity attributions and message sources on each dependent variable,

mediated by anger of obesity attributions (One unit increase of message sources × Obesity attribution types)

| Conditional indirect effects<br>Interaction → Mediator → DVs (Interaction effects of IVs on Anger of attributions × Direct effects of Mediator × DVs) | B | SE (Boot) | Boot 95% CI [LL, UL] |
|---|---|---|---|
| Message sources (1) × Obesity attributions (0) → Anger of attributions → Attitudes on messages ($a_{5a} \times b_{2mes}$) | -0.112 | 0.089 | [-0.302, 0.048] |
| Message sources (1) × Obesity attributions (1) → Anger of attributions → Attitudes on messages ($a_{5a} + a_{6as}$) × $b_{2mes}$ | -0.079 | 0.038 | [-0.214, 0.035] |
| ($a_{5a} + a_{6as}$) × $b_{2mes}$ - ($a_{5a} \times b_{2mes}$) | 0.034 | 0.050 | [-0.040, 0.160] |
| Message sources (1) × Obesity attributions (0) → Anger of attributions → Attitudes on the message topic ($a_{5a} \times b_{2top}$) | 0.013 | 0.080 | [-0.152, 0.170] |
| Message sources (1) × Obesity attributions (1) → Anger of attributions → Attitudes on the message topic ($a_{5a} + a_{6as}$) × $b_{2top}$ | 0.008 | 0.058 | [-0.112, 0.120] |
| ($a_{5a} + a_{6as}$) × $b_{2top}$ - ($a_{5a} \times b_{2top}$) | -0.004 | 0.033 | [-0.081, 0.064] |
| Message sources (1) × Obesity attributions (0) → Anger of attributions → Attitudes on the recommendation ($a_{5a} \times b_{2rec}$) | -0.086 | 0.080 | [-0.255, 0.063] |
| Message sources (1) × Obesity attributions (1) → Anger of attributions → Attitudes on the recommendation ($a_{5a} + a_{6as}$) × $b_{2rec}$ | -0.063 | 0.060 | [-0.194, 0.039] |
| ($a_{5a} + a_{6as}$) × $b_{2rec}$ - ($a_{5a} \times b_{2rec}$) | 0.022 | 0.041 | [-0.047, 0.119] |
| Message sources (1) × Obesity attributions (0) → Anger of attributions → Source expertise ($a_{5a} \times b_{2exp}$) | -0.171 | 0.098 | [-0.394, -0.010] |
| Message sources (1) × Obesity attributions (1) → Anger of attributions → Source expertise ($a_{5a} + a_{6as}$) × $b_{2exp}$ | -0.120 | 0.071 | [-0.281, -0.006] |
| ($a_{5a} + a_{6as}$) × $b_{2exp}$ - ($a_{5a} \times b_{2exp}$) | 0.051 | 0.065 | [-0.052, 0.209] |
| Message sources (1) × Obesity attributions (0) → Anger of attributions → Source sociability ($a_{5a} \times b_{2soc}$) | -0.107 | 0.089 | [-0.303, 0.048] |
| Message sources (1) × Obesity attributions (1) → Anger of attributions → Source sociability ($a_{5a} + a_{6as}$) × $b_{2soc}$ | -0.074 | 0.062 | [-0.210, 0.035] |
| ($a_{5a} + a_{6as}$) × $b_{2soc}$ - ($a_{5a} \times b_{2soc}$) | 0.033 | 0.049 | [-0.034, 0.157] |
| Message sources (1) × Obesity attributions (0) → Anger of attributions → Source trustworthiness ($a_{5a} \times b_{2tr}$) | -0.220 | 0.096 | [-0.121, -0.061] |
| Message sources (1) × Obesity attributions (1) → Anger of attributions → Source trustworthiness ($a_{5a} + a_{6as}$) × $b_{2tr}$ | -0.155 | 0.071 | [-0.058, -0.037] |
| ($a_{5a} + a_{6as}$) × $b_{2tr}$ - ($a_{5a} \times b_{2tr}$) | 0.065 | 0.076 | [-0.064, 0.240] |
| Message sources (1) × Obesity attributions (0) → Anger of attributions → behavioral intentions ($a_{5a} \times b_{2bi}$) | -0.063 | 0.053 | [-0.179, 0.032] |
| Message sources (1) × Obesity attributions (1) → Anger of attributions → behavioral intentions ($a_{5a} + a_{6as}$) × $b_{2bi}$ | -0.045 | 0.039 | [-0.132, 0.023] |
| ($a_{5a} + a_{6as}$) × $b_{2bi}$ - ($a_{5a} \times b_{2bi}$) | 0.018 | 0.029 | [-0.026, 0.089] |

In summary, H15 was partially supported. When the mediator was anger toward message sources, the type of interactions between obesity attributions and message source types on statistically significant differences in unit changes of dependent variables in most cases except for the case when message trustworthiness and behavioral intentions were predicted variables. When obesity attributions were external attributions, and if these attributions were delivered by non-Native American sources, Native American participants showed more positive attitudes and source evaluations on sources' expertise and sociability through a decrease in levels of anger. The outcome indicated that certain types of obesity attributions and message source types' Interactions led to significantly different reactions to messages as well as message sources in general as a result of unit changes of anger about message sources, which in turn a change of units of each dependent variable. On the other hand, regardless of interactions between obesity attributions and message source types, the amount of unit changes in message attitudes, cognitive source evaluations, and behavioral intentions via anger about obesity attributions were not significantly different. Table 12 presents the overall analysis outcomes that are associated with 15 research hypotheses.

Table 12. Summary of regression analyses outcomes (for testing hypotheses 1-15)

| Analysis steps | Independent variables | | Mediators (SE) | | Dependent variables (SE) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $M_s$ | $M_a$ | $Att_{mes}$ | $Att_{top}$ | $Att_{rec}$ | $SE_{exp}$ | $SE_{soc}$ | $SE_{tr}$ | BI |
| Step1 (Covariates only) | Ingroup Orientations | | - | -.40* (.16) | - | - | - | - | - | - | - |
| | Health Involvement | | - | - | -.02 (.23) | - | .07 .22) | - | - | - | - |
| | Obesity Self-Involvement | | - | - | - | .46** (.14) | - | - | - | - | .16 (.10) |
| | Obesity Other Involvement | | - | - | -.51* (.23) | - | -.40 (.22) | - | - | - | .10 (.11) |
| Step2 (Covariates + Main effects of IVs) Testing H1,2,3,4,6, 7,8,9 | Covariates | Ingroup Orientations | - | -.39 (.15) | - | - | - | - | - | - | - |
| | | Health involvement | - | - | -.20 (.19) | - | .09 (.18) | - | - | - | - |
| | | Obesity Self-involvement | - | - | - | - | - | - | - | - | .17 (.10) |
| | | Obesity Other involvement | - | - | .32 (.19) | .32** (.12) | .22 (.22) | - | - | - | .09 (.11) |
| | Obesity Attributions | | -.09 (.17) | -.05 (.17) | -.02 (.13) | .01 (.15) | .00 (.12) | .14 (.13) | .32** (.12) | .12 (.12) | -.02 (.07) |
| | Message Sources | | .15*** (.17) | .94** (.31) | -.94*** (.26) | -.68** (.25) | -1.05*** (.23) | -1.01*** (.26) | -1.05*** (.27) | -1.04*** (.26) | .12 (.17) |
| | Anger of message sources ($M_s$) | | - | - | -.23** (.09) | -.33*** (.09) | -.19** (.07) | -.19* (.08) | -.25** (.08) | -.14 (.08) | -.02 (.04) |
| | Anger of obesity attributions ($M_a$) | | - | - | -.13 (.08) | -.01 (.09) | -.09 (.07) | -.18* (.08) | -.12 (.08) | -.22** (.08) | -.02 (.04) |
| | Covariates | Ingroup Orientations | - | -.39* (.15) | - | - | - | - | - | - | - |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Step3 (Covariates + Main effects of IVs + Interaction effects) Testing H 11 – 15 | Health involvement | - | - | -.20 (.19) | - | .09 (.18) | - | - | - | - |
| | Obesity Self-involvement | - | - | - | - | - | - | - | - | .17 (.10) |
| | Obesity Other involvement | - | - | .32 (.20) | .33** (.13) | .22 (.18) | - | - | - | .09 (.11) |
| | Obesity Attributions | .28 (.24) | .11 (.23) | .03 (.19) | -.07 (.20) | -.04 (.16) | .12 (.18) | .16 (.17) | -.070 (.17) | .02 (.10) |
| | Message Sources | .52*** (.34) | .10** (.35) | -.89** (.30) | -.77** (.29) | -1.09*** (.27) | -1.03*** (.29) | -1.23*** (.30) | -1.25*** (.29) | .17 (.19) |
| | Attributions × Sources | -.75* (.33) | -.33 (.33) | -.09 (.27) | .16 (.30) | .08 (.24) | .03 (.26) | .32 (.25) | .40 (.24) | -.08 (.14) |
| | Anger of message sources (M$_s$) | - | - | -.23** (.09) | -.33*** (.09) | -.19* (.08) | -.19* (.08) | -.23** (.08) | -.11 (.08) | -.02 (.05) |
| | Anger of obesity attributions (M$_a$) | - | - | -.13 (.08) | -.01 (.09) | -.10 (.07) | -.18* (.08) | -.13 (.07) | -.23** (.08) | -.06 (.04) |

*$p < .05$, **$p < .01$, ***$p < .001$

M$_s$: Anger of message sources; M$_a$: Anger of obesity attributions; Att$_{mes}$: Attitudes of messages; Att$_{top}$: Attitudes of the message topic (obesity); Att$_{rec}$: Attitudes of the recommended behavior; SE$_{exp}$: Cognitive source evaluation of source expertise; SE$_{soc}$: Cognitive source evaluations of source sociability; SE$_{tr}$: Cognitive source evaluations of source trustworthiness

*Testing targeted message effects:* H16 predicted targeted messages' effects only on Native American participants. Specifically, the hypothesis postulated significant differences in ways Native and non-Native American participants respond to obesity attribution types and message sources with respect to anger, attitudes, source evaluations, and behavioral intentions. Both those datasets collected from Native and non-Native Americans (N = 233 respondents) were included in the analysis. Again, Pearson's correlation analyses were performed in advance to explore significant relations between premeasures and outcome variables across all participants.

Table 13. Intercorrelations among key variables

(Both native American and non-Native American participants)

| Mediators & Dependent Variables | Ingroup Orientations | Outgroup Orientations (Contact) | Outgroup Orientations (Involvement) | Health Involvement | Obesity Self-Involvement | Obesity Other Involvement |
|---|---|---|---|---|---|---|
| $M_s$ | .11* | .11* | -.02 | -.04 | .03 | -.05 |
| $M_a$ | .10* | .08 | -.05 | .02 | .06 | -.02 |
| $Att_{mes}$ | .14** | .07 | -.16** | .15** | .17** | .16** |
| $Att_{top}$ | .17** | .05 | -.15** | .19** | .18** | .18** |
| $Att_{rec}$ | .09 | .06 | -.13** | .21** | .14** | .15** |
| $SE_{exp}$ | .07 | .08 | -.13** | .14** | .14** | .13** |
| $SE_{soc}$ | .05 | .04 | -.14** | .12** | .13** | .13** |
| $SE_{tr}$ | .07 | .03 | -.14** | -.12** | .16** | .14** |
| BI | .09 | .16** | -.23** | .20** | .26** | .26** |

*$p < .05$, **$p < .01$, ***$p < .001$

$M_s$: Anger of message sources; $M_a$: Anger of obesity attributions; $Att_{mes}$: Attitudes of messages; $Att_{top}$: Attitudes of the message topic (obesity); $Att_{rec}$: Attitudes of the recommended behavior; $SE_{exp}$: Cognitive source evaluation of source expertise; $SE_{soc}$: Cognitive source evaluations of source sociability; $SE_{tr}$: Cognitive source evaluations of source trustworthiness; BI: Behavioral Intentions

Premeasures that showed statistically significant associations with each outcome variable were entered as covariates in the data analysis processes. A series of 2 (Between-subjects factor:

message recipients: Native/non-Native Americans) × 2 (Within-subjects factor: obesity attributions: internal/external) × 2 (Between-subjects factors: sources of criticism: Native/non-Native Americans) mixed-design ANOVAs were performed. These analyses tested 1) the main effects of participants' ethnicity on 2 mediators each (anger toward message sources and obesity attributions) and 7 dependent variables (attitudes toward 1) messages, 2) the message topic and 3) the recommendation; evaluations of sources' 1) expertise, 2) sociability, and 3) trustworthiness, and behavioral intentions). Two sets of 2-way interactions between 1) participants' ethnicities and obesity attributions, as well as 2) participants' ethnicities and message sources were also estimated. Last, the 3-way interaction between message recipients' ethnicities, obesity attribution types, and message source types was computed.

*The main effect of message recipients' ethnicities on predictors*: First, the goal of the statistical analysis was to identify significant differences between the two message recipient groups' anger toward message sources and obesity attributions. Two mixed ANOVA analyses outcomes found a statistically significant main effect of participants' ethnicities on their anger toward message sources ($F_{1, 223} = 7.96$, $p = .004$, $\eta^2 = .034$) and message attributions ($F_{1, 223} = 15.19$, $p < .001$, $\eta^2 = .064$) after covariates associated with each mediator (anger toward message sources: ingroup orientation and other group contact orientation; anger about obesity attributions: other group contact orientation) were controlled. Native American participants reported more anger toward message sources ($M = 2.69$, $SD = .14$) and obesity attributions ($M = 2.99$, $SD = .14$) than did non-Native Americans (anger toward message source: $M = 2.10$, $SD = .14$; interactions between obesity attributions: $M = 2.19$, $SD = .14$).

The main effects of message recipients' ethnicities on attitudes toward 1) messages, 2) the message topic, and 3) the recommended behaviors were not statistically significant (Message

attitudes: $F_{1, 219} = .00$, $p = .955$; message topic attitudes: $F_{1, 217} = .00$, $p = .976$; message

recommendation attitudes: $F_{1, 220} = .09$, $p = .765$). Contrary to the hypothesis predicted, Native

American participants' attitudes towards obesity prevention messages overall did not differ from

those of non-Native American participants. With respect to source evaluations, no statistically

significant main effects of message recipients' ethnicities on any of the 3 cognitive source

evaluations were detected (expertise: $F_{1, 218} = .83$, $p = .362$; sociability: $F_{1, 218} = 2.10$, $p = .150$;

trustworthiness: $F_{1, 219} = .67$, $p = .416$). Regardless of message recipients' ethnicities,

participants' cognitive evaluations of message sources did not vary. Message recipients'

ethnicities also had no statistically significant influence on the varying levels of participants'

intentions to accept the recommendation ($F_{1, 211} = 2.73$, $p = .100$). Overall, Native American

participants reported significantly more anger toward message sources and obesity attributions

than did non-Native American participants. However, the two groups' subsequent message

processing outcomes (attitudes, source evaluations, and behavioral intentions) did not differ

significantly according to their ethnicities.

     *Effects of 2-way interactions between message recipients' ethnicities and obesity*

*attributions (message recipients' ethnicities × obesity attributions) on predictors*: The effects of

interactions between message recipients' ethnicities and obesity attribution types in evoking

varying levels of anger toward message sources and obesity attributions, as well as message

attitudes, source evaluations, and intentions to follow the message's recommendation were

examined. Hypothesis 16 predicted that Native American participants show 1) more anger

toward message sources and attributions, 2) more negative attitudes toward messages, 3) more

unfavorable source evaluations, and 4) greater intentions to reject the message

than non-Native American participants as a result of the interplay between message recipients'

ethnicities and obesity attribution types.

The mixed ANOVA outcomes revealed that all of these projections were statistically insignificant across all outcome variables (anger toward message sources: $F_{1, 223} = .68$, $p = .410$; interactions between obesity attributions: $F_{1, 223} = 1.01$, $p = .317$; attitudes toward messages: $F_{1, 219} = .26$, $p = .608$; attitudes toward the message topic: $F_{1, 217} = .41$, $p = .625$; attitudes toward the recommendation: $F_{1, 220} = .98$, $p = .324$; source expertise: $F_{1, 218} = 1.51$, $p = .221$; source sociability: $F_{1, 218} = .84$, $p = .360$; source trustworthiness: $F_{1, 219} = .34$, $p = .560$; behavioral intentions: $F_{1, 211} = .25$, $p = .620$). These outcomes contrasted with the research hypotheses predicted; combinations of message recipients' ethnicities and types of obesity attributions did not cause significant differences in participants' anger experience, attitudes, source evaluations, and behavioral intentions.

*Effects of 2-way interaction between message recipients' ethnicities and message sources (message recipients' ethnicities × source of criticism) on predictors*: H16 also predicted significant interaction effects between participants' and message sources' ethnicities on outcome variables. Significant variations among participants' anger toward message sources and obesity attributions, attitudes toward messages, the message topic, and recommendation, evaluations of sources' expertise, sociability, and trustworthiness, and behavioral intentions that are caused by interactions between message recipients' ethnicities and message sources were also predicted.

First, with respect to anger toward message sources and obesity attributions, statistically significant interaction effects between message recipients' and source ethnicities on anger were found (anger toward message sources: $F_{1, 223} = 14.74$, $p < .000$, $\eta^2 = .062$; anger toward obesity attributions: $F_{1, 223} = 9.75$, $p < .01$, $\eta^2 = .042$) after covariates were controlled. When message sources were non-Native Americans, Native American participants reported more anger toward

these sources ($M = 3.27$, $SD = .19$); this increment was significantly higher than anger toward

message sources that non-Native American participants reported ($M = 1.98$, $SD = .18$ on a scale

of 1 (Not angry at all) to 7 (Extremely angry). Compared to the anger Native American

participants reported toward Native American message sources ($M = 2.10$, $SD = .19$), non-Native

American participants showed more anger toward Native American message sources based on

the same scale ($M = 2.22$, $SD = .19$).

When interactions between obesity attributions was the outcome variable, Native and

non-Native American participants showed different levels of anger toward obesity attributions

depending on the message sources' ethnicities. When non-Native Americans delivered the

messages, Native American participants showed more anger toward obesity attributions ($M =$

3.49, $SD = .21$) than when Native Americans delivered the same messages on the same scale ($M$

$= 2.48$, $SD = 2.30$). On the other hand, non-Native Americans showed more anger toward obesity

attributions when message sources were Native ($M = 2.30$, $SD = .20$) than non-Native Americans

($M = 2.07$, $SD = .19$). Figure 11 illustrated the outcomes of these interactions.

Figure 11. Interactions of message recipients' and sources' ethnicities and anger toward message

sources (left) and anger obesity attributions (right) (Negative)
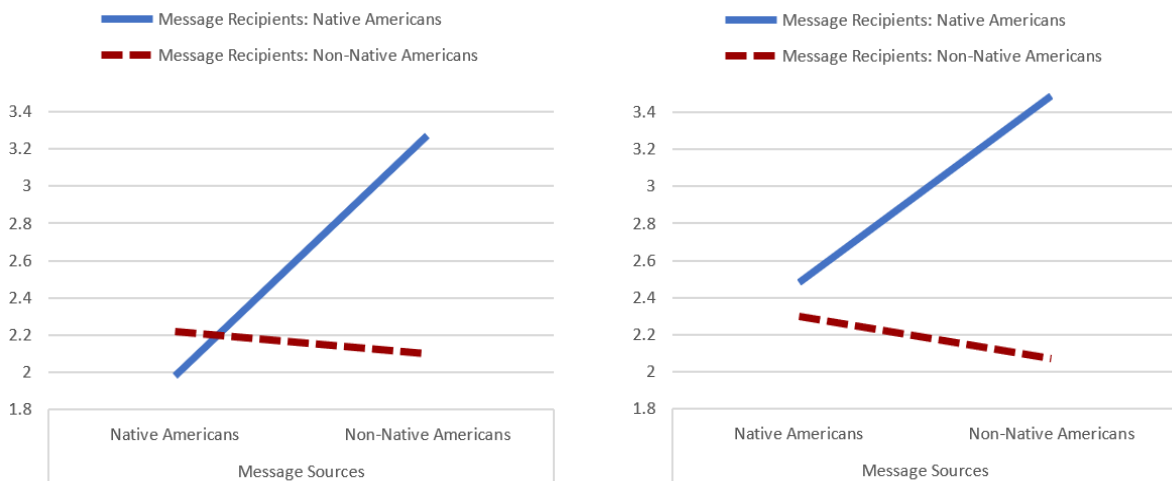
With respect to these 3 attitude dimensions, statistically significant interactions between message recipients' and sources' ethnicities and participants' attitudes toward 1) messages, 2) the message topic, and 3) the recommendation, were identified (message attitudes: $F_{1, 219} = 21.61$, $p < .001$, $\eta^2 = .090$; message topic attitudes: $F_{1, 217} = 13.01$, $p < .001$, $\eta^2 = .057$; $F_{1, 220} = 19.01$, $p < .001$, $\eta^2 = .080$) after covariates (Obesity self-involvement, obesity other involvement, other group integrated orientation, and health involvement) were controlled. Outcomes showed that who delivered obesity prevention messages led to significant differences between the two groups of participants' attitude scores. Specifically, Native American participants reported more favorable attitudes toward messages when their sources were Native Americans ($M = 5.77$, $SD = .19$) than non-Native Americans on a scale of 1 (Not positive at all) to 7 (Extremely positive) ($M = 4.44$, $SD = .22$). Similarly, non-Native American participants showed more positive attitudes toward messages when their sources were non-Native Americans ($M = 5.32$, $SD = .19$) than Native Americans ($M = 4.91$, $SD = .19$) (Figure 12).
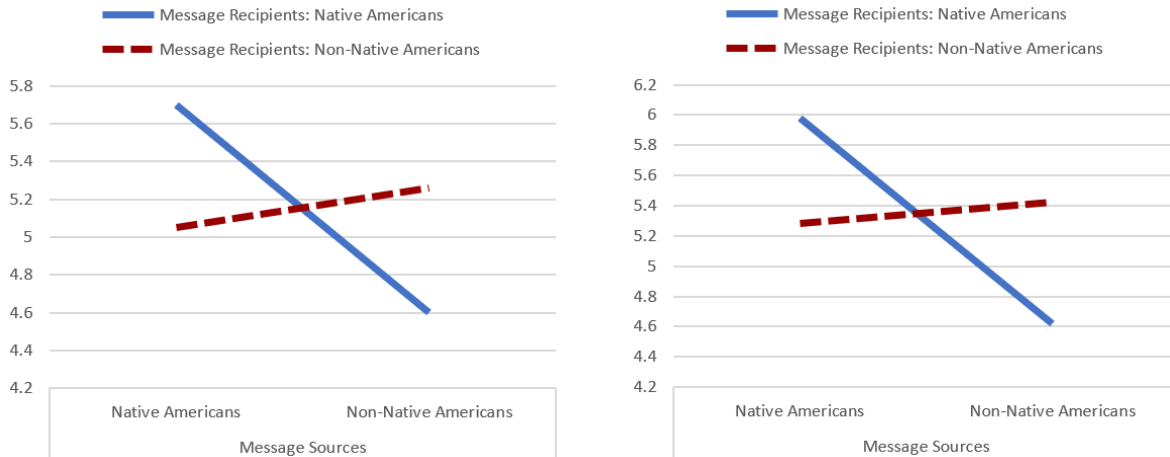
Figure 12. Interactions of message recipients' ethnicities and sources' ethnicities on attitudes toward messages (Positive)



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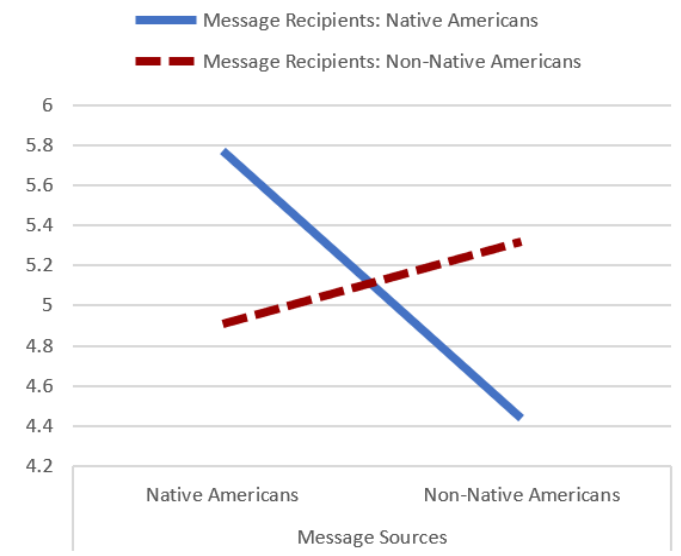
The same pattern was found when the outcome variables were attitudes toward the message topic and recommended behavior. Native American participants' attitudes toward the message topic, obesity, were more favorable when the message sources were Native Americans ($M = 5.70$, $SD = .19$) than non-Native Americans based on a scale of 1 (Not positive at all) to 7 (Extremely positive) ($M = 4.60$, $SD = .18$). Non-Native American participants showed converse patterns; attitudes toward the message topic were more positive when message sources were non-Native Americans ($M = 5.26$, $SD = .18$) than Native Americans based on the same scale ($M = 5.05$, $SD = .19$).

Native American participants' attitudes toward the recommendation stated in the obesity prevention messages were more favorable when Native American sources delivered the messages ($M = 5.98$, $SD = .17$) than when non-Native Americans delivered the same messages on the same scale ($M = 4.62$, $SD = .18$). On the other hand, non-Native American participants reported more favorable attitudes toward the same recommendation when message sources were non-Native Americans ($M = 5.42$, $SD = .17$) than Native Americans based on the same scale ($M = 5.28$, $SD = .17$). Figure 13 showed the interaction effects between message recipients' and message sources' ethnicities on attitudes toward the message topic and recommendation.
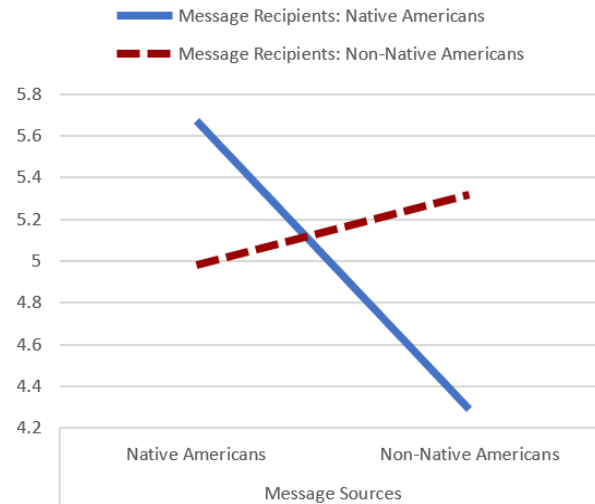
Figure 13. Interactions of message recipients' ethnicities and message sources' ethnicities on attitudes toward the message topic (left) and the recommendation (right) (Positive)



Next, differences between the two groups' evaluations of message sources' expertise, sociability, and trustworthiness were analyzed. The outcome indicated that there were statistically significant interactions between message recipients' ethnicities and sources' ethnicities in evaluating sources' expertise ($F_{1, 218} = 21.48$, $p < .001$, $\eta^2 = .090$) after covariates (Ingroup orientation, other group integrated orientation, obesity-self involvement, obesity other involvement, and health involvement) were controlled. Native American participants evaluated Native American doctors as more expert ($M = 5.67$, $SD = .19$) then non-Native American doctors on a scale of 1 (Not expert at all) to 7 (Extremely expert) ($M = 4.29$, $SD = .19$). However, non-Native American participants perceived that non-Native American doctors' expertise was greater ($M = 5.32$, $SD = 4.98$) than that of Native American doctors based on the same scale ($M = 4.98$, $SD = .19$) (Figure 14).

Figure 14. Interactions of message recipients' ethnicities and message sources' ethnicities on evaluations of message sources' expertise (Positive)



The analysis also found a statistically significant interaction effect between message recipients' ethnicities and source ethnicities on assessments of message sources' sociability ($F_{1, 218}$ = 18.55, $p < .001$, $\eta^2 = .078$) after all covariates associated with the source's sociability (Ingroup orientation, other group integrated orientation, obesity-self involvement, obesity other involvement, and health involvement) were controlled. Native American participants reported that Native American doctors' sociability ($M = 5.43$, $SD = .19$) was significantly higher than that of non-Native American doctors on a scale of 1 (Not sociable at all) to 7 (Extremely sociable) ($M = 4.07$, $SD = .20$). In contrast, non-Native American participants thought that non-Native American doctors were more sociable ($M = 5.19$, $SD = .19$) than Native American doctors based on the same measurement ($M = 4.89$, $SD = .19$) (Figure 15).

Figure 15. Interactions of message recipients' ethnicities and message sources' ethnicities on evaluations of message sources' sociability (Positive)
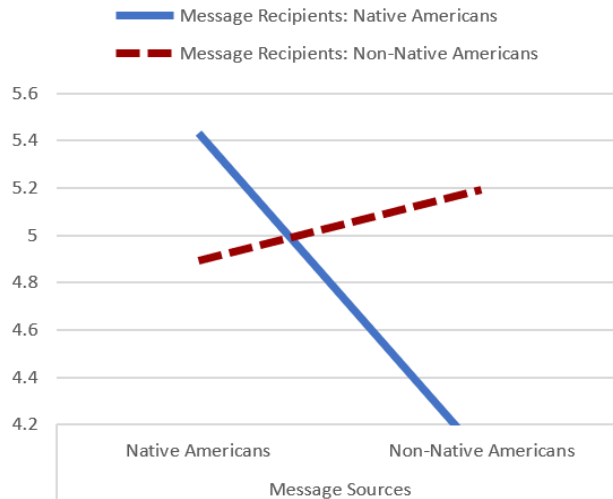


The same outcome was found with respect to participants' evaluations of message sources' trustworthiness; the two groups of participants' evaluations of sources' trustworthiness differed significantly ($F_{1, 219} = 21.02$, $p < .001$, $\eta^2 = .088$) after covariates (Ingroup orientation, other group integrated orientation, obesity-self involvement, obesity other involvement, and health involvement) were controlled. Like the other cognitive source evaluation outcomes presented, Native American participants evaluated message sources' trustworthiness more positively when they were Native American doctors ($M = 5.77$, $SD = .18$) than non-Native American doctors ($M = 4.39$, $SD = .19$) on a scale of 1 (Not trustworthy at all) to 7 (Extremely trustworthy). However, non-Native American participants thought non-Native American doctors were more trustworthy ($M = 5.38$, $SD = .51$) than Native American doctors based on the same scale (Figure 16).

Figure 16. Interactions of message recipients' ethnicities and message sources' ethnicities on evaluations of message sources' trustworthiness (Positive)
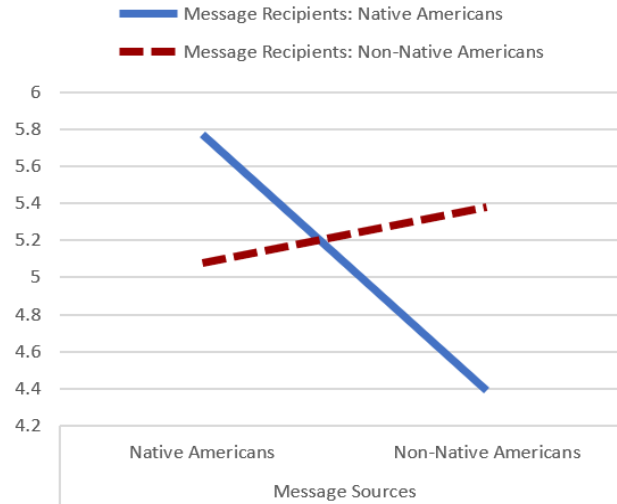


Finally, the outcome indicated that the interaction between participants' ethnicities and message sources' ethnicities had no significant effect on Native and non-Native American participants' behavioral intentions ($F_{1, 211} = .18$, $p = .669$).

In summary, the interaction effects supported the research hypothesis predictions. Across all outcome variables, Native American participants reported more anger toward both message sources and obesity attributions when message sources were non-Native than Native Americans. The converse outcomes were found for non-Native American participants, who reported more anger both toward message sources and obesity attributions when Native American than non-Native American sources delivered the messages. To Native American participants, non-Native American message sources caused more negative attitudes toward messages and unfavorable source evaluations compared to Native American message sources. Again, non-Native American participants exhibited the opposite pattern, in that they were more likely to report negative attitudes and unfavorable source evaluations when message sources were Native Americans. On

the other hand, when non-Native American doctors were the message sources, non-Native American participants tended to report more positive attitudes towards messages and favorable evaluations of these sources compared to situations when the message sources were Native American doctors.

*Three-way interactions between message recipients' ethnicities, obesity attributions, and message sources (message recipients' ethnicities × obesity attributions × source of criticism) and predictors*: H16 predicted significant 3-way interactions between participants' ethnicities, obesity attribution types, and message sources' ethnicities and the outcome variables. The results showed that none of these 3-way interaction effects was statistically significant across all outcome variables (anger toward message sources: $F_{1, 223} = 2.01$, $p = .154$; anger toward obesity attributions: $F_{1, 223} = .92$, $p = .340$; attitudes toward messages: $F_{1, 219} = .74$, $p = .390$; attitudes toward the message topic: $F_{1, 217} = 2.59$, $p = .109$; attitudes toward the recommendation: $F_{1, 220} = .94$, $p = .332$; source expertise: $F_{1, 218} = .42$, $p = .517$; source sociability: $F_{1, 218} = 3.18$, $p = .076$; source trustworthiness: $F_{1, 219} = .72$, $p = .400$, and behavioral intentions: $F_{1, 211} = .00$, $p = .951$). Regardless of the combinations of message recipients' ethnicities, obesity attribution types, and message sources' ethnicities, both Native and non-Native American participants showed no significant differences in their anger experiences, attitudes, source evaluations, and behavioral intentions. Table 14 summarized the results of all 16 research hypotheses' tests.

Table 14. Summary of hypotheses testing results

| Predictors | Hypotheses | Results |
|---|---|---|
| Obesity Attributions | H1: An internal attribution of obesity in the obesity prevention message will lead to higher levels of anger about 1) message sources and b) obesity attributions relative to an external attribution of obesity. | Rejected |
| | H2: An internal attribution of obesity in the obesity prevention message will lead to higher levels of negative attitudes toward 1) the message, 2) the message topic, and 3) the recommended behavior relative to an external attribution of obesity. | Rejected |
| | H3: An internal attribution of obesity in the obesity prevention message will lead to higher levels of unfavorable source evaluations on source's 1) expertise, 2) sociability, and 3) trustworthiness relative to an external attribution of obesity. | Partially Supported |
| | H4: An internal attribution of obesity in the obesity prevention message will lead to greater levels of message rejection (lower in behavioral intentions) relative to an external attribution of obesity. | Rejected |
| Message Sources | H5: A non- Native American ethnic source in the obesity prevention message will lead to higher levels of anger about 1) message sources, and 2) obesity attributions relative to a Native American ethnic source. | Supported |
| | H6: A non- Native American ethnic source in the obesity prevention message will lead to higher levels of negative attitudes toward 1) the message; 2) the message topic, and 3) the recommended behavior relative to a Native American ethnic source. | Supported |
| | H7: A non- Native American ethnic source in the obesity prevention message will lead to higher levels of unfavorable source evaluations on source's 1) expertise, 2) sociability, and 3) trustworthiness relative to a Native American ethnic source. | Supported |
| | H8: A non- Native American ethnic source in the obesity prevention message will lead to greater levels of message rejection (lower in behavioral intentions) relative to a Native American ethnic source. | Rejected |
| Mediation Effects of Anger | H9: Anger about a) message sources and b) obesity attributions will mediate the relationship between obesity attribution types and message processing outcomes (attitudes toward the message, source evaluations, and message rejections). | Rejected |

| | | |
|---|---|---|
| | H10: Anger about a) message sources and b) obesity attributions will mediate the relationship between message source types and message processing outcomes (attitudes toward the message, source evaluations, and message rejections). | Partially Supported |
| Obesity Attributions × Message Sources | H11: There will be an interaction between attribution types and message sources on Native Americans' experience in varying levels of anger about 1) message sources and 2) obesity attributions. | Partially Supported |
| | H12: There will be an interaction between attribution types and message sources on Native Americans' attitudes toward 1) the message; 2) the message topic, and 3) the recommended behavior. | Rejected |
| | H13: There will be an interaction between attribution types and message sources on Native Americans' evaluations on message source's 1) expertise, 2) sociability, and 3) trustworthiness. | Rejected |
| | H14: There will be an interaction between attribution types and message sources on Native Americans' levels of message rejections (behavioral intentions). | Rejected |
| | H15: Anger about a) message sources and b) obesity attributions will mediate the relationship between interactions of obesity attribution types and message sources and message processing outcomes (attitudes toward the message, source evaluations, and message rejections). | Partially Supported |
| Targeted Message effects | H16: Across attribution types, message sources, and a combination of an attribution type and the message source, Native Americans will show different message responses in terms of 1) anger, 2) message attitudes, 3) source evaluations, and 4) message rejection behaviors compared to non-Native Americans. | Partially Supported |

# Chapter 6. Discussion

The goal of this study was to explore the effects of obesity prevention messages that targeted Native Americans. Specific message features this study employed to design obesity prevention messages targeting Native Americans were obesity attributions and message sources of criticizing the obesity problem. The main purpose of the study was to answer predictions that Native Americans would experience varying levels of anger toward obesity prevention messages and subsequent health message processing outcomes as a result either of different obesity attribution types, message sources, or both. Roles of anger as a mediator that influences subsequent message processing outcomes with respect to message attitudes, source evaluations, and intentions to accept the recommendation were also discussed. Further, the main premise of the targeted health messages was tested by comparing Native Americans' responses to those of non-Native Americans to Native American targeted obesity prevention messages.

A series of attribution theories, including Kelly's attribution theory (Kelly, 1976; Kelly & Michela, 1980); actor-observer hypothesis (Johes & Nisbette, 1972); and the attribution theory of emotion and motivation (ATEM: Weiner, 1985, 1986, 2018); and the intergroup sensitivity effect (ISE: Hornsey & Imani, 2004) were utilized to develop predictions about obesity attributions and message sources' influences on anger and message processing outcomes. These theories provided the foundations of the study, with which several predictions about ways varying types of obesity attributions and message sources' ethnicity elicit different levels of anger toward these message attributes and further message processing outcomes among Native Americans. With respect to anger's roles in the following message processing as a mediating variable, cognitive-functional mode (CFM: Nabi, 1999, 2002) and the anger activism model (AAM: Turner, 2007) were used to discuss cases in which anger facilitates constructive or

counter-productive health message processing outcomes. Finally, all these previous discussions and expected outcomes were revisited on the basis of the effects of targeted health communication.

Based on these theories, 16 research hypotheses were proposed and tested. The hypothesis tests corresponded to the following issues. First, hypotheses 1 through 8 focused on the main effects of obesity attribution types and message sources on anger toward message sources and obesity attributions and outcome variables (Attitudes toward messages, cognitive source evaluations, and behavioral intention). Second, hypotheses 9 and 10 centered on the mediation effects of anger toward message sources and obesity attributions on message attitudes, source evaluations, and behavioral intention. Third, in addition to the main effects of obesity attribution types and message sources, hypotheses 11 to 15 predicted interactions of message sources and obesity attribution types on both the mediating variable (anger about message sources and obesity attributions) as well as predicted variables (attitudes, source evaluations, and behavioral intentions). Finally, H16 predicted the targeted message's effects. Targeted health message effects were tested by comparing targeted and non-targeted message recipients' message processing outcomes.

*The effects of source of criticisms on message processing outcomes*

Across all hypotheses tested, the source of criticism was a significant message attribute that influenced anger, message attitudes, and source evaluations. The anger that message source types evoked also played a significant role in determining the way varying levels of anger mediated the influences of obesity attribution types, message source types, or both. With respect to message sources, Native American message sources led Native American participants to: 1) experience relatively lower levels of anger toward both message sources and obesity attributions;

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2) show more positive attitudes toward messages, and 3) report positive message source evaluations compared to when message sources were non-Native American doctors. The varying levels of anger that were evoked as a result of the two different message sources' ethnicities also mediated the effects of source differences on forming attitudes toward messages and evaluations of the sources' expertise, sociability, and trustworthiness significantly. When Native American participants felt relatively less anger of message sources, the anger transmitted the effects of ingroup message sources on Native American participants in such a way that they reported relatively positive attitudes and source evaluations. On the other hand, greater levels of anger toward non-Native American doctors led them to form more negative attitudes and source evaluations.

When anger was the mediating variable that transmitted effects of combinations of obesity attributions and message source types on outcome variables, only anger toward message sources was a significant outcome variable. Given all possible interaction types of obesity attributions and message sources, the Native American participants reported the greatest levels of anger toward message sources due to the combination of outgroup message sources and internal attributions. On the other hand, relatively lower levels of anger about message sources were reported by combinations of outgroup message sources and external obesity attributions or ingroup message sources and external obesity attributions. These different degrees of anger also influenced variations in subsequent message processing outcomes (attitudes toward messages, the topic, the recommendation, source expertise, and sociability). Again, the outcome showed that relatively lower levels of anger that were generated by interactions of obesity attribution types and message sources mediated more positive message attitudes and source evaluations.

Further, matching between message sources and message recipients' ethnicities were

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significant factors for facilitating the targeted message's effects. Participants all reported: 1) lower levels of anger toward message sources and obesity attributions, and 2) positive attitudes and source evaluations when their ethnicities matched those of the message sources, such that the participants all felt less angry about message sources and obesity attributions. Study participants also thought that messages, their topics, and the recommendation were more positive, and the sources were more credible, sociable, and trustworthy when the message's source was a person who was of similar ethnicity. The same responses were found among non-Native American participants (largely identified themselves as White). Non-Native American participants' anger toward the message source was significantly lower when non-Native American doctors were the sources than when Native American doctors were message sources. These outcomes indicated that matching message sources and recipients' ethnicities would be the key factor in enhancing targeted message effects.

Overall, these results supported the main prediction of the intergroup sensitivity effect (ISE) (Hornsey & Imani, 2004). The ISE predicted causal relations between ingroup/outgroup categorization processes and their influence on people's reactions to criticisms delivered via either ingroup or outgroup members (Hornsey & Imani, 2004). To put this explanation in the study's context, identification with a person who criticizes the adverse health issue among tribal members was the significant factor that arouses specific emotions toward the message sources and makes them judge the messages' and sources' legitimacy.

Further, the ISE mentioned that identifying the group membership of the sources of criticism may provide a powerful cue to determine the following point (Hornsey et al., 2004). First, group membership may provide a heuristic cue in presuming critics' underlying motivation. To message recipients, ingroup members' criticisms are more likely to be perceived

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as genuine and considerate than are those of outgroup members (Hornsey & Esposo, 2009). Therefore, this perception causes ingroup members to believe that those criticisms are based on a desire to see the group improve and prosper by responding to its critics (Hornsey & Esposo, 2009). On the other hand, the same criticisms on the part of outgroup members are interpreted as not constructive and unacceptable because of potential doubts about the motivations of outgroup members' criticism, such as a ploy to score points or prove the other groups' superiority (Hornsey & Esposo, 2009).

The ISE also addressed that the group membership influenced critics' perceived credibility and trustworthiness (Hornsey & Esposo, 2009; Hornsey & Imani, 2004). For example, outgroup members' experience with other groups' issues tends to be episodic or second-hand relative to ingroup members' direct and first-hand experiences with the same problems (Hornsey & Esposo, 2009). Therefore, criticisms that derive from those short-term experiences are evaluated as less credible and reliable and thus, are less influential (Hornsey & Esposo, 2009; Hornsey & Imani, 2004). On the other hand, ingroup members' criticisms about the same problems are perceived to be more accurate and worth consideration because of the strong belief that sharing the same experience leads people to believe the criticisms are based on common and holistic perspectives on the problems.

Incorporating these theoretical considerations into the study context, Native Americans may believe that Native American doctors' criticisms of the obesity problem are rooted in sincere concerns based on their direct experiences of observing and experiencing the problem in many Native American communities. These perceptions eventually led Native Americans to lower their barrier to accept the messages and believe the recommendation will have more positive outcomes by reducing pervasive obesity issues. On the other hand, non-Native American

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doctors' criticisms of the obesity issue may raise Native Americans' suspicions of those White doctors' motives to criticize the obesity issue.

Further, White doctors may also lead Native Americans to believe that criticisms stemmed from White doctors are not based on the actual situation in Native American communities. Rather, these criticisms were more likely to be relied on mere observations of just a few cases or assumptions derived from statistics. Consequently, these negative perceptions about their motivations and lack of credibility on the issue influenced Native Americans' affective, cognitive, and attitudinal responses to obesity messages from White doctors.

The same interpretation could be applied to explain non-Native American participants' more positive evaluations and attitudes toward non-Native American doctors. Nearly 80% of the non-Native American participants identified their ethnicity as White. Based on the ISE's fundamental standpoint, the outcome implied that the majority of non-Native American participants thought and felt that White doctors were more positive and legitimate message sources in delivering obesity prevention messages, although the messages referred to Native Americans' obesity problem. This result indicated that message sources' ethnicity is the factor that facilitates the social categorization process. Ethnicity was an important reference to determine whether these doctors were ingroup or outgroup members. As a result of these categorization processes based on both doctors and their ethnicities, both Native American and non-Native American participants experienced anger and formed message attitudes and source evaluation.

Additionally, the researcher suggested another possible explanation as to why non-Native American message sources (in particular, White doctors) evoked more anger and negative message processing outcomes among Native American participants. Historically, Native

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Americans involved in many disputes with White people, particularly those who originated from European countries (Debo, 1984). Conflicts that continued over lengthy periods between newcomers and indigenous populations in North America had tragic consequences for many Native American societies, including forced relocation to Indian territories and deprivation of traditional food resources (Beave Heart, 1999a, 1999b; Evans-Campbell 2008; Debo, 1984; Sotero, 2006). As a result, numerous physical, emotional, psychological, as well as social traumas, have been passed from generation to generation. (Brave Heart. 1999a, 1999b; Evans-Campbell 2008) .

Those historical traumas also explained pervasive health issues that most indigenous populations experience. In terms of the obesity issue among Native Americans, many Native American tribes were forcefully removed from their homelands to rural areas by White settlers and the federal government (Debo, 1984). As a result, Native Americans experience generational relocations and the loss of traditional food-resources that have long been integrated into their body systems to maintain their stable health (Satterfield, DeBruye, Santos, Alonso, & Frank, 2016). Given that studies (e.g., Budzynska, West, Savoy-Moore, Lindsey, Winter, & Newby, 2013; Gittelsohn & Rowan, 2011; Smith & Morton, 2009) have argued that there is a strong relation between food desert and high obesity rate, forced relocations are highly likely to be an important cause of limiting Native Americans' access to affordable healthy and nutritious traditional food, whereby exacerbating their obesity. Therefore, Native Americans may believe that outgroup message sources should be the people who receive criticism on obesity, not those who criticize the issue pervasive in Native American societies. Therefore, Native Americans may experience more anger toward the source, which in turn, hindered constructive message processing.

*The effects of obesity attributions on message processing outcomes*

With respect to obesity attribution types' effects, the researcher predicted that attributing responsibility for the obesity issue to individuals would elicit more intense anger and adverse effects on Native Americans' message attitudes, source evaluations, and message acceptance. Varying levels of anger caused by obesity attributions and message source types also were expected to mediate the effects of these message attribute types on subsequent message processing outcomes. These predictions were posited according to the ways attribution theories addressed the human tendency to attribute causes of negative events and its associations with anger, attitudes, and cognitive and behavioral outcomes (Blaire & Crocker, 1993; Jones & Nisbett, 1971; Kelly & Michela, 1980; Lau & Russell, 1980; Ruble, 1973). However, neither internal nor external obesity attributions were associated with significant changes in the mean of anger toward sources and attributions or other following outcome variables.

Potential plausible explanations for such nonsignificant outcomes were provided. First, such nonsignificant findings may result from differences between negative events that this and previous studies selected. For example, some previous empirical studies (Hareli & Hess, 2008; Karasawa, 2001; Neumann, 2000) created hypothetical negative events or outcomes, then assessed degrees of anger and subsequent responses to these events as a result of their attribution process. In addition, the hypothetical negative situations these studies created were easy to identify or attribute either to external or internal reasons with respect to what or who was the main cause of the undesirable outcomes.

On the other hand, the obesity issue differs somewhat from other negative events that previous studies created, in that a combination both of internal and external factors cause this dangerous health condition. Numerous internal and external factors are all contributing factors to

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obesity. Internal and external factors' intricate interconnections also aggravate the negative health condition. Therefore, the researcher assumed that this real health threat could not be blamed explicitly on either one of these causes alone because both are plausible and considered equally significant factors when obesity prevention or treatment programs are designed and implemented in many Native American societies. Due to this reason, Native American participants may have accepted different attributions simply as one of the obesity factors, not a message attribute that was intended to make them feel angry or reject the message.

Another reason for the statistical non-significance of obesity attribution types on outcome variables may be related to the ways obesity attributions were manipulated. Initially, more explicit internal attributions that directly attribute Native Americans' wrong behaviors (e.g., food choice and lack of exercise) to a higher obesity rate in Native American societies were utilized. However, the original message script had to be revised multiple times in the course of collaborations with Cheyenne and Arapaho Health Board members. The Board members asked the researcher to soften the message tone by replacing explicit language with less straightforward language. The Chairman of the Health Board expressed his concern that these strong internal attributions may make Cheyenne and Arapaho people think they are singularly to blame for obesity. Therefore, Cheyenne and Arapaho people may be offended and do not want to participate in the study because it forces them to be too introspective and may come across as common stereotyping of Native Americans.

With respect to his concern, the researcher modified words and expressions in the original internal attribution messages, thereby satisfying both the researcher and the Board members. However, the main purpose of the manipulation of attributions was to evoke varying levels of anger and message responses, depending on types of attributions. The modification

process involved restating internal attributions to make them less intense and direct ways.

Exposing the obesity attribution as a within-subjects factor could also be a potential reason for the non-significant findings associated with obesity attribution types. Although rationales for determining attribution types as within-subjects factors were provided (e.g., reducing error variance that occurs due to individual differences or experimental conditions), this study's participants may be sensitized to the attribution manipulation (Leshner, 2014). Since all other factors (message sources' ethnicities and the recommended behavior) were equal, but only attribution types were different, Native American study participants' responses were impacted by the possibility that they may notice the main purpose of exposing two different messages and asking the same set of questionnaires repeatedly.

*The roles of anger on message processing outcomes as a mediating variable*

The outcome also provided empirical evidence that may fill the gap that neither the cognitive-functional model (CFM) nor and the anger activism model (AAM) addressed potential message factors that generate anger as a mediating variable leading to constructive message processing outcomes. Both models argued that optimal levels of anger would facilitate message processing outcomes. However, it was vague to define what the optimal levels of anger are clearly. In this specific study context, identifying the source that criticized the obesity problem was a significant factor in showing that 1) the source of obesity prevention messages was the factor that generates varying levels of anger among Native American study participants regarding the obesity issue. Furthermore, the researcher found that relatively lower levels of anger that were provoked by ingroup message led particular Native American tribes to demonstrate more constructive message processing outcomes about the obesity issue. With respect to the level of anger that Cheyenne and Arapaho tribal members experienced, non-Native

American message sources caused undesirable results, such as more negative message attitudes and source evaluations attributable to greater levels of anger these outgroup message sources elicited.

The researcher also concluded that the finding, which is that lower levels of anger resulted in more positive message processing outcomes regarding message attitudes and source evaluations, did not support the CFM and AAM's propositions on constructive roles of anger in persuasion in this study context. It is true that these outcomes provided empirical evidence for supporting previous discussions on unique dual-coping mechanisms associated with a feeling of anger (Miller & Quantip, 2017; Zhu & Thagard, 2002). Depending on the intensity of anger levels that study participants reported, message processing outcomes varied. However, relatively positive message processing outcomes that were reported among participants who felt lower levels of anger were gradually turning negative ways anger rises. If the minimal or lowest levels of anger that message participants experienced brought more constructive message processing outcomes, these outcomes rather support theories (e.g., psychological reactance theory and elaboration likelihood model) and previous studies (Moons & Mackie, 2007; Smith & Dillard, 1997; Mitchell, Brown, Morris-Villagran, & Villagran, 2001) that addressed adverse effects of feeling higher levels of anger in persuasion.

Interesting results were found about message sources' significant role in the specific study context. Attribution theories (e.g., Jones & Nisbett, 1971; Kelly & Michela, 1980) propose that others' internal attributions of negative events increase anger by violating a human tendency to attribute causes of negative outcomes to external factors. Cheyenne and Arapaho participants reported the highest level of anger toward message sources when Non-Native American sources mentioned internal obesity attributions compared to other combinations of obesity attributions

and message source types. The outcome supported the theoretical proposition; the anger toward

message sources was intensified as a result of the anger toward others' mentioning internal

attributions of negative outcomes instead of external attributions.

However, when internal attributions stemmed from ingroup message sources, Cheyenne

and Arapaho participants reported relatively lower levels of anger toward message sources

compared to the situation when the same message sources stated internal obesity attributions.

Despite the fact that higher levels of anger were predicted because of internal obesity

attributions, relations between internal attributions and anger experience among the study

participant were changed due to message source types. The results indicated that the message

source was a significant factor in that not only determined levels of anger experiences and

message processing outcomes but also moderated the effects of attributions' effects on anger.

*The main, interactions, and mediation effects of obesity attributions, sources of*

*criticisms, and anger on behavioral intentions*

None of the direct and indirect effects of obesity attributions, message sources,

and anger changed behavioral intentions significantly. According to the CFM and AAM,

following suggestions or recommendations should attenuate message recipients' anger

effectively, as well as lead to further constructive message processing outcomes. It indicated that

message recipients should believe that these suggested recommendations in anger-evoking

messages will work to resolve their negative emotions by enhancing their response efficacy in

order to expect ultimate constructive outcomes.

Given that the condition offered only one recommended behavior—to call the number

given in the messages to receive obesity interventions tailored to Native Americans—the

participants may think of the message recommendation as an ineffective solution to cope with

obesity issues, thereby triggering a lower response efficacy (Bandura, 2004; Casey, Timmermann, Allen, Krahn, & Turkiewicz, 2009; Lewis, Watson, & White, 2010; Umphrey, 2004). If it is the case, the message recommendation failed to generate response efficacy among angry study participants that both CFM and AAM addressed as a significant condition leading constructive role of anger in persuasion. If participants believed that the behavior recommended is not efficacious, not only in coping with obesity but also mitigating anger, then their intentions to engage in the behavior necessarily would be low (Bandura, 2004; Casey et al., 2009; Lewis et al., 2010; Umphrey, 2004).

Study participants' evaluations of their thoughts about the effectiveness of the suggested recommended behavior were not directly assessed in this study. Thus, it is unclear whether the assumption is true. Future studies that include measures that assess respond efficacy toward message recommendations will shed lights on one of the core assumptions of the CFM and AAM in terms of relations among anger, respond efficacy, and intention to accept the recommendation in persuasive communication in broad. Furthermore, more proactive interventions, such as visiting local obesity care centers, or downloading tribal-specific mobile applications to manage obesity issues, also could be considered as alternative solutions that may increase higher efficacy among the targeted message recipients in further studies.

## Implications

This dissertation has several theoretical as well as practical implications. First, anger's unique properties in persuasion were tested based on theoretical standpoints. Compared to other negative emotions (e.g., fear, sadness, disgust), anger's roles in health message processing have attracted relatively less attention, despite theories that can guide the existing empirical studies. Based on these theories' main argument about anger and its properties, the researcher attempted

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to identify message factors that facilitate optimal levels of anger toward health messages, and anger's effects on further message processing outcomes.

Despite the cognitive-functional model (CFM) and the anger activism model (AAM) well explained unique properties and mechanisms in the way in which anger works in persuasive message processing, the ways to evoke a certain level of anger that leads to constructive outcomes have not been elaborated. Two message attributes were introduced based on a series of attribution theories and the ISE in conjunction with the CFM and AAM. Attribution types had no significant influence on variations in anger experiences or other message processing outcomes. However, the study provided venues for future studies to validate the CFM and AAM's main propositions by investigating which types of message properties work better than others in which context. Depending on the contexts in which anger plays significant roles in enhancing persuasive outcomes, other message factors always can be introduced and applied to further empirical studies to enrich and elaborate on these theories.

Second, obesity prevention message factors that may appeal to the specific populations who have suffered the most from the issue and been marginalized in obesity healthcare systems in the United States were illuminated. Although statistics long have documented the increasing obesity rate, which is becoming critical among Native Americans, the issue and the targeted population has been neglected in health communication. The researcher provided opportunities for other researchers to pay more attention to the significant health issues that need to be the focus of academic research agendas. Future research that concentrates more on health issues that are pervasive among underserved populations, including Native Americans, would contribute to reduce the perennial health disparities and enhance their quality of life and life expectancy.

Third, outcomes of testing targeted message effects guided for many non-Native

American health care providers who strive to prevent and reduce health problems among Native Americans. These outcomes do not necessarily mean that Native Americans reject obesity prevention messages that non-Native Americans created. The results rather indicated the importance of understanding Native Americans' historical and cultural backgrounds to design strategic health intervention programs and campaigns. Dominant racial and ethnic groups have subjucated Native Americans for over 600 hundred years; despite remarkable recovery from traumatic assaults, still, Native Americans remain marginalized in health issues. From outsiders' standpoints, it may be easy to overlook Native Americans' historical and cultural contexts that are closely interconnected with current health problems. Therefore, non-Native American health care providers need to pay more attention to take a holistic approach to understand major historical events and assess their influence on undesirable health issues among Native Americans to create effective and target-appropriate public health campaigns.

Fourth, the researcher offered valuable insights into the importance of incorporating message recipients as co-investigators through the entire study process. Because this study was conducted in a multicultural communication setting, and the researcher and study population shared little in common in many aspects, the researcher made constant efforts to include key members of the targeted population as significant study partners who were able to infuse valuable knowledge and insights into the entire study procedure. However, despite the value of this collaboration, numerous restrictions and practical problems (e.g., time, money, and other resources' shortage, disagreements among people about the research processes) always were involved that such research must consider. However, the researcher and the researchers' advisor spent a lengthy amount of time to determine where these issues originated and identify the most desirable solutions for them by on-going collaborations with the targeted study populations. The

concerted collaborations demonstrated the importance of partnerships and the value of collaboration in academic research activities as a crucial factor in pursuing mutual benefits both for researchers and tribal members.

Last, this study's results had invaluable implications in understanding responses to obesity prevention messages not only among Cheyenne and Arapaho tribes, but also other Native American tribes. Further, this understanding offered future avenues to design obesity prevention messages that lead to desirable outcomes for tribal members. The researcher of this study demonstrated the significance of applying a variety of potential message attributes to identify their optimal features, as well as ways to manipulate these factors to maximize the message's effectiveness for the targeted populations. The specific message features that were found to promote positive message processing outcomes can be applied further across various media platforms and other health issues. For example, tribes also can expand the applications of the same message factors to create TV or radio commercials, as well as mobile and online platforms for obesity-related health issues. These applications will provide opportunities for Native Americans to combat chronic obesity and obesity-related complications, thereby reducing health concerns and improving their members' longevity.

## Limitations

With respect to the nonsignificant outcomes related to obesity attribution types, the researcher assumed that these outcomes might derive from the procedures used to create the stimuli in collaboration with the Cheyenne and Arapaho Health Board members. This inclusion of the target study populations during the study design and preparation had numerous advantages for an in-depth understanding of the participants and the study environment. However, despite these merits, some restrictions also accompanied this collaboration, including compromising

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the original manipulations of obesity attributions and data collection processes.

With respect to the obesity attribution manipulation, the goal was to create two different types of obesity attributions that should be sufficiently provocative to raise certain levels of anger or anger-related negative emotions by emphasizing who or what could be blamed for tribal members' obesity problems. However, the original statements were modified in somewhat euphemistic ways because of the concerns that the Health Board members raised. This adjustment was necessary not only to protect the vulnerable research participants' rights, but also to continue harmonious collaborations with the tribes. Nevertheless, this process may have changed the obesity attributions, such that they were more informative rather than statements that elicited anger because of the way they are stated, thereby failing to evoke participants' affective responses to each of the attribution types, as the researcher intended originally.

Data collection on the Native American participants was conducted in the field. These field experiments offered meaningful opportunities in the study for the researchers to share ideas and have further conversations about the study as well as the obesity issue. However, many distractions and unexpected situations occurred because of uncontrollable environmental factors that jeopardized holding external factors constant across all experimental conditions to reduce their effect on the study outcomes. Because of circumstances beyond the researcher's control, the researcher underwent modifications in the data collection method. No or extremely low internet coverage in the Powwow area resulted in switching data collection platforms from iPad to paper-printed stimuli. Although the same study procedures, formats, questionnaires, designs, or randomizations were maintained, differences between the two data collection platforms resulted in several variations with respect to the total amount of time participants spent to complete the study, the degree to which individuals controlled the study procedures overall, including

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revisiting study materials. Because the paper-based study materials allowed more flexibility, this change may have caused some differences in processing the study materials and answering questionnaires between the participants from whom data were collected in two different ways.

Another limitation associated with the data collection processes was the locations where the data were collected. The Arapaho Chief designated the locations and chose appropriate study places largely according to the locations' accessibility to the potential participants. However, because of the nature of Powwows, in which dancing, playing musical instruments, and group-singing take place, these activities' proximity sometimes distracted the participants from the study. Because many inherent limitations were existed in recruiting sufficient numbers of participants and collecting data, two Powwows provided the best opportunities to recruit the targeted study populations. Nevertheless, data collection in the field was interrupted by several unexpected circumstances that could not be controlled or prevented; therefore, the experiment would have resulted in different outcomes had it been conducted in a laboratory setting.

## Suggestions for Future Research

Numerous research agendas that would be worth considering in future studies. First, future studies can expand the targeted messages' participants by inviting other Native American tribes to participate. Given that tribes differ in many ways, such as their culture, history, current living environments, primary health concerns, perspectives, and approaches, each copes with health issues differently as well. Therefore, careful investigations of other tribes certainly are needed. For example, some tribes have been allied historically for a long while, such as the Cheyenne and Arapaho. Therefore, the long-term hospitable relationships established between the two have led them to share many commonalities in the way they lead their lives as nomadic tribes in the Southern Great Plain areas. Further, the U.S. government relocated most

Native American tribes to Indian Territories historically, and forced them to accept new lifestyles and cultures, while several others still populate their original territories and maintain their traditions. All of these past and current changes influence the way each tribal member thinks and reacts to specific health issues, thereby reflecting their acceptance and the way they process health-related messages. If future studies determine the underlying similarities and differences among different tribes and use this knowledge to create and test health campaigns by recruiting multiple tribes who are willing to participate, the outcomes will not be limited to interpretation in a certain tribal context but apply instead to a broader Native American social context.

Second, future studies can apply this research framework for testing the effects of attributions and sources on different groups of study participants in health message processing contexts. Causes-and-effects relations between message attributes and Native Americans' responses were proposed by concentrating on unique historical and cultural backgrounds that existed between Native Americans and Non-Native Americans, especially White people. However, the logic of this study can also be utilized for proposing further research agendas by focusing on similar relations between other racial and ethnic groups. For example, historical relationships between African Americans and White Americans, traumatic experiences that African Americans have experienced, and their outcomes on current psychological and physical health issues could also be discussed in a similar vein. The researcher expected that by reflecting on both the present and the past, future studies may discover the root of causes of continuing health issues among the underrepresented populations, thereby continuing to generate in-depth discussions on many current health issues.

Next, mixed methods can be applied to the same or similar research agendas. The researcher of this study relied on an experiment only to test the research hypotheses. Choosing

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two independent variables, which are obesity attributions and message sources, and dependent variables (anger, attitudes toward messages, cognitive source evaluations, and behavioral intentions) largely was based on theories and reviews that have been conducted in similar study contexts. However, qualitative approaches, such as in-depth interviews, focus groups, or ethnographies, can also provide valuable insights into the study design process. For example, in-depth interviews would promote understanding of targeted message recipients' perspectives and thoughts about their main interest in health concerns. Through this process, future studies would obtain additional information by considering the specific health issues that should be studied and appropriate message attributes in a particular health campaign—for example, knowing in advance the current or past health interventions or programs that tribes have experienced and their opinions on these endeavors via focus groups or interviews also will provide information with respect to designing messages that increase message recipients' efficacy and thoughts about the recommended behaviors' effectiveness. In the outcome interpretation stages, incorporating qualitative interpretations in addition to explanations of a study's statistical results obtained from a quantitative data analysis approach would improve our understanding of the outcomes and their implications.

Last, understanding ongoing message processes could be achieved by employing psychophysiological measures in an experimental laboratory setting. Only self-reported measures were utilized in this study. Adding measures that capture responses' physiological responses, including heartrate, pulse, skin conductance, eye-tracking, and facial expressions during message exposure, can serve as indicators that would allow researchers to obtain real-time message processing outcomes. For example, measuring heartrate variations combined with eye-tracking would provide information about message recipients' cognitive resource allocation patterns in

specific message attributions. Facial expressions and skin conductance would contribute further insights into understanding which types of emotions individuals experience and the way they change over time and depending upon specific message factors. These physiological measures would provide a wealth of information not only for continuing academic research, but also for health practitioners who wish to design disease prevention messages.

**Conclusion**

The dissertation study targeted one of the most vulnerable population to obesity and obesity-related problems in the United States. Despite a sheer volume of evidence that showed the need for increased efforts for coping with the ever-increasing obesity rate among Native Americans, this issue has not been a center of academic research. This research, therefore, attempted to design and test obesity prevention messages that may appeal to the specific group of people most affected. The targeted message recipients, which were Cheyenne and Arapaho Tribes, engaged in the entire research process actively, including stimuli creations and data collection processes. The Tribal members' collaborations helped the researcher to conduct research activities with better knowledge and appreciation of these targeted message recipients' perspectives on the obesity problem in their respective Tribes. Overall, the researcher found that the courier of obesity messaging in Tribal communities is as much a factor in affecting change as the message itself. They showed lower levels of anger about messages, positive attitudes toward messages, and positive source evaluations when message sources were Native Americans. The outcome indicated that Cheyenne and Arapaho Tribal members would be more likely to react to criticisms about obesity from people who are more knowledgeable on the basis of their firsthand experiences. Outcomes of this study would contribute to creations of the Tribal specific obesity prevention message in the near future. Communication researchers' continuing interests on

Native Americans' health issues will also make a great contribution toward promoting better

health among Native Americans.

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# Appendix A: Study Stimuli (The initial set)

*Internal obesity attributions derived from American Indian sources*



"*We Native Americans **make the wrong food choices**, so we tend to be more obese than other races or ethnicities.*"

*- Indian Health Service, 2017*

Good obesity care helps you manage your weight.

**CALL** a local health center to receive obesity management tailored for Native Americans (1-800-747-0152).

*Dr. Hollis Pitchlynn*, **M.D.,**
**Director of the Center of Excellence in Obesity and Diabetes, School of Medicine at Case Western Reserve University.**

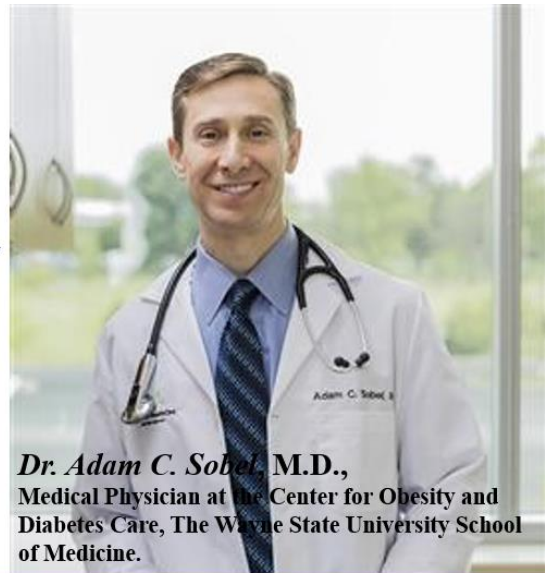**Native American Obesity Care Association**
www.NAOCA.org/vitalsigns/NativeAmerican-obesity



"*We Native Americans **do not exercise enough**, so we tend to be more obese than other races or ethnicities.*"
*- Indian Health Service, 2017*

Good obesity care helps you manage your weight.

**CALL** a local health center to receive obesity management tailored for Native Americans (1-800-747-0152).

*Dr. Arne Vainio*, **M.D.,**
**The Wayne State University School of Medicine, A member of the Association of American Indian Physicians.**

**Native American Obesity Care Association**
www.NAOCA.org/vitalsigns/NativeAmerican-obesity

"We Native Americans **do not know how to maintain a healthy weight**, so we tend to be more obese than other races or ethnicities."

- Indian Health Service, 2017

Good obesity care helps you manage your weight.

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*Dr. Arne Vainio, M.D.,*
**The Wayne State University School of Medicine, A member of the Association of American Indian Physicians.**

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www.NAOCA.org/vitalsigns/NativeAmerican-obesity

*Internal obesity attributions derived from non-American Indian sources*



"Native Americans **make the wrong food choices**, so you tend to be more obese than other races or ethnicities."

- Obesity Medicine Association, 2017

Good obesity care helps you manage your weight.

**CALL** a local health center to receive obesity management tailored for Native Americans (1-800-747-0152).

*Dr. Michael Adornetto, D.O.,*
**President of the Westshore Obesity Care, at the University Hospitals, Westshore Primary Care.**

**Native American Obesity Care Association**
www.NAOCA.org/vitalsigns/NativeAmerican-obesity

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*"Native Americans **do not exercise enough**, so you tend to be more obese than other races or ethnicities."*

*- Obesity Medicine Association, 2017*

Good obesity care helps you manage your weight.

**CALL** a local health center to receive obesity management tailored for Native Americans (1-800-747-0152).
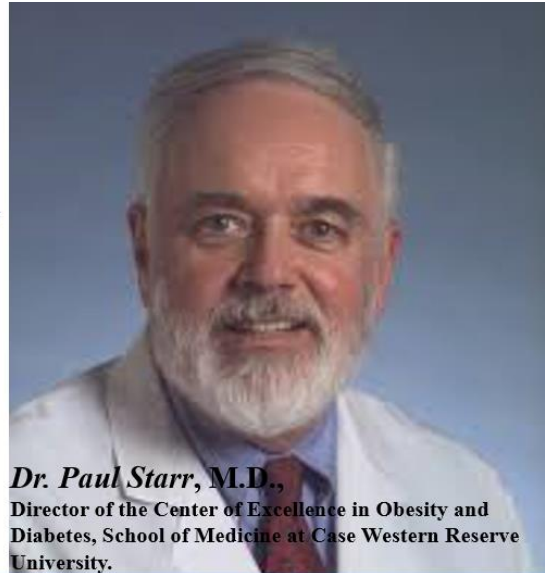
**Dr. Paul Starr, M.D.,**
**Director of the Center of Excellence in Obesity and Diabetes, School of Medicine at Case Western Reserve University.**
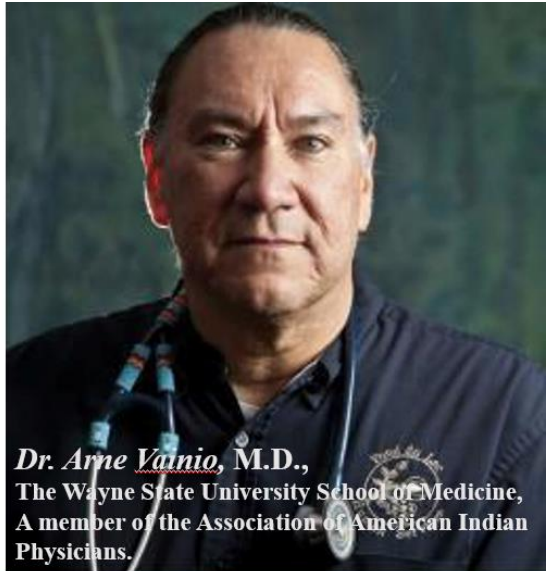
**Native American Obesity Care Association**
www.NAOCA.org/vitalsigns/NativeAmerican-obesity



*"Native Americans **do not know how to maintain a healthy weight**, so you tend to be more obese than other races or ethnicities."*

*- Obesity Medicine Association, 2017*

Good obesity care helps you manage your weight.

**CALL** a local health center to receive obesity management tailored for Native Americans (1-800-747-0152).

**Dr. Adam C. Sobel, M.D.,**
**Medical Physician at the Center for Obesity and Diabetes Care, The Wayne State University School of Medicine.**

**Native American Obesity Care Association**
www.NAOCA.org/vitalsigns/NativeAmerican-obesity

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*External obesity attributions derived from American Indian sources*



*"We Native Americans **can't access healthy foods in our local community**, so we tend to be more obese than other races or ethnicities."*

*- Indian Health Service, 2017*

Good obesity care helps you manage your weight.

**CALL** a local health center to receive obesity management tailored for Native Americans (1-800-747-0152).
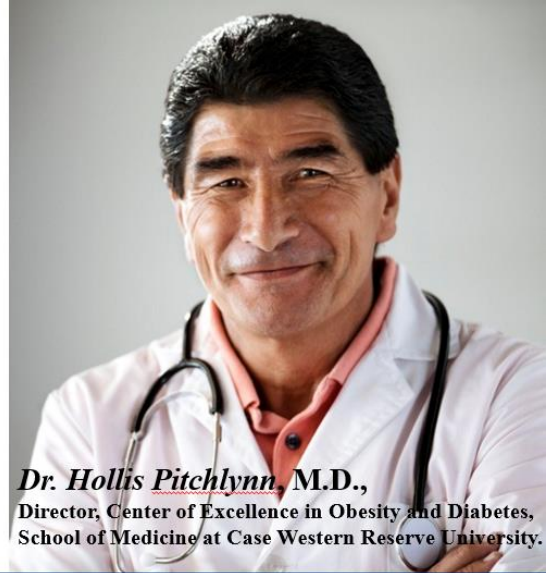
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**Director, Center of Excellence in Obesity and Diabetes, School of Medicine at Case Western Reserve University.**

**Native American Obesity Care Association**
www.NAOCA.org/vitalsigns/NativeAmerican-obesity



*"We Native Americans lack **U.S. Government-sponsored obesity prevention programs in our communities**, so we tend to be more obese than other races or ethnicities."*

*- Indian Health Service, 2017*

Good obesity care helps you manage your weight.

**CALL** a local health center to receive obesity management tailored for Native Americans (1-800-747-0152).

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**The Wayne State University School of Medicine, A member of the Association of American Indian Physicians.**
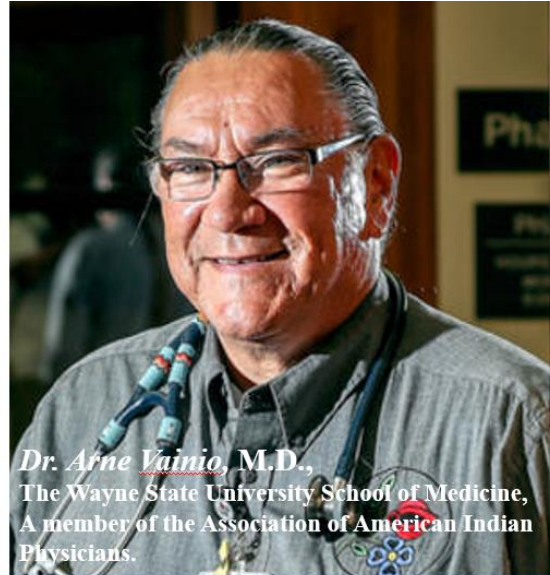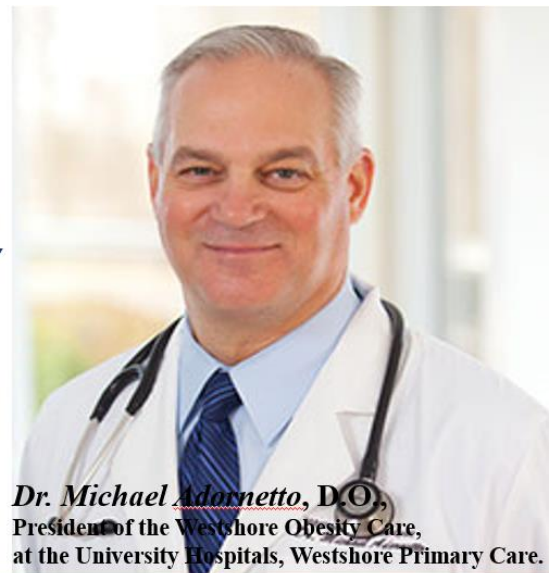
**Native American Obesity Care Association**
www.NAOCA.org/vitalsigns/NativeAmerican-obesity

"We Native Americans **do not have enough weight maintenance facilities** (gyms, running tracks, fitness classes, etc.) **in our communities**, so we tend to be more obese than other races or ethnicities."

- Indian Health Service, 2017

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*External obesity attributions derived from non-American Indian sources*



"Native Americans **can't access healthy foods in our local community**, so you tend to be more obese than other races or ethnicities."

- Obesity Medicine Association, 2017

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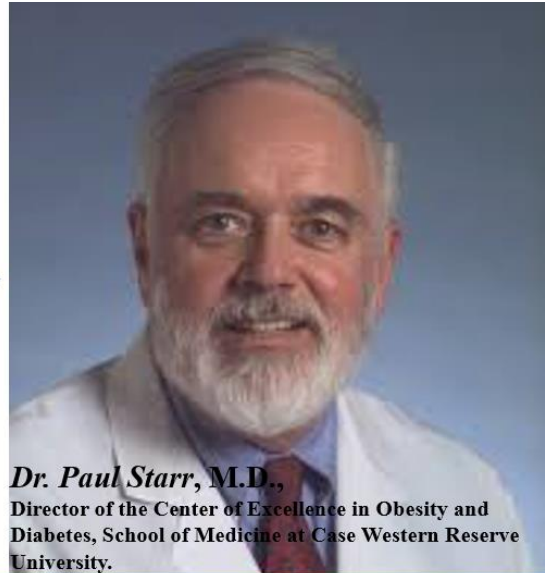
**Native American Obesity Care Association**
www.NAOCA.org/vitalsigns/NativeAmerican-obesity

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# Appendix B: Study Stimuli (The final set for data collections)

*Internal obesity attributions derived from American Indian sources*



*"American Indians **often choose food that is affordable, but not healthy**, so we tend to be more obese than other races and ethnicities."*

- American Indian Medical Association, 2019 -

Good obesity care helps you manage your weight.

**CALL** a local health center to receive obesity management tailored for American Indians (1-800-444-6472).

***Dr. Donald YellowBear*, M.D.**
Director, Center of Excellence in Obesity and Diabetes, School of Medicine at Case Western Reserve University.

**American Indian Obesity Care Association**
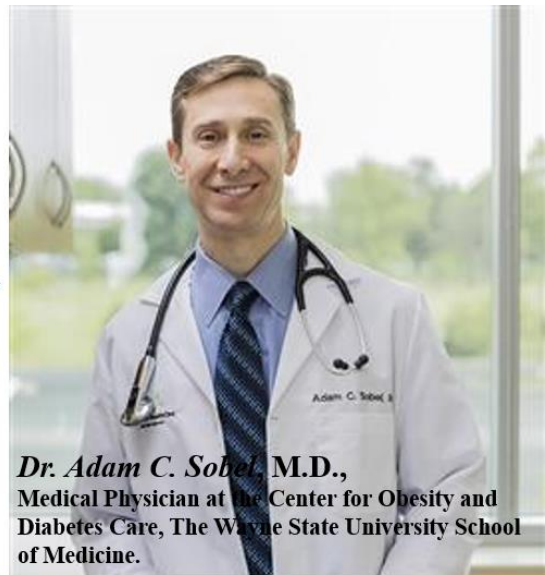www.NAOCA.org/vitalsigns/NativeAmerican-obesity



*"American Indians **do not always exercise enough**, so we tend to be more obese than other races and ethnicities."*

- American Indian Medical Association, 2019 -

Good obesity care helps you manage your weight.

**CALL** a local health center to receive obesity management tailored for American Indians (1-800-444-6472).

***Dr. Arne Vainio*, M.D.**
Family Practice Physician,
Fond du Lac Human Services Min-no-aya-win Clinic on the Fond du Lac Ojibwe Reservation in Minnesota.

**American Indian Obesity Care Association**
www.NAOCA.org/vitalsigns/NativeAmerican-obesity

"*American Indians often **do not know how to maintain a healthy weight**, so we tend to be more obese than other races or ethnicities.*"

- American Indian Medical Association, 2019 -

Good obesity care helps you manage your weight.

**CALL** a local health center to receive obesity management tailored for American Indians (1-800-444-6472).

**Dr. Joseph Speaks, M.D.**
Medical Physician at the Center for American Indian Obesity and Diabetes Care, Westshore Primary Care.

**American Indian Obesity Care Association**
www.NAOCA.org/vitalsigns/NativeAmerican-obesity

*Internal obesity attributions derived from non-American Indian sources*



"*American Indians **often choose food that is affordable, but not healthy**, so they tend to be more obese than other races and ethnicities.*"

- Obesity Medicine Association, 2019 -

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President of the Obesity and Diabetes Care, School of Medicine at Case Western Reserve University.

**American Indian Obesity Care Association**
www.NAOCA.org/vitalsigns/NativeAmerican-obesity

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*"American Indians **do not always exercise enough**, so they tend to be more obese than other races and ethnicities."*

- Obesity Medicine Association, 2019 -

Good obesity care helps you manage your weight.

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*Dr. Matthew Kacir,* **M.D.**
**Director of the Center of Excellence in Obesity and Diabetes, School of Medicine, Westshore Primary Care.**

**American Indian Obesity Care Association**
www.NAOCA.org/vitalsigns/NativeAmerican-obesity

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*"American Indians often **do not know how to maintain a healthy weight**, so they tend to be more obese than other races or ethnicities."*

- Obesity Medicine Association, 2019 -

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**Medical Physician at the Center for Obesity and Diabetes Care, The Wayne State University School of Medicine.**

**American Indian Obesity Care Association**
www.NAOCA.org/vitalsigns/NativeAmerican-obesity

*"American Indians **can't access healthy foods in local communities**, so we tend to be more obese than other races and ethnicities."*

- American Indian Medical Association, 2019 -

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Director, Center of Excellence in Obesity and Diabetes, School of Medicine at Case Western Reserve University.

**American Indian Obesity Care Association**
www.NAOCA.org/vitalsigns/NativeAmerican-obesity



*"American Indians lack **public-sponsored obesity prevention programs in local communities**, so we tend to be more obese than other races and ethnicities."*

- American Indian Medical Association, 2019 -

Good obesity care helps you manage your weight.

**CALL** a local health center to receive obesity management tailored for American Indians (1-800-444-6472).

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Family Practice Physician, Fond du Lac Human Services Min-no-aya-win Clinic on the Fond du Lac Ojibwe Reservation in Minnesota.

**American Indian Obesity Care Association**
www.NAOCA.org/vitalsigns/NativeAmerican-obesity

"*American Indians* **do not have enough weight maintenance facilities** (*gyms, running tracks, fitness classes, etc.*) **in local communities,** *so we tend to be more obese than other races or ethnicities.*"

- American Indian Medical Association, 2019 -

Good obesity care helps you manage your weight.

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*External obesity attributions derived from non-American Indian sources*



"*American Indians* **can't access healthy foods in local communities,** *so they tend to be more obese than other races and ethnicities.*"

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www.NAOCA.org/vitalsigns/NativeAmerican-obesity

# Appendix C: Self-Reported Measurements

*General Instruction*

Thank you for your participation in this study.

First, you will be asked a series of questions to assess your involvement with a specific issue and your Tribe.

Next, you will see 2 printed messages regarding a certain health issue. You will see these 2 messages one by one and answer the following questions after seeing each message. These questions will ask your thoughts and feelings about the message you just saw. The same process will be repeated until you see all 2 messages and answer 2 sets of questionnaires for each message.

Finally, you will answer questions that ask your eating habits, exercise routines, and demographic information.

You are free to leave the study at any time and doing so will remove your responses from the record. Please answer the following question below to move on to the next page of you want to continue this study.

Thank you

Do you want to continue this study?
Yes
No

*Pre-measurements*

**Health and obesity issue relevance, importance, and interest**

Please answer the following statements.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Not at all | Very rarely | Rarely | Somewhat | Frequently | Very frequently | Extremely |

*Health issues*
1. To what extent are health issues personally relevant to you?
2. To what extent are health issues relevant to your tribe?
3. To what extent are health issues relevant to the entire American Indian Societies?
4. To what extent are health issues personally important to you?
5. To what extent are health issues important to your tribe?
6. To what extent are health issues important to the entire American Indian Societies?
7. To what extent are health issues personally interesting to you?
8. To what extent are health issues interesting to your tribe?

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9. To what extent are health issues interesting to the entire American Indian Societies?

*Obesity issues*
1. To what extent are obesity issues personally relevant to you?
2. To what extent are obesity issues relevant to your tribe?
3. To what extent are obesity issues relevant to the entire American Indian Societies?
4. To what extent are obesity issues personally important to you?
5. To what extent are obesity issues important to your tribe?
6. To what extent are obesity issues important to the entire American Indian Societies?
7. To what extent are obesity issues personally interesting to you?
8. To what extent are obesity issues interesting to your tribe?
9. To what extent are obesity issues interesting to the entire American Indian Societies?

**In-group and outgroup orientations** (Phinney, 1992; Roberts et al., 1999)

Please answer to what extent do you agree or disagree with the following statements.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Strongly disagree | Disagree | Somewhat disagree | Neither disagree not agree | Somewhat agree | Agree | Strongly agree |

*In-group orientations*
1. I understand pretty well what my ethnic group membership means to me, in terms of how to relate to my own group and other groups.
2. I have often talked to other people in order to learn more about my ethnic group.
3. I have a strong sense of belonging to my own ethnic group.
4. I have spent time trying to find out more about my own ethnic group, such as its history, traditions, and customs.
5. I feel a strong attachment towards my own ethnic group.
6. I have often done things that will help me understand my ethnic background better.
7. I understand pretty well what my ethnic group membership means to me.

*Outgroup orientations*
1. I sometimes feel it would be better if different ethnic groups didn't try to mix together (Reversed).
2. I like meeting and getting to know people from ethic groups other than my own.
3. I often spend time with people from ethnic groups other than my own.
4. I enjoy being around people from ethnic groups other than my own.
5. I am involved in activities with people from other ethnic groups.
6. I didn't try to become friends with people from other ethnic groups (Reversed).

*Instructions before each stimulus*

On the following page, you will read a health message.
The message will be appeared on the screen for approximately 20 seconds.

After the given amount of time, the screen will be automatically moved on to the next page that includes questions followed.
When you are ready to see the message, please click the button below to move on to the next page.

*Post-measurements*

**Anger and Agitation-related negative emotions** (Higgins et al., 1997; Nabi, 2002; Roney et al., 1995)

*Anger and agitation-related negative emotions on message sources*
Please answer the following questions about your feelings on the message source who stated a reason why American Indians tend to be more obese than other races and ethnicities.

1. The source of the message who pointed out the obesity issue among American Indians made me feel….

|  | Not at all | Rarely | Slightly | Moderately | Somewhat | Very | Extremely |
|---|---|---|---|---|---|---|---|
| Irritated | | | | | | | |
| Agitated | | | | | | | |
| Uneasy | | | | | | | |
| Resentful | | | | | | | |
| Angry | | | | | | | |

*Anger and agitation-related negative emotions on obesity attributions*
Please answer the following questions about your feelings on the message source who stated a reason why American Indians tend to be more obese than other races and ethnicities.

2, The way the message stated as a reason why American Indians tend to be more obese than other races/ethnicities made me feel…

|  | Not at all | Rarely | Slightly | Moderately | Somewhat | Very | Extremely |
|---|---|---|---|---|---|---|---|
| Irritated | | | | | | | |
| Agitated | | | | | | | |
| Uneasy | | | | | | | |
| Resentful | | | | | | | |
| Angry | | | | | | | |

**Attitudes toward message** (Hornsey & Imani, 2004, Nabi, 2002)

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*Attitudes on the message recommendation*
Please answer the following questions about your thoughts/feelings on the recommendation (call the number for receiving obesity management information tailored for American Indians) stated in the message you just read.

I thought/felt that the recommendation (call the number for receiving obesity management information tailored for American Indians) is either…

| | | |
|---|---|---|
| Helpful | ---------------------------------- | Unhelpful |
| Positive | ---------------------------------- | Negative |
| Favorable | ---------------------------------- | Unfavorable |
| Bad | ---------------------------------- | Good |
| Unacceptable | ---------------------------------- | Acceptable |
| Useful | ---------------------------------- | Useless |

*Attitudes on the message topic*
Please answer the following questions about your thoughts/feelings on the message topic (obesity).

I thought/felt that the message topic (obesity) is either…

| | | |
|---|---|---|
| Unacceptable | ---------------------------------- | Acceptable |
| Favorable | ---------------------------------- | Unfavorable |
| Right | ---------------------------------- | Wrong |
| Bad | ---------------------------------- | Good |
| Wise | ---------------------------------- | Foolish |
| Positive | ---------------------------------- | Negative |

*Attitudes on the message*
Please answer the following questions about your thoughts/feelings on the message you just read.

I thought/felt that the message is either…

| | | |
|---|---|---|
| Unacceptable | ---------------------------------- | Acceptable |
| Favorable | ---------------------------------- | Unfavorable |
| Right | ---------------------------------- | Wrong |

| | | |
|---|---|---|
| Bad | ---------------------------------- | Good |
| Wise | ---------------------------------- | Foolish |
| Positive | ---------------------------------- | Negative |

**Cognitive Source Evaluations** (McCroskey, 1996; Miller et al., 2007)

*Source Expertise*
Please answer the following questions about your thoughts/feelings on the message source who stated a reason why American Indians tend to be more obese than other races and ethnicities.

I thought/felt that the message source is either…

| | | |
|---|---|---|
| Expert | ---------------------------------- | Inexpert |
| Intelligent | ---------------------------------- | Unintelligent |
| Qualified | ---------------------------------- | Unqualified |
| Unconvincing | ---------------------------------- | Convincing |
| Respectable | ---------------------------------- | Disrespectable |

*Source Sociability*
Please answer the following questions about your thoughts/feelings on the message source who stated a reason why American Indians tend to be more obese than other races and ethnicities.

I thought/felt that the message source is either…

| | | |
|---|---|---|
| Friendly | ---------------------------------- | Unfriendly |
| Unlikable | ---------------------------------- | Likable |
| Considerate | ---------------------------------- | Inconsiderate |
| Pleasant | ---------------------------------- | Unpleasant |
| Unsympathetic | ---------------------------------- | Sympathetic |

*Source Trustworthiness*
Please answer the following questions about your thoughts/feelings on the message source who stated a reason why American Indians tend to be more obese than other races and ethnicities.

I thought/felt that the message source is either…

| | | | | | | |
|---|---|---|---|---|---|---|
| Reliable | ------------------------------------ | | | | | Unreliable |
| Untrustworthy | ------------------------------------ | | | | | Trustworthy |
| Valuable | ------------------------------------ | | | | | Worthless |
| Good | ------------------------------------ | | | | | Bad |
| Dishonest | ------------------------------------ | | | | | Honest |

**Behavioral intentions** (Block & Keller, 1995; Dillard & Shen, 2005)

Please answer the following questions about your intention to accept the recommendation in the message you just read.

1. Please indicate how much you are likely to call the number in the message to receive obesity management tailored for American Indians. You may move the slider under the question from '0' (indicating 'Definitely will not follow the recommendation') to '100' (indicating "Definitely will follow the recommendation').

I am willing to call the number in the message to receive tailored obesity management for American Indians.

| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|

2. To what extent are you willing to call the number in the message to receive obesity management tailored for American Indians?

| Extremely unlikely | Unlikely | Slightly unlikely | Moderately | Slightly likely | Moderately likely | Extremely likely |
|---|---|---|---|---|---|---|

**Obesity indicators (weight, exercise, and/or dietary behavior)**

Please answer the following questions about your dietary and exercise habits.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Never | Rarely | Occasionally | Sometimes | Often | Frequently | Everyday |

1. How often do you eat pick-up or delivery foods (include fast foods) per week on average?
2. How often do you exercise to a degree that you were sweating and/or out of breath per week on average?
3. How often do you eat microwavable and/or ready-made meals per week on average?
4. How often do you consult your doctor, nurse, nutritionists, and/or health trainers to discuss topics related to weight management per week on average?
5. How often do you check your weight per week on average?
6. How often do you take nutritional supplements (e.g., vitamins, minerals, proteins, amino

acids or other nutritional substances) per week on average?

8.  How often do you eat fresh vegetables and/or fruits per week on average?

8. Do you currently have a health insurance?
1) Yes, I have
2) No, I haven't
3) I am not sure
4) Prefer not to answer

9. Have you ever been diagnosed as either obese or overweight?
1) Yes
2) No
3) Prefer not to answer

10. What is your current weight in pounds? Please round off the nearest whole number (For example: if you are ranged in weight between 135.0 to 135.4, please write in 135).

11. What is your height in feet and inches? (For example, if you are 5 feet and 4 inches, please write 5'4").

## Demographics

1. You are
1) Male
2) Female
3) Prefer not to answer
4) Others (                )

2. What is your age in years?   (                )

3. What is your highest grade completed?
1) Some highs school
2) High school diploma or equivalent
3) Technical School (Vo Tech, Career Certification, etc.)
4) Some College (but did not graduate)
5) Associate's Degree
6) Bachelor's Degree
7) Master's Degree
8) Terminal Degree (e.g., Ph.D., M.D, LLP)
9) Prefer not to answer

4. What is your annual household income?
1) $ 0-9,999
2) $ 10,000 – 19,999
3) $ 20,000 – 29,999
4) $ 30,000 – 39,999

5) $ 40,000 – 49,999
6) $ 50,000 – 59,999
7) $ 60,000 – 69,999
8) $ 70,000 – 79,999
9) $ 80,000 – 89,999
10) $ 90,000 – 99,999
11) $ 100,000 or more
12) Prefer not to answer

5. What is your current employment status?
1) Employed full time
2) Student
3) Retired
4) Not employed-seeking work
5) Employed part time
6) Not employed not seeking work
7) Prefer not to answer

We thank you for your time spent taking this survey.
Your response has been recorded.

# Appendix D: The Tribal Support Letter

**Health Board Program**
700 Black Kettle
P.O. Box 38
Concho, OK 73022

CHEYENNE & ARAPAHO
TRIBES

(405) 422-7695
(405) 422-8263 *FAX*
(405) 262-0345 Ext. 27695
1-800-247-4612

December 6, 2018

Ms. Kim,

Thank you for visiting the Health Board about your proposed project studying our people's responses to health messaging. This project, which will help determine the best ways to communicate health messages about obesity and diabetes are important concerns among members of the Southern Cheyenne and Arapaho Tribes of Oklahoma. We understand that this study is important for accomplishing the long-term goal of preventing and reducing these conditions among our people.

We support your project and believe its approach will be effective in making headway on these issues. We look forward to our continued collaborations. Thank you.

Sincerely,
Allen Sutton, Chairman of C&A Health Board

# Appendix E: The Letter of the Study Approval (OU IRB)

**The UNIVERSITY of OKLAHOMA**

**Institutional Review Board for the Protection of Human Subjects**

**Approval of Initial Submission – Exempt from IRB Review – AP01**

**Date:**     June 11, 2019              **IRB#:**  10858

**Principal**
**Investigator:**  Narae Kim              **Approval Date:** 06/11/2019

**Exempt Category:** 2

**Study Title:**    MESSAGE DESIGN FOR AN ANGER-EVOKING OBESITY PREVENTION CAMPAIGN: RISK MESSAGE PROCESSING AMONG AMERICAN INDIANS

On behalf of the Institutional Review Board (IRB), I have reviewed the above-referenced research study and determined that it meets the criteria for exemption from IRB review. To view the documents approved for this submission, open this study from the *My Studies* option, go to *Submission History*, go to *Completed Submissions* tab and then click the *Details* icon.

As principal investigator of this research study, you are responsible to:
- Conduct the research study in a manner consistent with the requirements of the IRB and federal regulations 45 CFR 46.
- Request approval from the IRB prior to implementing any/all modifications as changes could affect the exempt status determination.
- Maintain accurate and complete study records for evaluation by the HRPP Quality Improvement Program and, if applicable, inspection by regulatory agencies and/or the study sponsor.
- Notify the IRB at the completion of the project.

If you have questions about this notification or using iRIS, contact the IRB @ 405-325-8110 or irb@ou.edu.

Cordially,

Lara Mayeux, Ph.D.
Chair, Institutional Review Board