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SOCIAL NETWORKING SITES AND PHYSICAL ACTIVITY: THE ROLE OF FRAMED HEALTH MESSAGES

Cassie Gonzalez

Abstract

Cardiovascular disease, cancer, and diabetes are the current leading causes of death in the United States, where most of these diseases are caused by a few specific risk behaviors including tobacco use, poor nutrition, and lack of physical activity (Rutledge, Lane, Merlo, & Elmi, 2018). Healthcare professional are being encouraged to educate patients and the community about the risks associated with health behaviors and lifestyle choices. I explore aspects of these health messages in the context of gain- vs loss-framed messages presented through two social networking sites, Twitter and Instagram, on subsequent health behavior changes. Whereas existing literature has explored the influence of message framing and health behaviors in print, audio, and visual medias, few studies have examined these effects through the use of social networking sites. The purpose of this study was to examine whether gain- vs loss-framed messages presented through social networking sites differ on subsequent physical activity levels. I hypothesized gain-framed messages would be more effective in the adoption of physical exercise among college-aged students versus the loss-framed messages. Undergraduate students at a southern based university completed a questionnaire assessing physical activity levels and social networking site (SNS) use. Participants were randomly assigned to one of six conditions and asked to "follow" their designated social networking account. For a period of two weeks, experimenters live posted a specified stimulus demonstrating a gain- or loss-framed message. Participants completed a follow-up questionnaire assessing physical activity and a post-experiment manipulation check.

Keywords: Framed Messages, Health Behavior, Social Networking Sites

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Chapter I: Introduction

Physical inactivity substantially impacts health in various ways. Engagement in regular physical exercise contributes to a reduced risk in developing several diseases, obesity, and premature death (Warburton, Nicol, & Bredin, 2006). In 2016, approximately 2 out of 5 American adults and 1 in 5 youths were considered to be obese (Centers for Disease Control and Prevention, 2016). More specifically, the prevalence rate of obesity was 35.7% for younger adults aged 20-39 and 42.8% for older adults aged 40-59 (Hales, Carroll, Fryar, & Ogden, 2017). According to the Centers of Disease Control and Prevention (CDC), obesity refers to a registered body mass index (BMI) of 30 or greater and is associated with an increased risk of serious health concerns such as cardiovascular disease (Centers for Disease Control and Prevention, 2016). Additionally, being obese increases an individual's risk for developing type 2 diabetes (adult-onset diabetes). Over the last 20 years, prevalence of adult-diagnosed diabetes has tripled and is currently the 7th leading cause of death in the United States. Those with diabetes are twice as likely to suffer from heart disease, the leading cause of death in America, or a stroke at an earlier age than those without diabetes (Centers for Disease Control and Prevention, 2018). In addition to obesity and diabetes, poor diet, physical inactivity and excessive alcohol use are all sizeable medical conditions and lifestyle choices that increase risk for developing heart disease. The World Health Organization (WHO) recommends health professionals begin transitioning to a “contemporary” patient-oriented approach when targeting changes in health behaviors and lifestyle choices

(World Health Organization, 2005a). Previous research suggests through behavior changes, approximately 80% of type 2 diabetes and cardiovascular disease can be prevented (World Health Organization, 2005b).

Health Message Framing

Increasing awareness about the negative consequences associated with physical inactivity provides individuals the opportunity to make informed changes regarding their lifestyle choices and health related behaviors. Historically, medical professionals have implemented health communication efforts aimed to prevent, detect, or promote these various health behaviors for their patients and the general population. Promotion of desired health behavior (e.g. regular physical activity) information can be presented through many forms such as brochures, commercials, public service announcements, and various media outlets (Salovey, Schneider, & Apanovitch, 2002). Quality and characteristics of the health message content can be influenced by a number of factors including the persuasive presentation of the information (Salovey, Schneider, & Apanovitch, 2002). Additionally, linguistics and layout of these health messages can impact the rate of acceptance of the information, intent to change, and actual adoption of the target behavior. Previous research has examined health promotion messages in the context of this presentation of information (Harrington & Kerr, 2017). Specifically, researchers have studied content focus on either positive or negative consequences of accepting or not accepting a certain health behavior, known as *message framing* (Rothman & Salovey, 1997; Salovey, Schneider, & Apanovitch, 2002). More specifically, message framing is composed of two concepts: gain- vs loss-frame. Gain-framed messages involve the *benefits* of adopting the behavior being salient. For

example, “wearing sunscreen can decrease your risk of developing skin cancer.” Whereas, loss-framed messages present information focusing on the *damages* of not accepting the behavior. For example, presenting information as “not wearing sunscreen increases your risk of developing skin cancer.” (Salovey, Schneider & Apanovitch, 2002: Detweiler, Bedell, Salovey, Pronin, & Rothman, 1999).

Limited research has explored the unique mechanisms that influence the effectiveness of framed messages on ensuing health behavior. Specifically, research has shown tailoring messages in the form of gain- or loss-frames are more persuasive and illicit higher levels of behavior change compared to non-tailored messages (Myers, 2010). Interpretation of circumstances presented in framed messages affect one’s processing of information (Salovey, Schneider, & Apanovitch, 2002). Previous research has focused on prospect theory as the primary system in understanding decision making in the context of message framing (Myers, 2010; Kahneman & Tversky, 1979). According to the prospect theory, individuals are risk-aversive when presented with information that involves outcomes with certain gains and individuals are risk-seeking when decisions are in the terms of potential losses (Harrington & Kerr, 2017). A well-known study by Tversky and Kahneman (1981) examining the idea of prospect theory presented participants with two programs involving a hypothetical disease killing 600 individuals. One condition featured gains, participants were told to choose between two programs highlighting the number of individuals who would be saved from the disease. The first program would save 200 people, whereas the second program had a 1/3 probability that 600 people would be saved, and a 2/3 probability all 600 people would not be saved. The other condition highlighted losses, where participants were to choose

between two programs focused on how many would die from the disease. The first program indicated 400 people would die, whereas the second program has a 1/3 probability that no one would die, and a 2/3 probability all 600 people would die. Each program offered a low-risk (certain) and high-risk (uncertain) option, and each outcome was framed as gain or loss. Of those in the gain-frame condition, 72% of participants chose the low-risk (certain program), suggesting risk aversion when faced with potential gains; 78% of participants in the loss-frame condition chose the high-risk (uncertain) program, suggesting risk-seeking when offered potential losses (Tversky & Kahneman, 1981).

In the realm of health promotion there are two types of behaviors researchers have examined in relation to message framing: *detection* and *prevention* behaviors. Detection behaviors are those that when adopted indicate a potential discovery of a disease, including HIV testing and mammograms. These behaviors can be interpreted as a high-risk option for individuals based on the chance they may find undesirable information (e.g. positive for HIV). Prevention behaviors entail the act of preventing a disease or condition through particular behaviors, such as the use of sunscreen (Elbert & Ots, 2018; Rothman & Salovey, 1997). Prevention behaviors are thought of as low-risk options in that individuals have the ability to prevent negative outcomes and gain benefits for health. Previous research has suggested, gain-frame messages are more efficient when targeting prevention behaviors (e.g. sunscreen use) and loss-framed message are likely to be more effective with behaviors aimed at detection (e.g. yearly mammograms). Aligning with prospect theory, research indicates that prevention behaviors (e.g. eating fruits and vegetables) are considered to be less risky, therefore individuals tend to be risk-aversive

and are more likely to respond to gain-frame messages to maintain health (Latimer et al., 2008). Conversely, detection behaviors (e.g. monthly breast self-examinations) are interpreted as risky, therefore individuals are risk-seeking and are more likely to respond to loss-frame messages (Tversky & Kahneman, 1981). Specifically, regarding physical activity, a prevention behavior, research shows that using gain-frame messaging is more effective in eliciting changes in behavior or intention (Latimer, Brawley, & Bassett, 2010).

Social Media

Previous generations used other media platforms such as newspapers, television, and radio to disperse important health information. Increasing cases of obesity, heart disease, and diabetes comes at a time the internet, specifically, social networking sites (SNS), are on the rise. Health professionals are employing use of the internet and social networking sites to incorporate health promotion aiming to address the rise in unhealthy individuals. Incorporating health information into SNS provides an opportunity to employ previous findings about message framing into these bulletins in hopes of initiating health behavior changes.

The original intention of the World Wide Web was to provide users a common accessible platform to share and receive information (Kaplan & Haenlein, 2010). The first introduction of a social media-like platform, “Open Diary”, was developed around 1979 as a site for writers to share their thoughts and opinions (Kaplan & Haenlein, 2010). Since then, social media has dramatically evolved in design and popularity. With the development of high-speed internet, companies like Myspace, Twitter, and Facebook moved toward the idea of social networking sites to connect individuals in a universal

domain (Kaplan & Haenlein, 2010). Previous studies involving social media sites have primarily focused on the use of discussion boards, blogs, and Facebook. Limited research has implemented the use of newer social networking sites such as Instagram and Twitter.

Twitter describes their platform as "the place to find out what's happening in the world right now" (Twitter, 2018). Twitter is an instant streaming, live feed of thoughts, information, or news about anything, all over the world where its 3,900,000 subscribers partake in sharing, viewing, and talking about endless topics. Recently, Twitter has become a viable community for dissemination of health information instantly to a vast number of individuals. Use of this platform and similar social networking sites can spread awareness on any health behavior such as sunscreen use, tobacco cessation, as well as the importance of human papillomavirus (HPV) vaccinations (Vance, Howe, & Dellavalle, 2009). For example, during the influenza A (H1N1) pandemic, the World Health Organization utilized their Twitter account with more than 11,700 followers to transmit information for the prevention, detection, and treatment of the H1N1 virus (McNab, 2009). This simple "tweet" had the potential of reaching those 11,700 individuals quicker than any brochure, public service announcement, or news article. Employing the use of social media platforms as a channel for health communication can provide quick, inexpensive, information to a greater number of individuals (McNab, 2009). A vast amount of opportunity lies in the use of social media for health promotion, specifically with the chance to reach difficult groups and the use of targeted campaigns as well (Gough, et al., 2017).

In a 2010 telephone survey, eight out of ten adult internet users reported turning to the internet to obtain information about a variety of health topics including specific

disease or treatments (Fox, 2011). Although only 7% of internet using adults look to social media for health information, social media poses a substantial opportunity to reach the more than 70% of young adults and adolescents that use these sites every day (Korda & Itani, 2011). In 2002, Jones and Madden (2002) argued that most college students began using computers between the ages of 3 and 5. It is most likely that the age of exposure to technology has decreased with the introduction of smartphones, tablets, and advanced computers. Studies have shown that using social media networks alone have a positive effect on increasing nutrition knowledge, as well as expanding the motivation for healthier eating habit (Nour, Yeung, Partridge, & Allman-Farinelli, 2017). As technology continues to progress, it is imperative researchers shift their focus beyond the aspects of the real world to the possibility of influence in the virtual world. Sullivan et al. (2013) demonstrated that a virtual reality weight management program (i.e. Second Life) was comparable to the face-to-face appointment, suggesting that an online technique can provide similar results than an in-person encounter. Using internet-based intervention can provide a low-cost alternative to the typical health informed appointments.

This evolving technology and the development of influential social networking sites (i.e. Facebook, Twitter, Instagram, etc.) blurs the barriers on public health information broadcasting. Recent research has implemented the use of web-based technology to examine health behavior promotion and change (Centola, 2013). Previous research has shown that health interventions are being used on social media, with discussion boards being the most popular. These interventions mostly include supplemental systems such as videos, modules, and self-report diaries (Williams, Hamm, Shulhan, Vandermeer, & Harling, 2014). Additionally, studies have examined influence

of online communities in respect to promotion of health behaviors where individuals demonstrated greater adoption of health behaviors if their network was considered tightly clustered (Centola, 2013). Social media platforms serve as an auspicious channel for dissemination of health messages by providing important information to countless individuals in real time (Gough, Hunter, & Kee, 2017).

The Present Study

The aim of this study was to examine the use of gain- vs loss-framed health messages through two social media platforms (i.e. Instagram and Twitter) and the subsequent influence on health behavior change. Previous research has examined the influence of gain- vs. loss-frame messages on the subsequent change in health behaviors, demonstrating that gain-frame messages are most effective for *prevention* behaviors and loss-frame messages are most influential for *detection* behaviors. For example, a message targeting negative consequences of not using sunscreen (e.g. getting skin cancer) will be less effective than messages salient in positive consequences (e.g. maintaining health, not getting skin cancer). Whereas, messages that focus on the negative consequences of not getting a yearly mammogram (e.g. discovery of breast cancer) will be more effective than a message that focuses on the positive consequences (e.g. not discovering breast cancer). In the present study, I examined physical exercise as a prevention behavior against obesity, heart disease, and diabetes. Consistent with the prospect theory, I propose the following hypothesis:

H1: The gain-framed message conditions will be more effective in the adoption of physical exercise among college-aged students versus the loss-framed messages.

Previous research has explored the differences of gain- versus loss-framed health messages through various deliveries, including modes such as brochures, magazines, vignettes, and message prompts (Harrington & Kerr, 2017; Bommel, 2016). To examine if previous findings of prospect theory and framed health-messages hold when presenting through social networking sites, I propose the following research questions:

RQ1: Will there be a difference in effectiveness of gain- and loss-framed health messages delivered through social networking sites on physical activity engagement, compared to the control condition?

Limited research has explored the influence of health framed messages in the form of a real time, organic post, on social networking sites on ensuing behavior changes. The present study aimed at addressing this gap in the literature by examining the effectiveness of gain- vs. loss-framed messages on physical activity presented in real time on both Instagram and Twitter. A secondary objective of this current study was to analyze the differences in outcomes or effectiveness of message framing specifically between the two social media platforms (Twitter and Instagram). Twitter is considered to be a microblogging application, whereas Instagram is a popular tool for sharing pictures or videos. Meta-analyses have shown that health messages in a visual form, such as pictures, are generally more persuasive than text only messages (Keller & Lehmann, 2008). To further explore the effects of health message framing delivery, I proposed a second research question:

RQ2: Will there be differences in physical activity outcomes between the Twitter and Instagram conditions?

Chapter II: Methodology

Participants

Undergraduate students at Murray State University were invited to participate in an online study using SONA in exchange for course credit. Although a power analysis indicated that 89 participants would be necessary to detect an effect size of Cohen's *d* = .3 with 80% power and an alpha of .05, approximately 38% of initial participants (n = 182) completed both the pre and post questionnaire, participants were dropped from the analyses if they did not complete the follow-up questionnaire. The study concluded with a total of 69 participants completing both parts of the study. The study was predominately female (92.6% female, 7.4% male) where the participants age ranged from 18 to 22 years old, with an average age of 18.93 years (see table 1).

Table 1. *Demographics information*

Demographic variables	
Age (years)	18.93
Sex	
Male	7.4%
Female	92.6%
Race/Ethnicity	
White	92.8%

Black	5.8%
Asian	1.4%
Marital Status	
Single	97.1%
Living with Partner	2.9%

Materials and Measures

Message framing manipulation. Twenty-one unique stimuli were created following guidelines discussed by Rothman and Salovey (1997). Generated gain-framed message content focus on an assortment of positive outcomes associated with engaging in physical activity, while loss-framed message content were centered around a variety of negative consequences related to physical inactivity. Each stimulus consists of a visual representation of an individual engaging in physical activity (Pexels, 2018), with a text overlay containing the designated framed message content. Each gain- and loss-framed conditions share an identical image with their designated text overlay. The control group stimuli were created using images of varying cats and kittens, feline facts text overlay included replacing the health-related text.

Demographic Questionnaire. Participants were asked to answer questions related to demographics including sex, age, marital status, and ethnicity.

Physical Activity. Participants engagement in physical activity was measured using the International Physical Activity Questionnaire-Short Version (IPAQ-SV). The IPAQ was originally created by an International Consensus Group in 1998 to identify physical activity and inactivity across a variety of domains for ages 15-65 (Levin,

Schneider, & Gaeth, 1998). The IPAQ includes four long and four short forms designed for administration via telephone or self-report with two distinct reference points of the last 7 days or in a usual week. For this study, to measure participant physical activity the IPAQ-Short Form self-report was administered. This measure has been found to contain moderate to high reliability with coefficient ranging from 0.71-.89 in college-aged students (Dinger, Behrens, & Han Ma, 2006). This 7-item measure includes open-ended questions based on the participant's 7-day recall of physical activity. The measure includes three levels of physical activity: category 1= low, category 2= moderate, category 3= high. Category 1 includes the lowest level of physical activity and does not meet criteria for category 2 or 3. Category 2 captures 3 or more days of vigorous activity including 20 minutes per day OR 5 or more days of moderate activity or walking for at least 30 minutes per day OR 5+ days of any combination of walking, moderate or vigorous intensity with a minimum of 600 MET-min/week. Category 3 includes either vigorous activity on at least 3 days with an accumulated 1500 MET-minutes/week OR 7 or more days of walking, moderate to vigorous activity with at least 3000 MET-minutes/week. According to The Cooper Institute (2017), a MET is a unit of energy expenditure (similar to the idea of burning calories). For example, a resting energy expenditure is considered as 1 MET, whereas if you were exercising at 5 METS, this interprets to 5 times the energy expended that at rest (Farrell, 2017). For the analysis of the IPAQ, walking=3.3 METs, Moderate physical activity=4.0 METs and vigorous physical activity= 8.0 METs. Summing total, the walking, moderate physical activity, and vigorous physical activity scores give the total physical activity MET-minutes/week.

Social networking site use. Social networking site platform use was measured using two items to assess average amount of time spent on social networking accounts each day (hours and minutes) and identifying which social networking sites in which they use regularly. The purpose of gathering this information was to assess the time spent on social networking sites on average each day and to gather information on the current active accounts each participant possessed.

Manipulation check. To assess the effectiveness of health framed messages on levels of physical activity a post-test manipulation check was used (see Table 2). Questions were administered to examine whether participants physical activity levels changed as a function of the health framed messages. On a 5-point Likert scale, subjects rated the extent to which they felt the presented stimuli made them increase their physical activity levels. On a 4-point Likert scale, participants were asked if they recall seeing stimuli presented to them during the experimentation period. For each of the manipulation check questions, higher scores indicate stronger memory and behavior change as a result of the postings.

Table 2. *Manipulation check questions*

	M	*SD*	Range
"Do you remember seeing posts…"	1.96	1.05s	1-4
"You feel your behaviors have changed…"	.61	.79	0-4

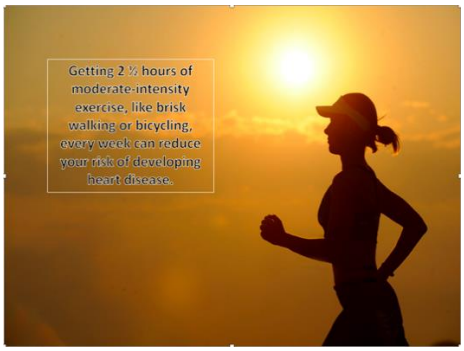
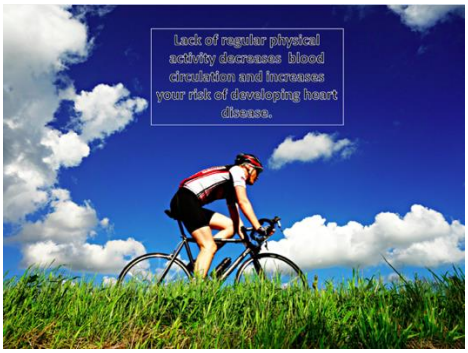
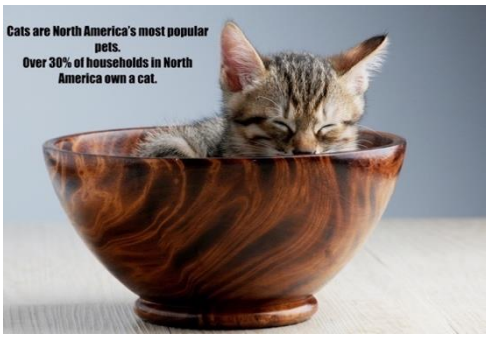
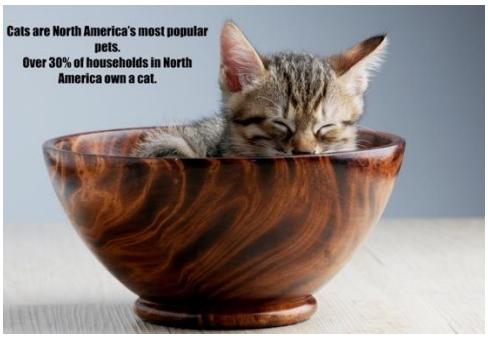
Procedure

Participants agreed to participant in the study through SONA and were asked to provide informed consent. Following agreement to participant, participants were directed to the online survey, where they were instructed to complete the demographic questionnaire. Following completion of the demographic questionnaire, participants were asked to complete the IPAQ and the social networking site use questions.

Each participant was randomized using computer software into three experimental groups: 1) participants instructed to use Twitter; 2) participants use Instagram and 3) the control group participants were assigned to either Twitter or Instagram containing non-health related message content. Within the Twitter and Instagram groups, participants were randomly assigned to a gain-frame group or a loss-frame group. A total of six experimental conditions included: Condition 1: Twitter-Gain (n = 9), Condition 2: Twitter-Loss (n = 4), Condition 3: Twitter-Control (n = 7), Condition 4: Instagram-Gain (n = 20), Condition 5: Instagram-Loss (n = 12), and Condition 6: Instagram-Control (n = 17; see Table 2). Participants were asked to "follow" their designated social networking account for the full duration of the study, 14 days. Each SNS included a live post of an appointed framed health message (gain- or loss-frame) three times a day at 9am, 1pm, and 5pm for 14 days. To examine the differences between SNS platforms, each SNS included identical images and text overlay for each assigned condition. For example, the Twitter gain-frame condition received identical stimuli as the Instagram gain-frame, the Twitter loss condition and Instagram loss condition received identical stimuli as well. Immediately after completing the initial experimentation period of 14 days, participants were sent an invitation to complete the follow-up questionnaire including the IPAQ-SV

and manipulation check questions via direct message through their social networking account (Gallagher & Updegraff, 2012).

Table 3. *Experimental and control condition stimuli*

Condition	Twitter	Instagram
Gain-Frame	 "Getting 2 ½ hours of moderate-intensity exercise, like brisk walking or bicycling, every week can reduce your risk of developing heart disease."	 "Getting 2 ½ hours of moderate-intensity exercise, like brisk walking or bicycling, every week can reduce your risk of developing heart disease."
Loss-Frame	 "Lack of regular physical activity decreases blood circulation and increases your risk of developing heart disease."	 "Lack of regular physical activity decreases blood circulation and increases your risk of developing heart disease."
Control	 "Cats are North America's most popular pets. Over 30% of households in North America own a cat."	 "Cats are North America's most popular pets. Over 30% of households in North America own a cat."

Chapter III: Results

Data were first analyzed with a mixed model ANOVA across all groups. Results indicated that there were no differences between conditions ($F_{(1,8.70)} = 0.04$, $p = 0.85$). All analyses were performed using the lmerTest package in R using a Type III ANOVA with Satterthwaite's method. Subsequent analyses are planned comparisons for hypothesized differences between groups.

Gain- vs. Loss-Framed Messages. Based on previous research involving health framed messages, the effects of health frame messages on IPAQ scores were examined using a mixed model ANOVA to compare the frequency of engaging in physical exercise in the gain-frame and loss-frame conditions. The analysis showed a non-significant difference in the scores for the gain-framed message condition (M=141.33, SD=146.46) and loss-framed message condition (M=225.19, SD=204.32) conditions ($F_{(1,\ 2\backslash 14.58)} = 0.06$, $p = 0.80$). Contrary to previous research regarding the effectiveness of gain-framed messages on prevention behaviors, the hypothesis was not supported. This study did not find significant results related to gain- or loss-framed messages changing the behaviors of participants over a two-week period as a result exposure to the framed messages, regardless of presentation.

Table 4. *Correlations*

	1	2	3	*M*	*SD*
1. IPAQ 1	-			181.89	204.66
2. IPAQ 2	0.79	-		164.19	153.36

3. AGE	-0.08	-0.17	-	18.93	0.96

Note. IPAQ 1 indicates the IPAQ scores prior to the experimental period. IPAQ 2 indicates the IPAQ scores post experimental period.

Social Networking Platforms. In order to examine if previous findings involving prospect theory and framed health-messages hold when presented through social networking sites, a mixed model ANOVA examined the impact of the framed messages compared to the control condition. The ANOVA indicated a non-significant difference between the experimental groups (M=173.28, SD=170.95) and the control group (M= 148.28, SD=121.88) on physical activity behavior changes ($F_{(1, 8.75)} = 0.001$, $p = 0.97$). The current study did not find consistent results regarding the effectiveness of framed message delivery on subsequent changes on prevention behaviors when delivered through two social networking sites.

Instagram vs. Twitter. A secondary objective of this current study was to analyze the differences in outcomes of message framing specifically between the two social media platforms (Twitter and Instagram). A mixed model ANOVA compared the effects of health message framing delivery delivered through these two social networking sites, showing a non-significant difference between framed messages delivered through Twitter (M=105.3, SD=92.44) and Instagram (M=207.27, SD=193.09) on engagement in physical activity ($F_{(1, 12.75)}$=0.24, $p = 0.64$). Results regarding the difference in effectiveness of the framed messages delivered through two inherently different social networking platforms showed no significant changes when compared to each other, meaning one platform did not present as more effective than the other.

Chapter IV: Discussion

Physical activity heavily impacts an individual's physical and mental health in a multitude of ways. Whereas a sedentary lifestyle can negatively impact your health, an active lifestyle can reduce an individual's risk for negative health outcomes such as cardiovascular disease, obesity, and diabetes (Warburton, Nicol, & Berdin, 2006). Physical inactivity is steadily increasing, such that less than 5% of the United States' adults participate in 30 minutes or more of physical activity each day (U.S. Department of Agriculture, 2010). With decreases in the overall physical activity for adults comes with an increase in the negative health consequences including chronic diseases such as diabetes. In response, medical professionals of all domains are faced with an important task to inform the public of both the benefits of physical activity and the costs of physical inactivity. Given this task, it is important to analyze the effectiveness of these health informed messaged targeted to increasing physical activity. These health behavior changes can be influenced by framing effects delivered through a variety of platforms such as brochure, commercials, and ads (Salovey, Schneider, & Apanovitch, 2002). Research shows presentation of a message in either terms of losses or gains can changes the receptiveness of the message, whereas gain-framed messages are best for prevention behaviors, loss-framed messages are best for detection behaviors (Detweiler & Bedell, 1999). Similarly, the prospect theory states that individuals tend to seek out risk when presented with the negative outcomes associated with a decision but focus on avoiding

risks when presented with potential benefits (Latimer et al., 2008). The focus of the present study was to examine the difference between gain- and loss-framed messages delivered through two social media platforms, Instagram and Twitter, on subsequent engagement in exercise behaviors in college-aged individuals. In the present study, it was predicted that the gain-framed messages would increase subsequent physical activity among college-aged participants, regardless of the platform used (Instagram or Twitter). This study did not find results consistent with previous research which suggests gain-framed messages being more effective in *prevention* behavior changes such as the prevention of chronic illnesses or negative health outcomes. Instead, the current study did not show a significant difference between the gain- or loss-framed messages delivered through each of the social networking platforms on changes in physical activity. These results may be representative of the limited number of participants completing each portion of the study, including following their designated social networking account. Furthermore, these results suggest that gain-framed messages do not present effective on changing behaviors when delivered through social networking platforms. This study did not find evidence to support the hypothesis that gain-framed messages would be more effective on changing physical activity in this population.

Additionally, this present study proposed the research question on the differences between the gain- and loss-framed messages and the control group, suggesting that framed messages in general are effective for behavior changes when delivered through social networking platforms. Gain- and loss-framed health messages have been researched via various deliveries to individuals, including brochures, magazines, vignettes, and message prompts (Harrington & Kerr, 2017; Bommel, 2016). Limited

research has analyzed the use of social media platforms and live, in real-time postings, to study health behaviors, therefore this study aimed at analyzing the differences between the general effectiveness of the framed message group compared to the control group. The current study did not find significance differences between the framed message groups compared to the group who did not receive a framed message pertaining to health behavior changes. Although these results might suggest that framed messages delivered through social networking platforms are not as effective compared to previous findings involving other modes of delivery, it is important to consider the lack of diversity and completion of both parts of the study for this sample. These results cannot be generalized to the general population, therefore warranting further research in delivering framed messages via social networking platforms. The results suggest that previous findings regarding framed messages do not carry over when delivered through live posting on social networking sites. The lack of behavior changes in this study may be attributed to the nature of both Instagram and Twitter, such that the amount of time spent viewing each post may be limited to the amount of attention each participant attributes to the presented message. Framed messages delivered through a social networking site may not provide the individual an adequate opportunity to attend to the message appropriately in order to reach influential levels to subsequent change behavior. These findings suggest time and attention may be important factors when encountering a framed message.

One goal of this study was to determine whether the social media platform used to deliver the framed health message influenced its effectiveness on health behavior changes. Twitter and Instagram, while both social networking sites, are inherently difference in the purpose of their usage. Instagram was created for the use of picture

sharing and Twitter for microblogging, this study used identical postings to deliver the framed messages, where the only difference between each posting was the words used (gain- vs. loss-framed). When comparing the two platforms, this study found a non-significant difference in the effectiveness of the framed health message, regardless of gain- or loss-framed message, on physical activity engagement. These findings suggest that the type of social networking site used to deliver these framed messages did not influence the effectiveness of these messages for this sample of individuals. The platform design did not prove to be an important factor for the receptiveness of the framed messages, suggesting that the intended use of the social networking sites does not play a role in how participants interpreted the live post. These results may be representative of the generally non-significant results for the overarching effectiveness of the messages on physical activity engagement in this study.

Chapter V: Limitations and Future Directions

A potential limitation to the presented study includes the limited recruitment of participants to complete the second part of the study (n=69). Overall, individuals who participated in the first phase of the study did not follow their designated accounts as instructed, therefore were excluded from the sample due to the absence of the intervention phase. It is important to note the use of algorithms for accounts on Instagram and Twitter which may have impacted the viewing of the posted stimuli to participants. It is difficult to determine whether or not participants saw each of the posts on their designated account. Furthermore, the number of accounts each participant followed may have influenced their opportunity to view the postings daily, proving as a limitation to the study. The manipulation check showed 39% of participants did not remember seeing the posts on their daily accounts during the 14 days intervention period, while 16% indicated they remembered "very clearly." Examining the manipulation check questions suggest that the participants exposure to the posts may have been more limited than previously thought, proving as a limitation to the intervention of this study. Additionally, during the scheduled intervention period, the Instagram platform website unexpectedly ceased operating for a period of 24 hours resulting in the inability to live post the framed messages to the platform. Therefore, the continuous intervention period of 14 days for participants was interrupted due to the technical difficulties of the platform. Following the resolution to the technical difficulties, the participants received the remainder of their scheduled framed message posts, completing their two week exposure to the framed messages. This potential limitation may have influenced the outcome of the participant's

physical activity, such that they did not receive a continuous intervention during the initially schedule times.

Furthermore, the participants were recruited through a southern based university where the sample pool is majority White females, which is accurately represented in this study (92.8%, 92.6%, respectively). Therefore, a potential limitation to this study includes the homogeneity of the sample. Given the homogeneity of the sample, the results cannot be confidently generalized to the population outside of the designated university. Additionally, the sample being mainly females could be in part due to the title of the study during recruitment of participants (i.e. "Social Networking Use & Exercise"), influencing participant's decision to participate. In addition, all measures completed by the participants were self-report, leaving room for misrepresentation of current physical activity whether over or under representation. The self-report of physical activity for the participants may have posed as a limitation for the current study, future studies should consider an objective representation of physical activity through Fitbit, pedometer, or record keeping diary. Lastly, when analyzing the data, the residuals exhibited an odd distribution where the data were clustered around the middle with outliers at the end of the distributions proving a limitation to the current study as well.

Social networking sites continue to grow in popularity and use, while printed media such as brochures and newspapers may one day no longer exist by transitioning to the internet platform in the future. As technology and the dependence on the internet continue to grow, it is important to incorporate important health information and announcements into these high-volume sites so that more individuals can be reached. Although this study did not show significant results related to the effectiveness of framed

health messages delivered through social networking sites, future studies should continue to examine the relationship between social media platforms and health behavior changes in order to understand the effectiveness of these practices. For example, future studies should consider potential dosing effects for the exposure to the framed-messages, such that the duration of intervention be shorter or longer than the 14 days in the current study. Examining if previous findings regarding gain- and loss-framed messages transfer across various virtual platforms and media will be vital in successful attempts to increase health behavior changes.

On any given day, more than 500 million individuals log in to Instagram and more than 500 million tweets are sent out (Clark, 2019; Cooper, 2019). Given the wide reach of social networking sites and the internet, it is important to represent differences among gender, age, race/ethnicity, or socioeconomic status. Capturing the influence social networking platform health messages have on a diverse sample will be helpful to determining when and where to use certain health messages. Finding the answers what works best for whom when it comes to uniting framed messages and the internet. While the current study lacked in diversity within the participants, future studies should examine a more diverse sample, including various races and ethnicities in order to understand the potential demographic confounds related to health behavior changes.

Although this study included Instagram and Twitter social networking platforms, many other platforms exist (e.g. Facebook, Reddit, LinkedIn, Tumblr, etc.) that could potentially be more effective in changing behaviors. While research exists on the use of framed messages on Facebook, limited research exists utilizing the “live” posts to the social networking platform. Therefore, future research should include various other social

networking sites, including Facebook, where the framed messages are posted in real-time to the accounts analyzing the effectiveness on subsequent health behavior changes. The ability to analyze various social networking website can broaden the opportunities to reach more individuals in hopes of decreasing the negative health outcomes that poses a risk for sedentary adults.

Appendix I: IRB Approval Letter

MURRAY STATE UNIVERSITY

Institutional Review Board

328 Wells Hall
Murray, KY 42071-3318
270-809-2916• msu.irb@murraystate.edu

TO: Sean Rife, Psychology

FROM: Jonathan Baskin, IRB Coordinator

DATE: 11/26/2018

RE: Human Subjects Protocol I.D. – IRB # 19-077

The IRB has completed its review of your student's Level 1 protocol entitled *Social Networking Sites and Physical Activity: The Roles of Framed Health Messages*. After review and consideration, the IRB has determined that the research, as described in the protocol form, will be conducted in compliance with Murray State University guidelines for the protection of human participants.

The forms and materials that have been approved for use in this research study are attached to the email containing this letter. These are the forms and materials that must be presented to the subjects. Use of any process or forms other than those approved by the IRB will be considered misconduct in research as stated in the MSU IRB Procedures and Guidelines section 20.3.

Your stated data collection period is from 11/26/2018 to 11/25/2019.

If data collection extends beyond this period, please submit an Amendment to an Approved Protocol form detailing the new data collection period and the reason for the change.

This Level 1 approval is valid until 11/25/2019.

If data collection and analysis extends beyond this date, the research project must be reviewed as a continuation project by the IRB prior to the end of the approval period, 11/25/2019. You must reapply for IRB approval by submitting a Project Update and Closure form (available at murraystate.edu/irb). You must allow ample time for IRB processing and decision prior to your expiration date, or your research must stop until such time that IRB approval is received. If the research project is completed by the end of the approval period, then a Project Update and Closure form must be submitted for IRB review so that your protocol may be closed. It is your responsibility to submit the appropriate paperwork in a timely manner.

The protocol is approved. You may begin data collection now.

Appendix II: Survey

Demographics

What is your sex?

Please select your ethnicity?

What is your age?

What is your current marital status?

International Physical Activity Questionnaire-Short Version

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the last 7 days. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the vigorous activities that you did in the last 7 days. Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

1. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?

_____ days per week

No vigorous physical activities Skip to question 2. How much time did you usually spend

doing vigorous physical activities on one of those days?

_____ hours per day

_____ minutes per day

Don't know/Not sure

Think about all the moderate activities that you did in the last 7 days. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ days per week

No moderate physical activities Skip to question 5

4. How much time did you usually spend doing moderate physical activities on one of those days?

_____ hours per day

_____ minutes per day

Don't know/Not sure

Think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?

_____ days per week

No walking Skip to question 7

6. How much time did you usually spend walking on one of those days?

_____ hours per day

_____ minutes per day

Don't know/Not sure

The last question is about the time you spent sitting on weekdays during the last 7 days. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the last 7 days, how much time did you spend sitting on a weekday?

_____ hours per day

_____ minutes per day

Don't know/Not sure

This is the end of the questionnaire, thank you for participating.

Social Networking Site Use

Please answer the following questions regarding social networking sites (e.g. Twitter, Instagram Snapchat, Facebook, etc.).

1. On average, how much time (hours and minutes) do you spend on social networking sites in a typical day?

   _____ hours per day

   _____ minutes per day

2. Please select the social networking sites you currently have an account for and use regularly:

    Facebook

    Twitter

    Instagram

    Snapchat

    LinkedIn

    Tumblr.

    Reddit

    Pinterest

    Other

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