

2017-01-01

Monitoring And Blunting Coping Style Effects On College Student Processing Of Health Information Via Social Media

Katherine Marie Aguirre

University of Texas at El Paso, kmaguirre@miners.utep.edu

Follow this and additional works at: https://digitalcommons.utep.edu/open_etd



Part of the [Medicine and Health Sciences Commons](#), and the [Psychology Commons](#)

Recommended Citation

Aguirre, Katherine Marie, "Monitoring And Blunting Coping Style Effects On College Student Processing Of Health Information Via Social Media" (2017). *Open Access Theses & Dissertations*. 396.

https://digitalcommons.utep.edu/open_etd/396

This is brought to you for free and open access by DigitalCommons@UTEP. It has been accepted for inclusion in Open Access Theses & Dissertations by an authorized administrator of DigitalCommons@UTEP. For more information, please contact lweber@utep.edu.

MONITORING AND BLUNTING COPING STYLE EFFECTS ON COLLEGE
STUDENT PROCESSING OF HEALTH INFORMATION VIA SOCIAL MEDIA

KATHERINE MARIE AGUIRRE

Doctoral Program in Psychology

APPROVED:

Lawrence Cohn, Ph.D., Chair

John Wiebe, Ph.D.

Theodore Cooper, Ph.D.

Craig Field, Ph.D.

Daniel Scheller, Ph.D.

Charles Ambler, Ph.D.
Dean of the Graduate School

Copyright ©

by

Katherine M. Aguirre

2017

MONITORING AND BLUNTING COPING STYLE EFFECTS ON COLLEGE
STUDENT PROCESSING OF HEALTH INFORMATION VIA SOCIAL MEDIA

by

KATHERINE MARIE AGUIRRE, M.A., B.S.

DISSERTATION

Presented to the Faculty of the Graduate School of

The University of Texas at El Paso

in Partial Fulfillment

of the Requirements

for the Degree of

DOCTOR OF PHILOSOPHY

Department of Psychology

THE UNIVERSITY OF TEXAS AT EL PASO

December 2017

Dedication

I am dedicating this dissertation to my loved ones.

To Mom, your example of what it means to be an independent woman with her wits about her will stick with me forever and I hope to pass this example down to my children and my future mentees. I will work to repay your bravery and sacrifice in raising my brother and I.

To Dad, you have shown more generosity and kindness to people than most charities I've seen. You taught me the importance of being professional but to also be a kind person. You give so much of yourself and supported me in more ways than one.

To Ruben, I owe it to you for setting me on the path I am on today. Were it not for you, I would not have believed that I could contribute to something bigger than myself.

To Jim, I have almost broken a rib with how hard we make each other laugh. I have kept going all these years with the inside jokes and the calls on the way to work. I leave you with this, "Fine! I guess I'll have to make my own tea!"

To Ivan, I finally met someone who I felt was worth fighting my demons. Your love and support during this critical time in my life has been immeasurable. From listening to me for hours on end to providing comfort when I was down, I hope in turn I've showed you the same. I can't wait to take a long, relaxing trip with you.

Abstract

The dissemination of public health messages via social media is a growing phenomenon that is changing the health communication landscape (Chou, Hunt, Beckjord, Mojer, & Hesse, 2009). Few studies have investigated how individuals process health-threatening information. This study addressed this gap in knowledge. Specifically, the current study investigated the impact of coping style on an individual's attention to health-threatening and health-promoting words on an attention task. The current study also investigated the impact of coping style on the recall of health-threatening, health-promoting, and neutral words contained in a diabetes health message. In addition, the current study investigated if coping style influences the way individuals frame a message when “sharing” information with other social media users after reading a diabetes health message.

This study addressed those aims using two experimental tasks. The first task was a dot probe task to detect any difference in attention to health-threatening and health-promoting words. The second task asked participants to read a diabetes health message and Tweet about what they read. This novel approach was used to measure memory recall, Tweet valence, and the number of health-threatening and health-promoting words or phrases used to construct Tweets. Data analyses included a three-step hierarchical regression model. Step 1 included health anxiety and perceived risk for developing diabetes scores. Step 2 included state anxiety and trait anxiety scores. Finally, Step 3 included monitoring and blunting coping scores.

The final models for all dependent variables were not statistically significant. However, several bivariate correlations were found. Namely, the higher the health anxiety score, the fewer health-promoting keywords recalled ($\beta = -0.19, p = 0.01$). Exploratory analyses revealed a primacy effect. Specifically, when health-promoting information was presented first, participant Tweets

contained more health-promoting keywords, demonstrated a higher health-promoting valence, and used more health-promoting words and phrases. The results from this study will inform future health communication research on dissemination via social media. This study's innovative approach of investigating reaction times and responses to a health message to create a fuller picture of information processing will add to the health communication literature on how to better assess attention to, and use of, health information.

Table of Contents

Dedication	iv
Abstract	v
Table of Contents	vii
List of Tables and Figures	ix
Chapter 1: Introduction	1
1.1 OVERVIEW	1
1.2 DIABETES	3
1.3 SOCIAL MEDIA	6
1.4 HEALTH MESSAGES	13
1.5 ATTENTIONAL BIAS AND INFORMATION PROCESSING	15
1.6 COPING STYLE	19
1.7 COPING AND ATTENTION BIAS STUDIES	24
1.8 COPING AND MEMORY BIAS STUDIES	31
1.9 THE PRESENT STUDY	34
1.10 HYPOTHESES	34
Chapter 2: Methods	36
2.1 PARTICIPANTS	36
2.2 MEASURES	37
2.3 MATERIALS	40
2.4 PROCEDURE	46
2.5 DATA ANALYSIS	47
Chapter 3: Results	49
3.1 PARTICIPANT CHARACTERISTICS	49
3.2 REGRESSION ANALYSES	55
3.3 EXPLORATORY ANALYSES	58
Chapter 4: Discussion	60
4.1 THE RELATIONSHIP BETWEEN HEALTH INFORMATION PROCESSING AND COPING STYLE, ANXIETY, AND PERCEIVED RISK	60
4.2 STRENGTHS	68

4.3 LIMITATIONS.....	69
4.4 FUTURE DIRECTIONS	70
4.5 CONCLUSION.....	72
References.....	74
Tables	86
Appendix.....	105
Vita	122

List of Tables and Figures

Table 1: Attentional bias and repressive coping studies	26
Table 2: Attentional bias and problem-focused, emotion-focused, and avoidant coping studies ..	28
Table 3: Attentional bias and Modes of Coping model studies	29
Table 4: Attentional bias and monitoring and blunting coping studies	31
Table 5: Memory bias effect sizes	33
Figure 1: DPT Timeline	42
Table 6: EBSCOhost databases used for literature review	86
Table 7: List of neutral and stimulus word pairs	87
Table 8: Participant characteristics	88
Table 9: Social media usage and health information sources	89
Table 10: Means, standard deviations, and reliabilities for independent variables	90
Table 11: Means, standard deviations, and percentages for dependent variables	91
Figure 2: Histogram for State Anxiety scores.....	92
Figure 3: Histogram for Trait Anxiety scores.....	93
Figure 4: Histogram for Health Anxiety scores.....	94
Figure 5: Histogram for Perceived Diabetes Risk scores	95
Figure 6: Histogram for Monitoring Coping scores	96
Figure 7: Histogram for Blunting Coping scores.....	97
Table 12: Correlations among key variables	98
Table 13: Final hierarchical regression models for DPT Health-Threatening and Health Promoting attentional bias scores	99
Table 14: Final hierarchical regression model for Health-Threatening and Health-Promoting keywords	100
Table 15: Final hierarchical regression model for Tweet ratings	101
Table 16: Final hierarchical regression models for Health-Threatening, Health-Promoting, and Neutral words or phrases used in participant Tweets	102
Table 17: Inter-rater agreement for Tweet coding.....	103
Table 18: Correlations for exploratory analyses.....	104

Chapter 1: Introduction

1.1 OVERVIEW

The dissemination of public health messages via social media is a growing phenomenon that is changing the health communication landscape (Chou, Hunt, Beckjord, Mojer, & Hesse, 2009). These messages contain informative content uploaded to social media networks such as Twitter, Facebook, Snapchat, and Instagram. These internet social networks, in turn, have the potential to reach millions of individuals. While there are character limits for some network services (e.g., Tweets could only be a maximum of 140 characters until November 6, 2017 when Twitter increased the character limit to 280), messages can be customized with picture and video content by social media users. Despite many health departments and government agencies having social media pages, social media outreach efforts are often not guided by empirical evidence.

Indeed, few studies have investigated how individuals process health threatening information. Prior studies have shown that *general* information processing may be influenced by individual differences in anxiety and coping style. However, little is known about how coping style affects attention to health-threatening information, recall of health-threatening information, or the framing of health messages when individuals “share” health-threatening information. A health message can be “framed” to convey information in a positive, negative, or neutral manner to highlight prevention benefits or health risks and is of interest because social media consists of information being disseminated or “shared” between users (Jha, Lin, & Savoia, 2015). The current research investigates factors that affect attention, recall, and message framing in the context of a specific medical threat, diabetes using an innovative social media task. This innovative approach attempted to assess attention to, and use of, health information from the cognitive micro-level and behavioral macro-level which will be discussed more in-depth in the methods and discussion

sections. Few studies have attempted this two-pronged approach and the results from this study will inform the health communication literature on how to better assess health information processing, both cognitively and behaviorally.

This study investigated the impact of coping style on an individual's attention to health-threatening and health-promoting words on an attention task. The current study also investigated the impact of coping style on the recall of health-threatening, health-promoting, and neutral words contained in a diabetes health message. In addition, this study investigated if coping style influences the way individuals frame a message when "sharing" information with other social media users after reading a diabetes health message.

Overall Summary

The introduction reviews type 2 diabetes incidence, causes, consequences, and prevalence to underscore the importance of public health efforts targeting type 2 diabetes. Two major social media platforms, Twitter and Facebook, dynamics will be described, with emphasis on how they are used for public health communication. Health messages will be reviewed regarding what features make them more effective for behavior change. A summary of the relationship between anxiety and attentional bias will be provided. A summary of four coping styles will be given to inform the reader on the components of each style. Evidence will then be reviewed regarding coping style's influence on attentional bias and memory bias. The second half of this dissertation will summarize participant recruitment, measures and their corresponding reliabilities, the components of the novel approach utilized, the current study's procedure, data analyses, results, and discussion.

1.2 DIABETES

Diabetes is a chronic disease that is hallmarked by the body's inability to produce or respond properly to the hormone insulin resulting in elevated blood glucose levels. Three basic types of diabetes have been identified: gestational, type 1, and type 2. Type 2 diabetes accounts for 90-95% of cases and usually results from poor diet and lack of exercise. Thus, communicating the risk of type 2 diabetes was the focus of this study. Type 2 diabetes is hallmarked by insulin resistance and deficiency, sometimes requiring insulin injection. A diagnosis of type 2 diabetes is made after a physician assesses past and current symptomology as well as baseline and fasting blood glucose levels. Once type 2 diabetes is suspected, blood tests for hemoglobin A1C and glucose levels will be ordered along with instructions to fast for at least twelve hours before testing. These tests can also help detect prediabetes among those individuals at high risk of developing diabetes. If a diagnosis is deemed appropriate for the individual, cardiovascular disease (CVD) risk should also be assessed due to the long-term complications of diabetes that can affect the cardiovascular system.

Complications from type 2 diabetes include ketones building up in the bloodstream (ketoacidosis), vascular problems, kidney failure, stroke, blindness, retinopathy, non-alcoholic fatty liver, nerve damage, depression, sleep apnea, circulatory complications leading to amputation of the lower extremities, and death (ADA, 2015). Diabetes was the 7th leading cause of death in the U.S. in 2010. However, diabetes and insulin resistance can be managed by weight loss, exercise, and use of diabetes pharmaceuticals like metformin, although blood sugar levels rarely return to normal (CDC, 2014).

Incidence and Prevalence

It is predicted that 333 million people around the world will have some form of diabetes by 2025 (Casey, Rouff, & Jaguerui-Covarrubias, 2014). The CDC (2014) estimates that 21 million people are currently living with some form of diabetes in the U.S., and therefore diabetes is increasingly recognized as a public health epidemic. Another 8.1 million individuals may be undiagnosed but living with the disease. Moreover, the incidence and prevalence of type 2 diabetes has globally increased every year in tandem with obesity rates since the 1980s (Inzucchi et al., 2012).

In 2012, there were 1.2 million new cases of adulthood diabetes diagnosed in the U.S. The present study's target group of young adults 18-35 years of age comprises approximately 4.3 million diagnosed and 4.1 million undiagnosed individuals afflicted by diabetes. In 2012, type 2 diabetes was present in 7.6% of non-Hispanic White Americans aged 20 years and older, 9.0% of Asian Americans, 12.8% of Hispanic Americans, 13.2 % of African Americans, and 15.9% of Native Americans. Among Hispanics living in the U.S., 13.9% of Mexican Americans, 8.5% of Central and South Americans, 9.3% of Cubans, and 14.8% of Puerto Ricans were living with diabetes (CDC, 2014).

In 2012, there were more than 38 million people in the U.S. who could be classified as having prediabetes based on their fasting glucose or A1C levels (CDC, 2014). Hispanics compose thirty-eight percent of individuals with prediabetes (Diabetes Prevention Program Research Group, 2002). Because Hispanics have higher diabetes rates compared to non-Hispanic Caucasians, an overview of diabetes incidence and prevalence in this region is provided. In 2010, El Paso County's population was approximately 800,000 with 651,727 people of Hispanic origin and 96,000 individuals diagnosed with diabetes (Osborn, Miller, Bahr, & Zhang, 2014). This large population of Americans is a prime target for diabetes prevention efforts, including health

campaigns and interventions detailing the risky behaviors that may lead to type 2 diabetes and encouraging the adoption of healthy behavior change.

Risks

The increase in obesity rates among U.S. adults has contributed to the dramatic rise in type 2 diabetes among U.S. adults. The American Diabetes Association (ADA, 2015) recommends that overweight ($\text{BMI} \geq 25 \text{ kg/m}^2$) adults should be tested for type 2 diabetes even if they are asymptomatic. The following are risk factors for developing type 2 diabetes: history of gestational diabetes, hyperglycemia, hypertension, and dyslipidemia. In addition, individuals of African American, Hispanic, Asian American or Native American descent, and individuals with a family history of diabetes are also at risk (CDC, 2014). A main finding from the binational U.S.-Mexico Diabetes Control and Prevention Project revealed that diabetes risk in Hispanics is inversely related to socioeconomic status (SES). Therefore, Hispanics with higher education level and higher earnings are associated with lower risk for type 2 diabetes when compared to Hispanics of lower SES. Higher education level leads people to become better informed about how to prevent diabetes and higher SES may allow them to buy higher quality foods and exercise more, which are two behaviors that greatly reduce the risk of diabetes (Casey et al., 2014).

Prevention

The risk of developing diabetes increases with age, obesity, and a sedentary lifestyle; notably, individuals can make lifestyle changes to prevent or delay type 2 diabetes onset (Diabetes Prevention Program Research Group, 2002). To facilitate prevention efforts, blood tests can track the progression of insulin dysfunction by periodically measuring glucose and A1C to determine baseline levels (CDC, 2014). If prediabetes is suspected and impaired glucose uptake or A1C levels of 5.7-6.4% are confirmed, the ADA (2015) recommends an intensive diet change, 150 minutes of moderate-intensity exercise every week, and a seven percent loss of total body weight.

Follow-up counseling can also help patients manage a recommended health regimen. Three randomized controlled trials testing the above recommendations showed a 43-58% reduction of diabetes conversion over seven years in participants with prediabetes (Diabetes Prevention Group, 2009; Li et al., 2008; & Lindstrom et al., 2006). While there are pharmaceutical prevention treatments for diabetes, such as metformin, such treatments can be costlier than lifestyle modification. Prevention efforts could also reduce healthcare spending on diabetes. In 2012, \$176 billion in direct medical costs was spent treating diabetes (CDC, 2014). From a public health standpoint, utilizing social media to promote diabetes prevention information can be cost-effective, reaching millions of people who may be at risk for diabetes.

1.3 SOCIAL MEDIA

Currently, there are many individuals whose primary source of health information is the internet and social media. It is estimated that 59% -70% of *all* U.S. adults use the internet to search and share health information (Hale, Pathipati, Zan, & Jethwani, 2014; Prestin et al., 2015). Since 2004, there has been a global rise in the use of social media by health providers for disseminating health information (Fergie et al., 2015). Social media websites allow new ways of delivering health communication in the form of text, videos, and pictures (Jha et al., 2015). Social media offer an unprecedented opportunity to communicate with people in an inexpensive and far-reaching way and allows non-experts to receive health information from experts to make informed decisions (Neiger, Thackeray, Burton, Thackeray, & Reese, 2013). Therefore, internet health communication has become more participatory than traditional health communication methods (flyers, television commercials, etc.) because health organizations and the public can exchange questions, ideas, and counterarguments (Chou et al., 2013). Social media have been

shown to increase health knowledge and raise awareness of public health issues (George et al., 2015).

Seeking health information on social media websites has advantages over seeking health information from a physician or other health provider, including constant availability of information, more anonymity and therefore less chance of stigmatization, the ability to connect with others who have the same medical condition, and quick answers to questions (Hale et al., 2014). Many adults prefer to obtain health information from social media than face-to-face interaction with a physician (Syn & Kim, 2016). Therefore, social media can be used to inform and persuade users to engage in health behavior change (Chou, Hunt, Prestin, & Wen, 2013).

Chou et al. (2013) conducted a systematic review of 514 studies that investigated Web 2.0's impact on health promotion. Web 2.0 is a general term for internet services that host user-generated content such as blogs, wikis, podcasts and profile pages (Gibbons et al., 2011). The review evaluated whether the shift in health communication from traditional media to social media was beneficial to public health. Several issues were investigated regarding the feasibility of internet health campaigns, social media's potential limitations, and the possibility of using social media to combat health disparities. The review found evidence demonstrating the potential of social media due to their interactive features, widespread use, low cost, and ability to quickly send both global and/or personalized messages. However, several studies in the review suggested the effectiveness of web-based health campaigns would be reduced among individuals with low SES and low health literacy because of less internet access and the possibility of individuals not understanding the information.

Chou et al.'s (2013) review revealed that social media campaigns promoted behavior change when these campaigns encouraged competition between users. For example, one

intervention promoted physical activity as a competition between Twitter users. Only 3 out of the 514 studies investigated the role of social media campaigns to reduce health disparities. None of the latter campaigns reduced health disparities in vulnerable populations, perhaps because these populations lacked internet access which may have hindered health promotion efforts.

The authors identified three common themes in the literature: the need to capitalize on the interactive nature of social media, the need for quality control when posting information as scientific evidence, and the need to avoid omitting individuals without internet access from health campaigns. The authors also found that many studies do not consider the effect of interactive features of social media when developing new interventions. For example, user-generated feedback or a *comment* on a health post may influence other users who read the same message. Users may evaluate the post more negatively or positively based on the *comment*. The authors found studies where the comments from other users directly affected the efficacy of one YouTube intervention focused on weight loss. The researchers attribute the reduced effectiveness to these *comments* because they were derogatory in nature (stigmatizing obesity).

Much of the user-generated content found in some studies contradicted evidence-based practices, raising concerns about the credibility of these sources. The authors caution that anecdotal evidence may have a larger effect than empirical evidence on people seeking health information. For example, a Twitter study showed that most participant-generated Tweets on smoking cessation advocated behaviors that went against clinical guidelines. Therefore, the authors recommend taking a combined approach by combining user-generated content with clinical guidelines (Chou et al., 2013).

While the authors caution to not omit those of lower SES, internet access seems to be increasingly available to this vulnerable population. However, interventionists should be aware

of health literacy problems and design health messages so that they are easily understandable across social media platforms (Chou et al., 2013). Specifically, Facebook and Twitter are two of the largest social media platforms in the U.S. However, they have unique features from each other, such as *commenting* and *Retweeting*, which can be used in social media health campaigns.

Facebook

Facebook consists of profile pages that can be updated by people, businesses, organizations, and institutions with pictures, text-based statuses, and links. Subsequently, users may *comment*, *like*, or *share* another user's post. Globally, Facebook is utilized by 1.94 billion people and one in five webpage views in the U.S. is on Facebook (Facebook, 2017). Facebook is used by eighty-six percent of internet users aged 18-29 years old (Hale et al., 2014). In the public health area, Facebook is currently being used for interventions on disease management, disease support, information seeking, and healthy behavior change as well as study recruitment, follow-up, and information dissemination.

Jha et al., (2015) analyzed 2,597 Facebook posts from thirty-four health department Facebook pages and categorized posts into administrative (32%), healthy living (12%), communicable disease (9%), immunization (7%), emergency preparedness (7%), child health (5%), and tobacco use (3%). The authors concluded that health departments are focused on posting administrative messages rather than health messages. Many of health organization posts were not aimed at the public and, instead, addressed bureaucratic concerns, such as job postings and internal meetings.

This present study's population of interest is college students who may be at risk for diabetes. Social media are used most by college students, and therefore social media can be useful in reaching college students. Syn and Kim (2016) examined factors that influence college student

(aged 18-29 years) information seeking on Facebook. These factors include health topic sensitivity, information source, and demographics. The researchers found college students were more likely to seek and share health information that was not self-disclosing or sensitive.

Twitter

Another social media platform is Twitter, which allows users to Tweet or post messages, pictures, or videos on their profiles. Health messages are usually one-way communications between agencies and the community. However, Twitter allows for two-way communication via text-based or picture messages that foster interaction amongst users. Messages can also be used to encourage exchanging of this information with other users to further disseminate material by *sharing* or *retweeting* (Tonia, 2014). In 2017, 328 million people around the world had active Twitter accounts (Twitter Inc., 2017). Neiger et al. (2013) analyzed 3,000 Tweets from 210 U.S. health departments to determine the type of information being shared and what health related behaviors were being encouraged. Health department Tweets consisted of health issues (56.1%) and organizational issues (39.5%). Health issue Tweets consisted of information (e.g., incidence of disease, disease risks) and encouraged action (e.g., annual exam reminders, daily exercise recommendations). Organizational-related Tweets focused on organizational events (e.g., flu clinic) and recognition of user engagement (e.g., thanking users for milestones such as the Twitter account gaining 50,000 followers). Despite Twitter having fewer users in comparison to Facebook, Twitter messages seem to be more geared towards the public and may be better suited for public health efforts.

Diabetes Outreach via Social Media

The ADA (2015) stresses the importance of preventing diabetes due to the public health burden created by this chronic disease. Dissemination and outreach through social media could

possibly offset a significant amount of government and private resources that might otherwise be dedicated to treating diabetes. Prevention and awareness campaign efforts are also important because diabetes risk can be detected and treated in the prediabetes stage, therefore eliminating or delaying onset of this disease.

George et al. (2015) conducted a study aimed at increasing awareness about obesity and diabetes prevention using a social media campaign. This study's sample consisted of low-income, Hispanic and African-American participants living in New York who were considered at-risk for diabetes. The study used Twitter and paper advertisements to promote the intervention's health message about diabetes and obesity while emphasizing empowerment, self-efficacy, and advocacy. Researchers state that 68 out of the 171 participants reported healthier eating after six-week follow-up due to the social media health campaign. Total cost for the six-week health campaign was \$20,900, which is relatively low considering graphic design cost, printing cost, and advertising space in New York City transit hubs. The authors encourage the use of social media campaigns to bolster public health efforts at low cost.

Fergie et al. (2015) conducted a study using semi-structured interviews with forty young adults aged 18-30 with some form of diabetes or mental health disorder. Investigators reported participants actively engaging with health communication on social media as part of their daily routine. These young adults reported "appreciating" health information from different sources, ranging from professional websites to user-generated content like health blogs. The participants assessed health message importance by counting how many times the message was *retweeted* and the relevance to their own condition (the exact number of participants reporting this theme was not provided). The authors concluded that social media offer increasing opportunities for interventions

and health communication to educate users but cautioned that developers of health content should be mindful of user expectations and internet use patterns.

Study participants sought out health information to help self-manage their own health rather than seeking out a medical professional. The authors also stress the cost difference between traditional campaigns and social media campaigns (Fergie et al., 2015). For example, one smoking cessation mass media campaign conducted by the CDC in 2012 cost \$52 million for three months of television time (Dennis, 2013). In comparison, the Ministry of Egypt launched a social media health campaign on Facebook with a budget of \$3,500. A social media approach was taken due to the small budget and high cost of media time during Ramadan. The organizations brought in 11.2 million hits and added 8,000 new followers to their page in under two weeks (Vital Strategies, 2010).

Mobile apps (applications on smartphones) are available to monitor chronic conditions such as diabetes by recording and analyzing glucose levels for extended amounts of time. For example, if the app concludes that a medical office visit is necessary, then it will alert the person to schedule an appointment. Patient online portals allow health records to be stored electronically for immediate use by the doctor and can connect the patient to doctor-recommended online support groups (Ferguson, 2007). Evidence for health mobile technology includes a randomized controlled trial of 324 participants who were overweight, diagnosed with type 2 diabetes, or heart disease. The authors found that participants in an online forum group (in which participants could discuss topics and send messages to each other) would stay in a walking program fifteen percent longer than participants who were placed in just the walking program. Both groups were provided pedometers and a computer application to track their progress but only one arm of the study was given access to the online forum. The authors suggest the interactive nature of online forums and

social media can reduce attrition in interventions by promoting social support among users (Richardson et al., 2010). Therefore, public health efforts may be strengthened using social media because of the participatory nature, low cost and instantaneous ability to reach underserved groups. However, social media interventions should be developed using empirically tested and informative health messages. This current study had participants simulating writing a Tweet to friends, family, and followers. This procedure is detailed in Section 2.4.

1.4 HEALTH MESSAGES

Health messages are typically at the center of health interventions and are used to persuade target populations to engage in health behavior change. Strategies for convincing individuals to make healthier life choices have been studied for several decades with the goal of making health interventions and communication more effective (Broemer, 2002). Public health stakeholders (researchers, policy makers, community leaders, etc.) are interested in identifying message formats that effectively promote behavior change (Moorhead et al., 2013).

Stakeholders aim to use scientifically tested intervention components to ensure effectiveness in a population and minimize or eliminate negative outcomes. To ensure effectiveness in this regard, researchers must understand why the target population is engaging in risky activity and not engaging in healthy alternatives. While there may be a myriad of reasons, models of health behavior emphasize that only a few individual differences need to be the focus for a health intervention. Once the behavioral predictors are decided upon, health messages can be developed based on the target population and health condition. Health messages are usually classified as threatening, promoting, or neutral, based on the type of information they contain, and comprise pictures, text, sound, video, or a combination of these elements. A health-threatening message includes information focused on the disease, risks, and negative outcomes. A health-

promoting message includes information focused on cures, prevention, and benefits. Health messages can be framed to highlight the risk (negative frame) or benefits (positive frame) of a health-related behavior. Gain frames are positively framed messages that promote the “gaining” of health benefits, such as longer life expectancy when quitting smoking. Loss frames are negatively framed messages that warn of the risks and consequences or “losses” for engaging/not engaging in certain behaviors such as higher risk in developing cancer from smoking.

Preventive behavior, such as eating healthily, is less aversive than detection behavior because negative emotions are not usually associated with prevention. Detection behavior includes checking blood levels and invasive exams which can lead to the identification of a health condition and therefore can trigger negative emotions and cognitions (Broemer, 2002). Gain frames yield better outcomes when encouraging preventive behavior and loss frames yield better outcomes when encouraging early detection behavior (Rothman et al., 1999). When messages are incongruent (i.e., when positive frames are combined with detection behavior and negative frames are combined with preventative behavior) behavior change may be hindered. People may not read the message carefully, either because they feel they are not at risk or do not think they need to take preventive measures because the message is mixed. Negatively framed messages are more persuasive when the issue is self-relevant or when participants are highly ambivalent (Broemer, 2002).

The way positively or negatively framed messages are cognitively processed can be affected by cognitive biases. Attentional and memory biases affect what information is focused on and what information is remembered. Several factors affect cognitive biases including: type of information, whether the person is anxious, how much the person worries about her health, and

what type of coping style the person displays. The second half of this literature review will focus on these cognitive biases and the relationships they have with several individual characteristics.

1.5 ATTENTIONAL BIAS AND INFORMATION PROCESSING

Attentional bias is defined as a detectable difference in attention to or away from stimuli (Hou et al., 2014). An attentional bias for threatening stimuli is marked by pronounced attention directed towards or, alternatively, pronounced avoidance of threatening stimuli (Cisler & Koster, 2010). Attentional bias facilitates the detection of threat by directing attention to threat stimuli faster in contrast to other stimuli. Conversely, attentional bias may make it difficult to disengage or look away from threatening stimuli. However, there are individual characteristics that can affect the presence and direction (towards or away from stimulus) of attentional bias (Caldwell & Newman, 2005). For example, an attentional bias can result when stimuli are self-relevant to the individual (Cisler et al., 2009).

Neural components of attentional bias include the amygdala, which is strongly associated with the human fear response. Activation of the neural fear circuit forces excessive attention to the threat stimulus in an effort to facilitate the engagement of coping mechanisms. The prefrontal, anterior cingulate, and orbitofrontal cortices may also contribute to the difficulty of disengaging from threat stimuli because these structures communicate with the limbic system and may lower the fear response activation threshold. For example, anxious individuals with low attentional control of the prefrontal cortex may have difficulty in disengaging from threat stimuli (Cisler & Koster, 2010). This directional causation has not been resolved in the literature, but for the purposes of this current study, attentional bias was hypothesized to vary with levels of anxiety (Kaur, Butow, & Sharpe, 2013).

Anxiety and Attentional Bias

Elevated trait anxiety can lead to an attentional bias to or away from threatening stimuli (Avero et al., 2003). A meta-analysis of 172 studies investigating the relationship between anxiety and attentional bias yielded an effect size of $d = 0.45$ when comparing anxious individuals to non-anxious individuals. That is, anxious individuals tend to score half a standard deviation higher on an index of attentional bias when compared to non-anxious individuals (Bar-Haim et al., 2007). Cohen's d refers to the standardized mean difference between the treatment group scores and comparison group scores; that is, the difference between the means divided by the pooled standard deviations. A small effect is often defined as $d = 0.2$, a moderate effect is $d = 0.5$, and a strong effect is $d = 0.8$; therefore, a $d = 0.45$ can be seen as a moderate effect size. (Cohen, 1988). The anxiety and attentional bias relationship is considered robust for three reasons: 1) the relationship is present in several types of experiments including eye tracking and the Stroop, dot probe (DPT), visual search, and spatial cueing tasks. 2) The impact of anxiety on attentional bias showed no significant difference in effect size between the experiments. 3) The relationship is observed in most anxiety disorders such as generalized anxiety disorder (GAD), social phobia, posttraumatic stress disorder (PTSD), specific phobias, and obsessive-compulsive disorder with no significant difference between disorders. In the Bar-Haim et al. (2007) meta-analysis, aggregate effect sizes for attentional bias in anxiety disorders in comparison to non-clinical controls were: GAD, $d = 0.56$; OCD, $d = 0.45$, panic disorder, $d = 0.50$; PTSD, $d = 0.36$; social phobia, $d = 0.59$; and simple phobia, $d = 0.36$, and the aggregate effect sizes for high-self reported trait anxiety and clinically anxious individuals also did not differ significantly.

Attentional bias may be present for the duration of an anxiety disorder and manifest itself by exaggerating the severity of threat and lowering thresholds for detecting threat to serve as a positive feedback loop which maintains anxiety levels. Attentional bias may also affect the

development of normal behavior by disrupting attentional resources needed for learning to treat the anxiety disorder (Lecci & Cohen, 2007). Another type of anxiety of interest to public health is anxiety for one's own health.

Health Anxiety and Attentional Bias

While not included in the aforementioned meta-analysis, health anxiety has been shown to affect the processing of health-related information. Health anxiety is defined as feelings of worry and fear for threatening health conditions and can be caused by misguided thoughts and feelings about internal and external health-related stimuli. These misguided thoughts and feelings are usually the result of maladaptive cognitive biases that serve to maintain health anxiety. Moreover, hypochondria can be seen as pathologically severe health anxiety. For example, in a study investigating hypochondria, now known as illness anxiety disorder, individuals with lower perceived control over an illness had a larger attentional bias above and beyond trait anxiety. Participants with lower perceived control answered slowly on a modified health threat Stroop task because they were attending to the word meaning rather than the word color. The authors also noted the mere mention of health risk produced bias but information on how to control illness made the bias no longer detectable (Lecci & Cohen, 2007)

Only a few studies have focused on subclinical health anxiety effects on attentional bias. Some studies show that higher health anxiety is associated with higher interference on health-related threat words on the color Stroop task; that is, people higher in health anxiety were slower to answer on a modified Stroop task in which participants were asked to name the color of health-related and non-health related words rather than the word itself (Karademas, Christopoulou, Dimostheni, & Pavlu, 2008).

Another experiment used to detect attentional bias is the dot probe task (DPT). The participant is shown a screen with two separate stimuli displayed either side by side or on top of each other with a cross in-between the stimuli. Stimuli could be words, pictures, and pictures with words embedded in them. Once the stimuli are displayed for a researcher-determined amount of time, the stimuli disappear and an “X” appears on one side. The participant is asked where the “X” is located and to respond as quickly as s/he can. Attentional bias studies usually assess the difference in response times between threat and neutral words. This experimental paradigm was used for this study, and more details are provided in Section 2.3.

One study found that individuals with higher health anxiety levels displayed an attentional bias on the DPT that used self-relevant health threat words; that is, when exposed to personally relevant health threat words, participants with higher health anxiety levels responded faster on the DPT (Lee et al., 2013). Lees, Mogg, and Bradley (2005) found no association between health anxiety and attentional bias using a pictorial DPT that presented participants with pictures of health threatening stimuli paired with neutral stimuli. However, the researchers used a quartile split to identify a high health anxious group and a low health anxious group while excluding the participants not meeting the criteria, which may have led to a severe loss of statistical power. Jasper and Witthoff (2011) found higher health anxiety was associated with a preference for pictorial health threat on the DPT when health threat and neutral stimuli pairs were displayed for 175 ms. Specifically, participants who were high in health anxiety detected the placement of the probe faster than participants who were lower in health anxiety. Therefore, health anxiety seems to affect the beginning of health information processing by either facilitating detection of threat or interfering with the disengagement from threat and may be a function of how someone copes with threat.

1.6 COPING STYLE

Coping style is defined as the specific pattern of coping responses an individual uses in an attempt to moderate stress (Sladek, Doane, Jewell, & Luecken, 2016). Coping style is comprised of specific coping strategies and can be viewed as analogous to a personality trait (Kocovski, 2001). Most coping models were developed from Lazarus and Folkman's *Transactional Model of Stress and Coping* later elaborated by Glanz and Schwartz (2008). The *Transactional Model of Stress and Coping* comprises three stages: appraisal, reappraisal, and coping responses, and is the basis for many stress and coping studies. The term "transactional" refers to the interaction between a person and an external stressor, and how the person copes with the stressor by way of his appraisal, reappraisal, and resulting coping responses. This interactive process results in either adaptive or maladaptive outcomes that affect well-being and physical and mental health status.

Appraisal refers to the person's initial judgment regarding the "threat value" of a perceived stressor. In theory, appraisal will initiate the coping process by prompting efforts to deal with the severity and risks imposed by a perceived stressor. *Reappraisal* refers to the process of assessing the availability of coping resources and responses to deal with the threat. Examples of reappraisal include one's perceived ability to change, perceived social support, and one's perceived ability to regulate emotions. *Coping responses* are actions and thoughts used to reduce and eliminate the threat to oneself. Various forms of coping responses exist and include problem-solving or self-medication. These coping responses can be considered adaptive or maladaptive, passive or active, and differ in magnitude.

Coping styles can be classified as stable dispositional characteristics that are present throughout different experiences with stress. The following section summarizes four models of coping style shown to affect information processing. Generally, research suggests avoidant coping styles are associated with more deleterious mental and physical health outcomes. Negative outcomes can be reduced by engaging in more proactive coping strategies (Gorka, LaBar, & Hariri, 2016). In general, avoidance behaviors are used to protect the organism from threatening stimuli by taking the person out of the situation or blunting the negative effects of stress. Negative effects

of threat include unwanted emotional or physical arousal, thoughts of uncertainty, enhanced fear, and perceived loss of control (Paul et al., 2011).

Repressive Coping

A repressive coping style is defined as utilizing cognitive resources to avoid negative affect by not focusing on threatening or negative cognitions (Caldwell & Newman, 2005). Repressive coping occurs mainly during threat processing with the aim of reducing the potential for stress by avoiding, denying, and dissociating from threat (Paul et al., 2011). Repressors are often high on defensiveness but low in reported anxiety (Jansson, Lundh, & Oldenburg, 2005). Defensiveness in repression is defined as a tendency to reject personal faults and avoid anxious cognitions (Paul et al., 2011). Research has shown a positive correlation between repressive coping style and an avoidant information processing style (Avero et al., 2003).

The timeline of processing threatening information is an important moderator when assessing repressive coping style and threat. Repressors tend to avert their attention from threatening words as well as inhibit the processing of these words (Avero et al., 2003). Therefore, they display a first vigilant (attending to) response and then switch to an avoidant processing style (focus is away from threat). The avoidant response seeks to minimize any conscious experience of anxiety and any negative emotional arousal (Paul et al., 2011). Repressive coping can result in maladaptive health outcomes due to ignoring physiological indicators of health threat. For instance, an individual may ignore pain s/he is experiencing to control any fear or worry brought on by finding out why the pain is happening.

Individuals with a repressive coping style report high defensiveness and low anxiety. This coping style can be determined using a social desirability scale such as the Marlowe-Crown Scale of Social Desirability (Crowne & Marlow, 1960) and a trait anxiety measure such as the State-Trait Anxiety Inventory (Spielberger, 1983). Researchers may use a median split to categorize people into repressive and non-repressive styles or use a quartile split to categorize people in repressive, high anxious, low defensive, or high anxious and high-defensive. The latter three

categories are not considered a way of coping but rather a means of labeling (Langens & Morth, 2003).

Problem-Focused, Emotion-Focused, and Avoidant Coping

Problem-focused (also known as task-oriented) coping style uses coping responses directed outward to externally manage a stressor and not just reduce negative affect seen in repressive coping (Blumberg, 2000). Problem-focused coping involves active responses that can include solving the problem, seeking information, seeking help, and direct action (Karekla & Panayiotou, 2011). Individuals who have high self-efficacy and high perceived control usually exhibit this type of coping style. Problem-focused coping is considered more adaptive compared to emotion-focused and avoidant coping as it seems to lead to better well-being and health outcomes such as lower depression and anxiety levels (Kocovski, 2001).

Emotion-focused coping is aimed at reducing distress by internally managing arousal and reducing negative emotions by minimizing the threat, self-control, and venting (Blumber, 2000; Karekla & Panayiotou, 2011). Emotion-focused coping is positively correlated with higher psychological distress especially in cases when the threat can be controlled (Kocovski, 2001) but can have positive outcomes on quality of life measures when perceived control is low (Avero et al., 2003). However, emotion-focused coping is correlated with higher levels of CVD, depression, and anxiety.

An avoidant coping style is marked by evading threat (Blumberg, 2000). Avoidant strategies include denial, distraction, disengagement and substance use. An avoidant coping style has been associated with the most maladaptive outcomes such as substance abuse and dependence, depression and anxiety when the stressor is long-term (Karekla & Panayiotou, 2011). However, avoidant coping can be adaptive when the situation is short-term and uncontrollable (Avero et al. 2003).

The three coping styles outlined above can be assessed by the Coping Inventory for Stressful Situations (CISS). The CISS is a 48-item measure assessing how participants would react to stressful situations. The measure uses a five-point Likert scale with ratings from “not at all” to

“very much.” Participants are categorized based on whether they endorsed more problem-focused, emotion-focused, or avoidant coping responses. Only four studies from an extensive literature search (detailed in Section 1.7) investigated the relationship between this coping model and attentional bias. Therefore, this scale was not chosen to be the focus of the current study.

Model of Coping Modes

The Model of Coping Modes (MCM) describes coping styles as individual differences in attention orientation and emotional-behavioral regulation in response to stress (Krohne, 2001). Coping mode refers to either the vigilant or avoidant coping dimensions of the MCM (Paul et al., 2011). As such, the MCM is based on dimensions of vigilance and avoidance which form, in theory, the cognitive-motivational basis for coping behavior (Krohne, 2001). Vigilance and avoidance are orthogonal personality dimensions (Klein & Knauper, 2009). Vigilant coping is defined by an increased preference in consumption and processing threatening stimuli as the individual tries to reduce uncertainty in stressful situations. Conversely, avoidance diverts attention away from threat to reduce arousal (Klein & Knauper, 2009).

Vigilance and avoidance are measured by the Mainz Coping Index (MCI) developed by Krohne (1995) which quantifies a person’s score on the vigilance and avoidance dimensions. The MCI presents eight potentially threatening scenarios (four ego-threat and four physical threat) with five true/false statements related to vigilant coping strategies and five true/false statements for avoidant coping strategies. The two scores are summed up and quartile splits can be used to assign people into four categories: high anxious (high vigilance, high avoidance), repressors (low vigilance, high avoidance), low anxious (low vigilance, low avoidance) and sensitizers (high vigilance, low avoidance). In the literature, repressors and sensitizers are the labels that most studies focus on in their results. The quartile splits have been criticized for lowering statistical power and due to the orthogonal conceptualization of the two constructs should not be able to classify individuals into four groups (Klein & Knauper, 2009). For these reasons, the MCM was not the focus of this current study.

Monitoring and Blunting

Monitoring and blunting coping styles are composed of the coping responses individuals use when confronted with threatening information and how they process information. The monitoring dimension refers to how much a person seeks and focuses on threat information. The blunting dimension refers to how much a person engages in cognitive distraction or psychological dampening of threat stimuli (Rodoletz, 1995). Monitors will scan for external and internal threat cues and can easily identify threat but will interpret ambiguous situations as more threatening compared to blunters. When presented with threat information, they will focus on the threat and overestimate their personal risk (Schwartz, Lerman, Miller, Daly, & Masny, 1995). Conversely, blunters will distract themselves to avoid thinking about the stressor. Blunting is more of a conscious avoiding of threat compared to the avoidance dimension of the MCM and repression (Klein & Knauper, 2009).

Miller (1987) found there are situations in which one coping style has been shown to produce more positive outcomes. When a situation is viewed as controllable, a high monitoring and low blunting response is favored. This combination allows the person to engage in active solutions to her problem like going to the doctor and being informed on diabetes management. When the situation is out of her control, low monitoring and high blunting are favored as engaging in distraction will reduce stress. Both techniques will in theory reduce the arousal caused by threat.

Monitoring and blunting are measured using Miller's Behavioral Style Scale (MBSS) to identify different ways individuals cope with stressful situations. Monitoring and blunting are defined as conscious approaches to either seeking or avoiding threatening information (Klein & Knauper, 2009). Scores on the MBSS have been shown to have no correlation with sex, race, age, SES, or levels of depression and anxiety (El-Hag, 2001). Monitoring and blunting as well as the three coping style models summarized above have been shown to affect processing of threat information, an association which will be detailed in Section 1.7 and 1.8. Research has shown coping style contributes to the variance seen in attentional and memory bias, above and beyond anxiety level.

1.7 COPING AND ATTENTION BIAS STUDIES

Literature Review of Coping and Attentional Bias Studies

This dissertation investigates how dispositional coping style can affect attention to or away from health-threatening information. In August 2016, I conducted an extensive literature review of published and unpublished scientific studies addressing this topic. I searched all the EBSCO databases available to the University of Texas at El Paso (Table 6; 88 total). The following search terms and Boolean phrases were used: cop* AND attention* AND threat, which provided 1,737 search results. The first article exclusion stage was done by reading titles and abstracts and excluding from further review any citation that did not contain the word “coping.” Two-hundred forty-two citations were selected for further review. Each study’s abstract and methods section were read in their entirety to check for information on attentional bias and coping. Forty-eight citations met these criteria. Finally, after reviewing the variables, methods, and effect sizes in the latter studies, twenty-two studies were deemed appropriate for review because they investigated attentional bias, coping, and threat information processing. While only monitoring and blunting coping styles were the focus of this current study, it is important to highlight the similarities and differences in coping effects between different coping style models. Effect sizes (Cohen’s *d*) are provided if they were available or calculable from the literature.

Repressive Coping Studies

For repressive coping, six studies met the inclusion criteria for this review. Investigators have debated whether repressive coping leads to automatically or selectively avoiding threatening stimuli. In a study by Caldwell and Newman (2005), repressors made positive trait inferences about ambiguous stimuli when simply asked to answer as quickly as possible. However, when time pressure was applied, this positive answer bias was not present. This finding may be due to the high social desirability present in repression. If participants did not have the time to focus on stimuli, they, in theory, cannot make the decision to appear more positive to researchers; therefore, their usual repressive coping style cannot be enacted.

However, in Aureille's (1999) unpublished study, participants were asked to complete a DPT using socially threatening words (e.g., inept, ashamed), positive emotional words (e.g., confident, delightful), and neutral words (e.g., terrace, backpack). Results from the DPT suggest that repressive coping was associated with avoidance of socially threatening stimuli. This finding may demonstrate the use of repression as a way of protecting oneself from feeling negative emotion about the self.

Newman and McKinney (2002) found that participants high on repressive coping showed an attentional bias to threat stimuli on a Stroop task that displayed positive and negative words. Specifically, repressors did not show the interference effect when compared to a control group of non-repressors. This result may indicate a marked threat avoidance based on the shorter length of time repressors took to name the color of the stimuli words. Moreover, the control group showed more engagement with threat words as evidenced by their slower times on the Stroop task. However, the authors found no evidence for whether non-repressors had difficulty in disengaging with threat stimuli, only evidence of non-repressive participants showing slower times in answering the word color in comparison to repressors.

Langens and Morth (2003) used a visual spatial task that required participants to point out the location of a probe after being shown a failure, success, or neutral word. Slower response times on the visual spatial task are associated with avoidance of stimuli. Results showed repressors displayed signs of attentional avoidance in the low threat condition, but not in the high threat condition for failure words as evidenced by slower response times compared to non-repressor response times. The authors attribute this result to passive coping strategies employed by repressors to avoid negative emotion and since the threat was low, there was less motivation to do well on the task, a key component of social desirability and repressive coping.

Jansson et al. (2005) found a gender effect on a Stroop task that used illness-related, negative emotion, and neutral words. Men who were high in repressive coping had faster response times compared to non-repressive men and all female participants. This effect was found for all words but was not found in female participants. The authors suggest that this effect could be

attributed to the non-college student sample and an all-female research assistant team rather than coping style.

Lastly, Brosschot et al. (1999) found no main effect for repressive coping on the Stroop task. However, these results may be due to low power (15 subjects and use of median splits) though the authors contest this possibility. Nevertheless, these six studies show the importance of considering several factors beyond coping style such as anxiety and perceived risk. Table 1 lists the effect sizes for these six studies and can be interpreted as the standardized mean difference between repressors and non-repressors.

Table 1: *Attentional bias and repressive coping studies*

Authors	Published	Experiment	Cohen's <i>d</i> (if available)	Sample Size
Aureille (1999)	no	DPT	0.60*	48
Brosschot et al. (1999)	yes	Stroop and DPT	N/A	69
Caldwell & Newman (2005)	yes	Recognition DPT	N/A	56
Jansson et al. (2005)	yes	Stroop	N/A	167
Langens & Morth (2003)	yes	Visual spatial	0.55	72
Newman & McKinney (2002)	yes	Stroop	0.80	58

* $p < 0.05$

Problem-Focused, Emotion-Focused, and Avoidant Coping Studies

For problem-focused, emotion-focused, and avoidant coping, six studies met the inclusion criteria for this review. In Averro et al.'s (2003) study, participants completed a Stroop task using neutral (e.g. bookshop, fan), physical threat (e.g. cancer, behead), and ego threat (e.g. failure, despise) words. Problem-focused coping was related to faster Stroop task reaction times. This finding suggests that problem-solving coping facilitates the task at hand, specifically naming the word color, seemingly due to the problem-solving nature of problem-focused coping. Furthermore, avoidant coping was associated with longer response times on the Stroop task for

both physical and ego threat words, suggesting an interference in answering due to difficulty in disengaging from the meaning of the word. No statistically significant results were found for emotion-focused coping.

In Kocovski's (2001) unpublished study, participants completed a modified Stroop task using social threat and neutral words. Participants were also put in a high social evaluation threat condition in which they were told they would deliver a speech and a low social evaluation threat condition in which participants were not told anything. The author found no correlation between Stroop task response times and coping style. Power may have been lost due to not including participants in the low evaluation threat group in the data analysis per the author's hypothesis.

Gorka et al. (2016) found that problem-focused coping was associated with faster response times in a tone recognition task. When participants were asked to push a button as soon as they heard a tone designated to signal threat, people who were categorized as problem-focused copers responded significantly faster than people who were categorized as avoidant copers. While this study did not use traditional attentional bias measurements, it is important to highlight that avoidant copers were slower to respond to tones associated with threat.

Glinder et al. (2007) used a DPT in which words were partially occluded by the letter "X" and words that were not covered by anything. The authors found that an attentional bias toward unmasked cancer-related words was associated with lower self-reported symptoms of emotional distress and higher levels of positive affect and problem-focused coping. In summary, problem-solving coping seems to facilitate the task of naming the word color and is associated with lower emotional distress and higher positive affect. In regard to avoidant coping, Luecken et al. (2004) and Booth (2014) both reported findings of avoidant coping being associated with slower response times on a DPT using social threat (e.g. loser, failure) and neutral word pairs for the former study (word examples were not available for the Booth (2014) study) These results suggest that avoidant coping is associated with an avoidance of threatening stimuli causing slower response times.

Table 2 lists the effect sizes for these six studies. These effect sizes are the standardized mean differences between interference and facilitation scores (positive d 's equal avoidance of threat stimuli).

Table 2: *Attentional bias and problem-focused, emotion-focused, and avoidant coping studies*

Authors	Published	Experiment	Cohen's d (if available)	Sample Size
Avero et al. (2003)	yes	Stroop	N/A*	86
Booth (2014)	yes	DPT	0.41*	101
Glinder et al. (2007)	yes	DPT	-0.56*	135
Gorka, et al. (2016)	yes	Tone Recognition	N/A*	64
Kocovski (2001)	no	Stroop	N/A	112
Luecken et al. (2004)	yes	DPT	0.95*	63

* $p < 0.05$; NA* study results were significant but incalculable

Model of Coping Modes Studies

For the MCM, three studies met inclusion criteria for this review. Klucken et al. (2010) showed that sensitizers gazed longer at threatening faces rather than happy faces for the first 500 ms compared to other three MCM groups. This vigilant response to threatening stimuli was above and beyond attentional bias brought on by high anxiety. Further research on this result may elucidate on how attentional bias and vigilant coping style may be key for anxiety maintenance in anxiety disorders.

Paul et al. (2011) found repressors had more activation of neural correlates (frontal, parietal, and temporal cortices) than sensitizers in response to angry faces in comparison to happy, fearful, and neutral faces. This result implies a seemingly lower threshold for activation in response to threatening stimuli. However, there was no behavioral component to this study; therefore, one cannot make inferences about whether repressors focused towards or away from threatening stimuli, only that their threshold for activation may be lower than sensitizers. Moreover, these

results suggest that there is a rapid fear response in repressors that is subsequently dealt with by avoiding threatening stimuli.

To reiterate, Schwerdtfeger and Derakshan (2010) found a significant difference between repressors and sensitizers on a spatial cueing task using angry and neutral faces. Much like the DPT, the spatial cueing task requires participants to find a target placed after a stimulus word is displayed. Only one word is shown and can vary in the location on the screen, unlike in the DPT where a word pair is displayed. High cognitive avoidance predicted faster response times which suggests there was no interference caused by threatening stimuli because repressors may have been attending threatening stimuli. It should be noted that this finding goes against the conceptualization of cognitive avoidance and slower response times on a spatial cueing task in the MCM. Table 3 lists the available effect sizes of these three studies and can be interpreted as the standardized mean difference between sensitizers and repressors.

Table 3: *Attentional bias and Modes of Coping model studies*

Authors	Published	Experiment	Cohen's <i>d</i> (if available)	Sample Size
Klucken et al. (2010)	yes	Gaze Duration	N/A*	36
Paul et al. (2011)	yes	Neural Activation	1.30*	40
Schwerdtfeger & Derakshan (2010)	yes	Spatial Cueing	N/A*	70

* $p < 0.05$; NA* study results were significant but incalculable

Monitoring and Blunting Studies

For Monitoring and Blunting coping styles, six studies met inclusion criteria for this review. For this present study, coping style was measured using the MBSS utilized by all the studies in this section. Kim et al. (2014) asked participants to complete a DPT in which health threat (e.g. flu, acute) and neutral (e.g. glass, chair) word pairs were displayed for 1250 ms. The researchers found that participants high in health anxiety showed an attentional bias toward health words as evidenced by responding faster to the probe compared to participants low in health anxiety. Moreover, dispositional coping style acted as a moderator in the high health

anxiety group, as highly anxious blunders showed a higher preference for health-related words than highly anxious monitors. Coping style did not have a significant effect for either low-anxious blunders or low-anxious monitors.

Kim and Lee (2016) conducted an experiment investigating health anxiety and coping style as a continuation of Kim et al.'s (2014) study with the addition of an eye tracking component. Participants were asked to complete an eye tracking experiment that used health-related and nonhealth-related picture pairs that were displayed for 6 seconds. Each participant was timed on how long his/her gaze was focused and where his/her gaze was focused for each picture-pair. Participants high in health anxiety gazed longer at health-related stimuli (both threatening and non-threatening). This study found an effect for coping style in the opposite direction of what Kim et al. (2014) found. Specifically, participants in the high health anxiety group, those categorized as monitors showed an attentional bias towards the health-related pictures and blunders showed a bias away from health-related pictures.

In these two studies, health anxiety seemed to moderate the impact of coping style on the presence of attentional bias. Kim and Lee's (2016) results seem to support that participants high in health anxiety and high in monitoring will focus their attention on health-related pictures and may have led to a difficulty in disengaging from both health non-threatening and health threatening pictures. On the other hand, blunders seem to focus away from anxiety provoking health pictures to, in theory, reduce any negative emotions (i.e. anxiety) that may occur. A weakness of both these studies is that the authors failed to distinguish between threatening health stimuli (e.g. acute, needle) and non-threatening health stimuli (e.g. swab, sterilize).

Blumberg (2000) found low blunders were slower to color name on the Stroop task for AIDS words, suggesting an interference in response times. This finding contradicts previous findings for avoidance of threat words but may be due to a difficulty in disengaging from the threat word. El-Hag (2002) did not find any effect on the DPT when assessing levels of monitoring and rumination for threat versus non-threat words. However, rumination is more of a coping strategy that focuses on the causes and consequences of a stressor. This conceptualization

may have contributed to these null results, as rumination can be used to monitor information about one's own thoughts.

Klein and Knauper (2008) along with Muris et al. (1995) did not find significant differences between participants categorized as either monitors or bluntern in an emotional Stroop task for both studies. These null results may have occurred because both studies used threats of smoking and dental visits without measuring perceived risk of harm for either situation. In summary, these inconclusive results suggest that more research is needed to determine how coping style (monitoring and blunting) impact attentional bias and health information processing. Table 4 lists the effect sizes and can be interpreted as the standardized mean difference between monitors and bluntern. Positive scores reflect an attentional bias towards health stimuli.

Table 4: *Attentional bias and monitoring and blunting coping studies*

Authors	Published	Experiment	Cohen's <i>d</i> (if available)	Sample Size
Blumberg (2000)	yes	Stroop	N/A	184
El-Hag (2002)	no	DPT	0.16	255
Kim & Lee (2016)	yes	Eye tracking	-0.76*	84
Kim et al. (2014)	yes	DPT	0.55*	67
Klein & Knauper (2008)	yes	Stroop	N/A	74
Muris et al. (1995)	yes	Stroop	N/A	45

* $p < 0.05$

1.8 COPING AND MEMORY BIAS STUDIES

A separate, smaller scale, search was conducted for memory bias and coping. Thirteen studies were included in the review. Most of these studies were part of the preceding attentional bias literature review; additional studies were found on PsycINFO using the search terms “cop*”, “memory”, and “threat.” However, Averro et al. (2003) note that many studies have inconsistent definitions of memory bias in regard to recall and recognition. For the purposes of this study,

memory bias referred to a distinct difference in the recall or recognition of threat information when comparing individuals based on their coping style.

Repressors showed exaggerated forgetting of ego-threatening, self-relevant negative words (e.g. timid, unwise) after immediate recall. There may be an active inhibition of these negative words to protect the individual from negative emotions that may be brought on by remembering negative information (Alston et al., 2013). Aureille (1999) found repressive coping was associated with better implicit memory recall of socially threatening stimuli compared with non-repressors suggesting a purposeful attempt to forget leading to a shallow inhibition of threatening material. Due to this shallow inhibition, threatening stimuli remains in the consciousness and seemingly allows for more accurate and immediate recall of words. To reiterate, Oldenberg et al. (2002) found that repressors seem to retain threatening information at a shallow level that allows them to recall faster than non-repressors. Brosschot et al. (1999) did not find an explicit memory bias for threatening material (e.g. bullet, cannibal) and suggested memory bias may only be present in emotional arousing situations.

Avero et al. (2003) showed a pattern of false-alarms (incorrectly recalled) for threat words in emotion-focused coping on a memory recall task suggesting a preference for all threat words. This preference may be due to focusing on one's own emotions to gauge threat, therefore, if a word evokes emotion then the individual may think s/he has already seen the word. Avoidant copers made less false alarm responses suggesting a conservative approach in answering. The authors suggest that these two response patterns may be indicative of a response bias rather than a memory bias, again illustrating the inconsistencies in defining memory bias in the literature.

Three separate studies showed that sensitizers interpreted ambiguous situation anecdotes as more threatening while repressors favored interpreting ambiguous situations as nonthreatening

(Hock, Krohne, & Kaiser, 1996; Hock & Krohne, 2004). Repressors also tended to better remember the nonthreatening stimuli of these anecdotes. Krohne and Hock (2008) showed that individuals who were high in cognitive avoidance had comparatively worse memory to those low in cognitive avoidance for aversive information after delayed testing. Peters et al. (2012) conducted two studies using threatening pictures (Study 1) and words (Study 2) and found that sensitizers forgot less threatening material compared to repressors. The MCM studies seemed to be the most consistent with regards to their results (avoidance associated with worse memory performance; however, this may be due to the same authors (including the developer of the MCM) conducting the studies.

Lastly, Blumberg (2000) found that high blunterns had poor recall of an AIDS prevention film, again suggesting that blunterns avoid or inhibit processing of threatening information. Conversely, Schwartz-Buzaglo (1997) found that high levels of monitoring resulted in poorer retention of cancer threat words when presented in a negative frame. Monitoring and blunting studies seem to have conflicting results in the literature and calls for further testing of this coping style as a construct. Table 5 lists the effect sizes and can be interpreted as the standardized mean difference between the studies' coping styles of interest. Negative scores reflect a memory bias for better recall or recognition of threatening stimuli.

Table 5: *Memory bias effect sizes*

Authors	Coping Style	Published	Experiment	Cohen's <i>d</i> (if available)	Sample Size
Blumberg (2000)	MB	Yes	Recall	N/A*	184
Schwartz-Buzaglo (1997)	MB	no	Recall	0.54*	76
Peters et al. (2012)	MCM	yes	Recognition - Pictures	-0.46*	128
Peters et al. (2012)	MCM	yes	Recognition - Words	-0.38*	145

Hock & Krohne (2004)	MCM	yes	Recognition	N/A*	60
Hock & Krohne (2004)	MCM	yes	Recognition	N/A*	100
Hock et al. (1996)	MCM	yes	Recognition	0.64*	58
Krohne & Hock (2008)	MCM	yes	Recognition	N/A*	97
Alston et al. (2013)	MCM	yes	Recall	0.21*	95
Brosschot et al. (1999)	Rep	yes	Recognition and recall	N/A	60
Oldenburg et al. (2002)	Rep	yes	Memory	-0.02	60
Aureille (1999)	Rep	no	Implicit memory	N/A*	48
Avero et al. (2003)	PEA	yes	Recognition	N/A*	78

** $p < 0.05$; NA* study results were significant but incalculable*

1.9 THE PRESENT STUDY

This study investigated whether state anxiety, trait anxiety, health anxiety, perceived diabetes risk, and dispositional coping style in a predominantly Hispanic college sample affects the processing of social media health messages regarding diabetes risk and prevention. An innovative two-pronged approach was used to assess these relationships. First, a dot probe task using health-threatening, health-promoting, and neutral words was used to detect attentional bias. Second, a novel procedure was employed by asking participants to read a type 2 diabetes health message and then construct a Tweet (Coffman, 2015). This procedure's goal was to determine attentional bias, what keywords were recalled, what type of information participants would share with their friends, family, followers, etc., and what message frame (health-threatening, health-promoting, or neutral) was used to construct the Tweet.

1.10 HYPOTHESES

In the current study, coping style was predicted to be associated with attentional bias and memory bias above and beyond trait, state and health anxiety. That is, this study investigated how

coping style would affect participant performance on a health-related DPT and a health message Tweet task. Based on the studies above, the following relationships were hypothesized:

H₁: Participants who are higher in monitoring coping will display an attentional bias for engaging with health threatening words in the DPT leading to faster response times for the DPT.

H₂: Participants who are higher in blunting coping will display an attentional bias for avoiding health threatening words in the DPT leading to slower response times for the DPT.

H₃: Participants higher in monitoring coping will recall more health-threatening words in their Tweets.

H₄: Participants higher in blunting coping will recall fewer health-threatening words in their Tweets.

Chapter 2: Methods

2.1 PARTICIPANTS

One hundred and fifty students participated in this study. One participant did not complete 29 items on the survey and missed a check for participant attention. Therefore, this participant's data were not included into the final dataset. As such, this study included 149 participant protocols in the dataset. Participants were recruited using the Sona Systems Psychology Research Participation System. This research pool includes students enrolled in UTEP sections of Introduction to Psychology and other lower division courses. Participants were required to be 18 years old or older. Students who had been diagnosed with type 1 or 2 diabetes were excluded as this study assessed perceived diabetes risk. The potential subject pool was approximately 1,500 students. The justifications for recruiting from the Sona research pool were as follows: (a) the focus of this study was college student health risk and behavior, and (b) each measure has been psychometrically tested in college populations.

The University of Texas at El Paso (UTEP) is located on the U.S./Mexico border; approximately eighty-five percent of UTEP students self-identify as Hispanic. Ethnicity was not used as an eligibility criterion. However, because UTEP is composed of eighty-five percent Hispanic students, it was anticipated that approximately eighty-five percent of participants in this study would be of Hispanic heritage. Fifty-five percent of U.S. Hispanics live on the U.S.-Mexico border which includes El Paso, Texas where this current study was conducted. El Paso is one of the few counties in the U.S. that has a Hispanic majority (Casey et al., 2014).

A power analysis indicated that a sample size of 140 participants was needed to detect a population effect size of approximately $d = 0.55$ when $\alpha = 0.05$, two-tailed. The effect size estimate was based on findings reported by Kim et al. (2014) in their study investigating the impact of monitoring and blunting coping on performance on a health-related DPT. This current study adopted a conservative approach, and 150 participants were assessed (Cohen, 1988).

Human Subjects Protection

Several steps were taken to protect participant privacy and confidentiality. 1. Names were only asked for on the consent form. 2. Consent forms were stored in a locked file drawer. 3. Participants completed the study protocol in a private room away from other people. The area was separated from the other parts of the laboratory where the participants were not overheard. 4. Only the author and trained research assistants who completed IRB sanctioned researcher training had access to the data. 5. Participant data were not used in any fashion that violated what was said in the informed consent form. 6. Data were de-identified and stored in a password protected computer. 7. Participant answers were not audio- or video-recorded. 8. Laboratory access was limited to research assistants who has completed research conduct training. No physical or mental risks besides sitting in a chair for an hour and exposure to diabetes risk information were associated with this current study. Participants were asked if they wanted a list of physical and mental health services. Participants were offered a break to walk around if needed.

2.2 MEASURES

Demographics Survey

A 16-item measure (Appendix A) assessed basic demographic information including age, ethnicity, SES, gender, education level, living situation, English/Spanish proficiency, social media use, and health information sources.

Miller's Behavioral Style Scale (Miller, 1987)

A 32-item measure (Appendix F) assessed two distinct coping styles, monitoring and blunting. Four potentially stressful scenarios (dental visit, hostage threat, risk of being fired, and airplane trouble) are outlined and then ask how a participant might cope with each possible threat. The monitoring subscale assesses how much the participant would seek out information. For example, a monitoring coping item includes "I would look for every possible exit." In contrast, the blunting scale assesses how much the participant might distract themselves from the threat. For example, a blunting coping item includes "I would ask for a drink or tranquilizer from

the flight attendant.” Each item has two response options, “Yes” (1) and “No” (0). The two subscales are analyzed separately by adding up all “Yes” answers with scores ranging from zero to sixteen. Higher scores on monitoring are associated with a propensity to seek threatening stimuli. Higher scores on blunting are associated with a propensity to avoid threatening stimuli. A study conducted by Miller (1987) showed that the measure had discriminate validity and was distinct from other tradition trait measures. This same study found an internal reliability of $\alpha = 0.79$ for the monitoring subscale and $\alpha = 0.69$ for the blunting subscale (Miller, 1987). For the current pilot study ($N = 20$), the reliability for the monitoring subscale was $\alpha = 0.763$ and for the blunting subscale the reliability was $\alpha = 0.577$. For the current main study ($N = 149$), the reliability for the monitoring subscale was $\alpha = 0.563$ and for the blunting subscale the reliability was $\alpha = 0.515$. This decrease in reliability will be discussed in Section 4.3.

State-Trait Anxiety Inventory (Spielberger, 1983)

A 40-item measure (Appendices B and C) assessed state and trait anxiety. The first twenty items (Form Y-1) assess *state* anxiety and evaluate how the participant felt and thought when completing the form. Response options ranged from “Not at all” (1) to “Very Much So” (4). Most questions begin with the phrase “I feel...” and are followed with negative (e.g. tense, worried) or positive (e.g. content, relaxed) feelings or emotions. The last twenty items (Form Y-2) assess *trait* anxiety and evaluate how the participant *generally* feels or thinks. Response options ranged from “Almost Never” (1) to “Almost all the Time” (4). Most questions begin with “I am...” and are followed with negative (e.g. tense, worried) or positive (e.g. content, relaxed) feelings or emotions. Higher scores on each subscale indicate higher participant anxiety. Scores on each subscale can range from twenty to eighty. Questions were reverse coded when directionally appropriate. The instrument was constructed and validated in diverse samples

including college students (Spielberger, 1983). The state anxiety subscale has lower test-retest reliability than the trait anxiety subscale between test-retest as the state subscale asks how the participant is feeling while completing the form. A study assessing anxiety in participants sixteen years or older yielded a high internal consistency reliability for the forty items of $\alpha = 0.93$ (Barnes, Harp, & Jung, 2002). The current study considered the two subscales separately. The state subscale yielded a reliability of $\alpha = 0.921$ and the trait subscale yielded a reliability of $\alpha = 0.914$.

Health Anxiety Inventory – 18 (Salkovskis, 2002)

An 18-item measure (Appendix D) assessed participants' anxiousness about their own health. Each item has four response options that range from a non-anxious response to a fully anxious response. The following is a sample item: "a) if I notice an unexplained bodily sensation I don't find it difficult to think about other things" (1), "b) if I notice an unexplained bodily sensation I sometimes find it difficult to think about other things" (2), "c) if I have a bodily sensation or change I always wonder what it means" (3), or "d) if I have a bodily sensation or change I must know what it means" (4). Higher scores indicate higher participant health anxiety. Scores can range from eighteen to seventy-two. Prior research used a diverse sample that included participants with hypochondriasis to participants non-clinically worried about their health to validate this measure. In a study done by Salkovskis (2002), the internal consistency reliability for this measure was $\alpha = 0.95$. In this study, the health anxiety measure yielded a reliability of $\alpha = 0.845$.

Risk Perception Survey for Developing Diabetes (Walker et al, 2003)

A 43-item measure (Appendix E) that contains four separate subscales about perceived health risk was used to assess for several factors. An 8-item subscale assessed attitudes about

personal diabetes risk using four response categories ranging from “Strongly Agree” (1) to “Strongly Disagree” (4). Scores can range from eight to thirty-two. Higher participant scores indicate higher perceived risk for diabetes.

A 14-item subscale assessed participant perceived risk for other health disorders using four response categories ranging from “Almost No Risk” (1) to “High Risk” (4) and personal health history for self and family. Higher participant scores indicate higher perceived risk for other health conditions such as arthritis and cancer.

An 8-item subscale assessed participants’ perceived environmental health risks such as air pollution and pesticides using four response categories ranging from “Almost No Risk” (1) to “High Risk” (4). Higher participant scores indicate higher perceived risk for environmental factors.

Lastly, a 10-item subscale assessed participants’ perceived diabetes risk for certain characteristics such as being Asian American or Native American using four response categories ranging from “Increase the risk” (1), “Has NO effect on risk” (2), “Decreases the Risk” (3) and “Don’t Know” (0). A study by Walker et al. (2007) yielded an internal consistency reliability for the perceived risk section of $\alpha = 0.85$. The current study yielded a reliability of $\alpha = 0.604$.

2.3 MATERIALS

The Dot Probe Task

This study used the DPT to detect attentional bias exhibited by participants in relation to their diabetes risk perception, anxiety levels, and coping style. The DPT was developed by MacLeod et al. (1986) and is the most extensively used tool to detect attentional bias (i.e., differences in attention to and away from threat). This study’s DPT was modeled after Kim et al.’s (2014) DPT protocol because the authors assessed Monitoring and Blunting coping style and Health Anxiety to predict health word attentional bias.

The computer screen was placed twelve inches away from the desk for each participant. Participants were given the following instructions before the trials started: *Please place your index fingers on the “T” and “B” keys. You will be presented with a fixation point at the center of the screen followed by a pair of words. You are to look at and focus on both of the words while they are on the screen. Do not focus in the center. You will need to move your eyes up and down to focus on each of the words while they are on the screen. Once the words disappear from the screen, an X will appear on either the bottom or top of the fixation cross. Your task is to respond as quickly as possible to the X by pressing the “T” key if the X is on the top side of the fixation cross or the “B” key if the X is on bottom of the fixation cross. Once you respond to the X, another fixation point will appear followed by the presentation of a new set of words. You will perform several of these trials. Please let the researcher know if you have any questions. If not, please keep your attention on the computer screen and remember to respond as quickly as possible.*

Figure 1 below provides a visual timeline of the study’s DPT. Each trial began with a fixation cross displayed in the center of the computer screen which disappeared after 500 ms, then was replaced by a stimulus word pair (e.g., DEATH, HOURS). Each word pair was displayed for 500 ms. The word pair was then replaced with the letter “X” which lasted for 2000 ms or until the participant responded.

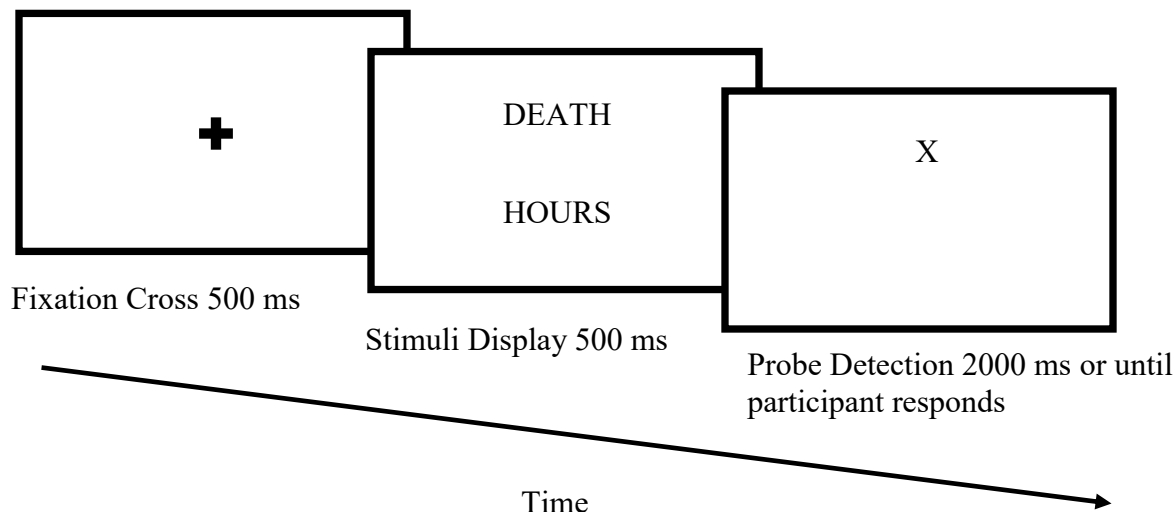


Figure 1: DPT Timeline

The DPT has high test-retest reliability in response times. This task was programmed using Inquisit 5 Lab software. The DPT consisted of twenty word-pairs (e.g., Death, Hours) with twenty neutral non-health words (e.g., mailbox, boot) and twenty health-threatening and health-promoting stimulus words (e.g., happy, death). In half of the trials, a health-threatening word was paired with a neutral word and a health-promoting word was paired with a neutral word for the remaining trials. Every word pair was constructed using lists of health-threatening, health-promoting, and neutral words from previous studies. (Brosschot et al., 1999; Kim et al., 2014; van Koningsbruggen & Roskos-Ewoldsen, 2009). Brysbaert and New's (2009) SUBTLEX-US database for American English word frequency was used to develop word pairs matched on frequency and length. These words were piloted tested on twenty participants from UTEP and the El Paso community. Participants rated a list of eighty-four words on how negative or positive they were on an eleven-point scale ranging from "completely negative" (-3) to "completely positive" (3). Health-threatening or health-promoting words that had a mean valence score between -1.5 to 1.5 were

omitted from the study. Neutral words with a mean score not in between -1.5 to 1.5 were replaced. The final list of words used as stimuli in the current study is presented in Table 7.

Calculation of Dot Probe Task Attentional Bias based on Response Times

Attentional bias was calculated separately for health-threatening and health-promoting stimuli by the Inquisit 5 software. To calculate the bias score for each category, the program takes the mean response times to probes that replaced health-threatening or health-promoting stimulus words (congruent trial) and subtracts them by mean response times when probes replaced a neutral target (incongruent trial). An example of a health-threatening congruent trial would be when the probe replaces the word “DEATH.” A health-threatening incongruent trial would be when the probe replaces the word “HOURS.” Negative bias scores signify faster detection of probes that replace stimulus targets relative to detection times that replace neutral stimuli. This negative score can be interpreted as facilitation for detection of stimuli (Cisler et al., 2009). Mean bias scores were computed for each participant.

Health Message

The innovative Tweet task included a health message about type 2 diabetes. All participants read a 309-word health message. The health message for this current study outlined CDC (2014) type 2 diabetes information and recommendations. The message was divided into health-threatening, health-promoting, and neutral fact-based components. An aim of this study sought to determine what remains salient after participants are asked to Tweet to their friends, family, followers, etc. about the message. This study investigated the way people process the health message below by measuring recall of health-threatening and health-promoting words (Coffman, 2015). The participants were shown the following health message displayed on a Qualtrics survey after the computer survey was completed. The health-threatening and health-promoting

components of the health message each contained ten keywords (twenty in total). The order of information presented was randomly counterbalanced for health-threatening and health-promoting content with neutral content last for each participant. The message was written at a ninth-grade reading level.

Health-Threatening Component of Health Message

“Obesity and a lack of physical activity contribute to the development of type 2 diabetes, a disease that can lead to several dangerous and life-threatening complications and infections. For example, blindness can result from high blood sugar levels in the eyes. Nerve damage can result in pain or the loss of sensation and feeling in your toes, feet, and legs. If left unchecked, circulation issues can lead to amputation (such as cutting off of a foot or leg). Finally, because this disease affects your entire body, death can result from these complications if they get worse and worse over time.” (n = 101 words)

Health-Promoting Component of Health Message

“Moderate exercise and eating nutritious foods can help prevent type 2 diabetes. Eating less candy and sweets and drinking less soda helps to lower blood sugar levels and keep your eyes healthy. If you are overweight, then losing weight can improve circulation to your toes, feet, and legs, keeping your body healthy, fit and attractive. Eating fresh fruit and vegetables can help you feel good and keep you in good shape so that you can pursue the activities that you really enjoy. Managing your daily stress can bring relief and make it easier for you to eat right, exercise, be happy, and live longer.” (n = 104 words)

Neutral Component of Health Message

“More than 21 million people in the United States currently live with some type of diabetes. There are another 8.1 million people who are undiagnosed and do not know they are living with

this condition. An estimated \$176 billion is spent annually in direct medical costs due to this condition and another \$69 billion is spent on paid time off and lost productivity. You may email the Centers for Disease Control and Prevention (which is part of the U.S. Department of Health and Human Services) to receive more information and a pamphlet with the latest news about this condition as well as other topics.” (n = 104 words)

Tweet Coding

Attentional bias was measured behaviorally with the novel Tweet task in which the following coding procedure was employed (Coffman, 2015). Two independent coders coded each participant Tweet. First, words or phrases that were coded as health-promoting, health-threatening, or neutral were entered into a spreadsheet as independent language units. An example of a one-word health-threatening unit would be “Death.” An example of a three-word health promoting unit would be “Drink more water.” Every *word* or *phrase* in each Tweet was coded by typing it in either a health-promoting, health-threatening, or neutral column and then counted. Words were only entered once across columns (i.e., a word could not be in the health-threatening and neutral columns). Word fragments were coded if the tone could be inferred. For example, “Reduce your cha...” was coded as health-promoting.

Punctuation was included in response fragments for emphasis or when appropriate (exclamation points, question marks, and hashtags). Word phrases were coded together to maintain meaning (e.g., “not bad”). Words that show emphasis as part of a word phrase (e.g. should, might, definitely, very, somewhat, etc.) were coded.

Finally, the overall valence was rated for each Tweet in a column labeled “Tweet Rating.” Tweets were rated from most health-threatening (-3) to most health-promoting (3). The coders met after coding every thirty Tweets to discuss any discrepancies in order to come to a conclusion on

ratings and Tweet coding. Cohen's (1960) kappa statistic was calculated for these ratings as recommended by a review of qualitative health promotion studies assessing framing of qualitative data (Cook, 2011).

Twenty previously identified key words (Table 7) were then entered into the Linguistic Inquiry and Word Count (LIWC) software program to count how many of these words were in the participants' Tweets (Pennebaker, Booth, Boyd, & Francis, 2015).

2.4 PROCEDURE

Data collection began in June 2017 and ended in October 2017. Study participants were recruited through the Sona system. After arriving at the laboratory, the participant read and signed a consent form detailing the study's aims, risks and procedures. The participant was then taken into a small quiet office to complete the study's measures in the following order: demographics, Miller Behavioral Style Scale, State-Trait Anxiety Inventory, Health Anxiety Inventory – 18, and Diabetes Risk Perception. These measures were completed online using the UTEP Qualtrics software on a laboratory computer.

The measures required fifteen to forty minutes to complete. A nonsense item was included partway through the survey to help identify if the participant was being inattentive i.e., the survey asked the participant to answer "very strongly" on a Likert scale. Two participants failed the attention check. Data from one participant were deleted from the analyses as twenty-nine items were not answered. Data from the other participant were entered into the analyses after the protocol was reviewed and considered complete.

For the DPT, participants were seated in front of the computer when the task started. They completed ten practice trials and eighty experimental trials. Then the health message Tweet task, was conducted on the same Qualtrics survey as the measures and was composed of the health

message paragraph outlined above. The following instructions were displayed above the health message to make sure participants did not accidentally click past the message: *Please read the following health message from the Centers for Disease Control. You will not be able to go back once you click “Next.”* The participant was not allowed to see the message after clicking to the next page on the survey. After being exposed to the health message, participants were asked: *Please write a tweet about what you just read to share with your friends, family, and/or followers on social media in 140 characters or less.*

At the end of Task 2, the participants were asked if they would like a list of health services. The participant was then given a list of nutrition and exercise services if the participant said yes (Appendix G). The participant’s answer was recorded by the researcher.

2.5 DATA ANALYSIS

Variables

Covariates

“Perceived risk for developing diabetes” and “health anxiety” were used as covariates in the first step of the regression model.

Independent Variables

Independent variables for this current study were “state anxiety” and “trait anxiety”. These variables were entered into the second step of the regression model. For coping style, monitoring and blunting scores were entered into the third step of the regression model.

Dependent Variables

The following variables were constructed from the DPT and health message Tweet tasks:
I. Attentional bias scores for Health-Threatening and Health-Promoting words, II. recall of

Health-Threatening and Health-Promoting keywords, III. Tweet Rating, and IV. number of Health-Threatening, Health-Promoting, and Neutral words and phrases used in Tweets.

Hierarchical Regression Models for Dependent Variables

Hierarchical regression analysis is a regression analysis in which predictor variables are entered into the equation in a specific order. This order is usually predetermined before the analysis and guided by theory or empirical evidence. These regression models are comprised of variables in more than one level in order to answer a specific research question. Hierarchical regression is used when a researcher is interested in understanding whether a variable entered has a spurious relationship with the dependent variable or accounts for variance above and beyond variables with presumably stronger relationships. Usually well-established variables are entered in the first steps of the model. That is, the predictive power of these variables has been shown in the literature to have a strong relationship with dependent variables. In order to parse the explanatory power of variables that are not as established, these variables are entered into the regression model in later steps to see if they account for variance above and beyond previous steps (Cohen, Cohen, West, & Aiken, 2013). Therefore, hierarchical regression was used to test the predictors as follows. Step 1 included Perceived Risk for Developing Diabetes and Health Anxiety scores. Step 2 included State Anxiety and Trait Anxiety scores. Lastly, Step 3 included Monitoring Coping and Blunting Coping scores. Data were entered and analyzed in SPSS 23.

Chapter 3: Results

3.1 PARTICIPANT CHARACTERISTICS

The study's sample characteristics are summarized in Table 8. The mean age of the sample was 21.34 years ($SD = 5.11$); females composed 62.4% of the sample. As anticipated, the sample was composed of a majority of Hispanics (81.9%), followed by Whites (10.1%), African Americans (2.7%), Asians (0.7%), and Other (4.7%; Native American, two or more races). The majority of participants were college Freshmen (34.2%) followed by Sophomores (32.2%), Juniors (17.4%), Seniors (14.1%), and Other (2.0%; Graduated, "Just taking classes"). Approximately 96.6% of the participants lived in El Paso, Texas, 2.7% lived in Ciudad Juarez, Mexico, and one participant lived in New Mexico. While none of the participants reported being diagnosed with diabetes (a criterion of the study), a majority of participants had at least one relative with diabetes (67.8%). However, the survey did not assess whether the relative was an immediate or extended family member.

A summary of participants' social media use and source of health information is presented in Table 9. Approximately 49.7% of participants reported using social media daily followed by hourly (43.6%), monthly (2.7%), weekly (2.0%), and never (2.0%). Participants had profiles on the following social media services: Facebook (81.0%), Twitter (51.7%), Instagram (86.6%), Snapchat (90.6%), and Other (8.1%; LinkedIn, Tumblr, Pinterest). Approximately 82% of participants reported getting their health information from their Primary Doctor, followed by Internet (50.3%), Family and Friends (43.6%), University Health Center (6.7%), and Other (4.0%). The means and standards deviations of the study's measures are provided below.

Descriptives for key variables

The means, standard deviations, and reliabilities of participant scores for coping, anxiety, perceived diabetes risk, and related variables are presented in Table 10. These measures were used as predictors of attentional bias for health-threatening and health-promoting words. In addition, these measures were also used as predictors of the type of information that participants would recall and Tweet after reading a diabetes health message. The above variables were also used to predict what type of tone this Tweet would convey. Recall, participants completed the Miller Behavioral Style Scale (1987), which contains two subscales for monitoring and blunting coping to assess their tendency to seek or avoid threatening information. Each subscale score could range from zero to sixteen. The monitoring subscale had a moderately high mean of 12.31 ($SD = 2.22$) indicating a higher tendency to engage with potentially threatening information and situations. In contrast, the blunting subscale had a relatively low mean of 5.72 ($SD = 2.42$) indicating a lower tendency to avoid potentially threatening information and situations. The means for monitoring and blunting were significantly different (paired $t(148) = 22.039, p < 0.001$).

Assessments of state and trait anxiety were derived using the State-Trait Anxiety Index. state and trait anxiety scores could range from 20 to 80. State anxiety scores had a mean of 37.25 ($SD = 10.77$). Trait anxiety scores had a mean of 42.61 ($SD = 10.69$) slightly higher *general* anxiety for participants compared to anxiety at the time of testing. The means for state anxiety and trait anxiety were significantly different (paired $t(148) = -7.770, p < 0.001$).

Health anxiety was assessed using the Health Anxiety Index – 18, with scores ranging from 18 to 72. Health anxiety scores had a mean of 32.19 ($SD = 6.98$). Lastly, perceived diabetes risk scores could range from 8 to 32. Diabetes risk scores had mean of 16.71 ($SD = 3.32$) indicating a mid-level perceived risk of developing diabetes. In addition, participants' self-

reported perceived diabetes risk (range: almost no risk (1) to high risk (4)) had a mean 2.26 ($SD = 1.10$) indicating a slight risk for diabetes.

The means and standard deviations of the DPT attentional bias scores for health-threatening and health-promoting words are presented in Table 11. Recall, attentional bias scores were derived for each participant by subtracting the mean response time for trials when probes replaced the stimulus word (health-threatening or health-promoting) by the mean response time for trials when probes replaced the neutral word. The mean attentional bias score for health-threatening words was 4.47 ms ($SD = 30.32$), suggesting no marked facilitation or avoidance while detecting the probe. The mean attentional bias score for health-promoting words was 2.31 ms ($SD = 29.88$). Prior research indicates that response times shorter than 100 ms are due to chance, suggesting there was no marked facilitation or avoidance while detecting the probe (MacLeod et al., 1986). A paired-sample t-test between health-threatening and health-promoting bias scores revealed no significant difference ($t(148) = 0.647, p = 0.519$), suggesting participants had no marked difference for either category.

In addition to the DPT, several variables were derived from the health message Tweet task. Previously identified health-threatening and health-promoting keywords used in participant Tweets were counted. In addition, two independent coders rated each Tweet for valence (range: -3 to 3). An example of a complete participant Tweet was “Diabetes is a serious disease that could lead to death. A way to prevent from getting diabetes is to exercise moderately and eat healthier.”

Cohen’s (1960) kappa was calculated to assess inter-rater reliability for the Tweet rating. Cohen’s kappa measures inter-rater agreement on categorical qualitative variables. It attempts to account for any agreement that may happen by chance. For this study, the kappa between this study’s two coders was $\kappa = 0.14$, a low reliability in terms of health research. Mismatches were

discussed and agreed upon every thirty Tweets in the order of participants. Percent agreement (Table 17) was calculated for the Tweet coding.

The health Tweets that were generated by participants were evaluated for health-threatening or health-promoting valence, number of health-threatening and health-promoting keywords recalled, and number of health-threatening, health-promoting and neutral words or phrase used. Keywords were previously identified terms deemed explicitly health-threatening or health-promoting. The means, standard deviations, and frequencies of this current study's Tweet variables are presented in Table 11. Only 17.4% of participants used at least one health-threatening keyword in their Tweet (Table 7). In contrast, 55.7% of participants used at least one health-promoting keyword in their Tweet (Table 7). Health-threatening words or phrases were used at least once in 55.0% of participant Tweets. An example of a participant health-threatening phrase was "Is a [chocolate] bar really worth getting a foot cut off?" However, again the use of health-promoting words or phrases in participant Tweets was higher with 87.9% of the participants using at least one word or phrase. An example of a participant health-promoting phrase was "Diabetes risks can be lowered by eating healthier". Lastly, 26.2% of participants used at least one neutral word or phrase for their health message Tweet. An example of a participant neutral phrase was "Hey guys, just read an article about type 2 diabetes".

Frequencies

The distributions of scores on measures of state anxiety, trait anxiety, health anxiety, perceived diabetes risk, and monitoring and blunting are presented in Figures 2-7. Notably, monitoring and blunting distributions were truncated. Specifically, only one participant scored in the lower quartile for monitoring. In contrast, there were no participants in the upper quartile for Blunting scores. Likewise, no participants were identified in the upper quartiles of state anxiety

and trait anxiety. These findings suggest that participants were not typically anxious in their daily activities nor were they anxious during the testing session. Although this study assessed subscales separately, Miller (1987) classified monitors and blunterners by subtracting participant monitoring scores from their blunting scores. Those participants with positive scores would be labeled as monitors and those with negative scores would be labeled as blunterners. Using this method of calculating scores revealed that this study had only four participants that could be labeled as blunterners. The impact of these truncations suggests a restriction of range and will be discussed in the next chapter.

Correlations among Key Variables

Bivariate correlations were conducted to assess significant relationships between key variables. Correlations between coping, anxiety, perceived risk, attentional bias, and type of information tweeted are presented in Table 12. Age was associated with monitoring coping scores ($r = -0.245, p = 0.003$) and neutral words or phrases ($r = 0.368, p < 0.001$). Younger participants scored higher on monitoring coping and tended to use more neutral words or phrases in their Tweets. Gender was negatively associated with monitoring coping scores ($r = -0.162, p = 0.049$). As such, females (1) tended to score higher on the monitoring coping subscale than males (2). Lastly, a majority of participants (71.8%) accepted a list of health services when it was offered after the study. State anxiety was negatively correlated with participants' decisions to accept a health services list at the end of the study ($r = -0.179, p = 0.029$). Therefore, the lower a participant's anxiety was at the time of testing, the more likely s/he was to accept the health services list. Acceptance of the health services list was positively correlated with monitoring ($r = 0.184, p = 0.025$) and perceived risk of developing diabetes scores ($r = 0.189, p = 0.021$). That is,

the higher a participant's monitoring or perceived risk scores were, the more likely s/he was to accept the health services list.

As expected, monitoring coping scores were negatively associated with blunting coping scores ($r = -0.24, p < 0.01$). Participants who sought out health information, subsequently scored low in avoiding health information. State and trait anxiety were positively correlated ($r = 0.69, p < 0.01$). That is, participants who were generally anxious were also anxious at the time of testing. Health anxiety was also positively correlated with state and trait anxiety ($r = 0.36, p < 0.01$ and $r = 0.57, p < 0.01$, respectively). Therefore, participants who tend to worry about their health tend to be more anxious and exhibit anxiety at the time of testing. Notably, health anxiety was the only predictor variable associated with a dependent variable, which was participant recall of health-promoting keywords ($r = -0.17, p < 0.05$). This finding suggests that the more a participant worries about their health, the less he or she recalls health-promoting information. Lastly, having a relative diagnosed with diabetes was positively correlated with perceived risk of diabetes ($r = 0.352, p < 0.01$). Therefore, if a participant had a relative with diabetes, the higher s/he perceived themselves at risk for diabetes.

Recall, two independent coders coded participant Tweets to derive six outcome variables: number of health-threatening and health-promoting keywords recalled, Tweet rating (range: -3 to 3), and number of health-threatening, health-promoting, and neutral words or phrases used in the Tweet. The Tweet rating was highly correlated with the recall of health-threatening keywords ($r = -0.53, p < 0.01$) and the recall of health-promoting keywords ($r = 0.31, p < 0.01$). Tweet rating was also highly correlated with health-threatening words or phrases used in the Tweet ($r = -0.70, p < 0.01$) and health-promoting words or phrases used in the Tweet ($r = 0.58, p < 0.01$). The number of health-threatening and the number of health-promoting words or phrases used were

negatively correlated with each other ($r = -0.45, p < 0.01$). Neutral words or phrases used were negatively correlated with both the use of health-threatening words or phrases ($r = -0.23, p < 0.01$) and health-promoting words or phrases used in participant Tweets ($r = -0.21, p < 0.01$). While there was only one significant bivariate correlation between predictor and outcome variables, hierarchical regression models were still conducted in order to test the hypotheses.

3.2 REGRESSION ANALYSES

Hierarchical Regression Model

Hierarchical regression analysis was used to assess whether monitoring and blunting coping style would explain variance in health information processing above and beyond state anxiety, trait anxiety, health anxiety and perceived diabetes risk. As such, the study's hierarchical regression model was entered as follows: Step 1: Perceived Risk for Developing Diabetes and Health Anxiety scores, Step 2: State Anxiety and Trait Anxiety scores, and Step 3: Monitoring Coping and Blunting Coping scores. This model was run for the following dependent variables: health-threatening attentional bias scores, health-promoting attentional bias scores, Tweet rating, health-threatening keywords, health-promoting keywords, and number of health-threatening, health-promoting, and neutral words or phrases used.

The regression model (Table 13) predicting health-threatening attentional bias scores revealed no relationship for the following variables. There was no relationship between measures of health anxiety and perceived diabetes risk with health-threatening attentional bias scores in Step 1 of the regression analysis. State and trait anxiety were entered into Step 2 of the regression analysis and did not account for any variance in health-threatening attentional bias scores. Moreover, monitoring and blunting scores in Step 3 of the regression analysis did not contribute significantly to differences in health-threatening attentional bias scores as predicted in Hypotheses 1 (higher monitoring scores would predict faster response times for health-

threatening words) and 2 (higher blunting scores would predict slower response times for health-threatening words).

The regression model (Table 13) predicting health-promoting attentional bias scores revealed no relationship for the following variables. There was no relationship between measures of health anxiety and perceived diabetes risk with health-promoting attentional bias scores in Step 1 of the regression analysis. State and trait anxiety were entered into Step 2 of the regression analysis and did not account for any variance in health-promoting attentional bias scores. Moreover, monitoring and blunting scores in Step 3 of the regression analysis did not contribute significantly to differences in health-promoting attentional bias scores.

The same hierarchical regression model from above was used to analyze the Tweet dependent variables. The regression model (Table 14) predicting the use of health-threatening keywords revealed no relationship for the following variables. There was no relationship between measures of health anxiety and perceived diabetes risk with the use of health-threatening keywords in Step 1 of the regression analysis. State and trait anxiety were entered into Step 2 of the regression analysis and did not account for any variance in the use of health-threatening keywords. Moreover, monitoring and blunting scores in Step 3 of the regression analysis did not contribute significantly to differences in the use of health-threatening keywords as predicted in Hypotheses 3 (higher monitoring scores would predict higher recall and use of health-threatening keywords in participant Tweets) and 4 (higher blunting scores would predict lower recall and use of health-threatening keywords in participant Tweets).

The regression model (Table 14) predicting the use of health-promoting keywords revealed only one significant relationship for the following variables. In the first step of the model, health anxiety was statistically significant with a $\beta = -0.19$, $p = 0.01$. This result suggests that the higher

the health anxiety score, the less likely participants used health-promoting keywords to construct their Tweet. However, in the final step of the model this relationship was not statistically significant. State anxiety, trait anxiety, and perceived diabetes risk did not account for the variance in the use of health-promoting keywords. Moreover, monitoring and blunting scores did not contribute significantly to differences in the use of health-promoting keywords.

The regression model (Table 15) predicting Tweet rating revealed no relationship for the following variables. There was no relationship between measures of health anxiety and perceived diabetes risk with Tweet rating in Step 1 of the regression analysis. State and trait anxiety were entered into Step 2 of the regression analysis and did not account for any variance in Tweet rating. Moreover, monitoring and blunting scores in Step 3 of the regression analysis did not contribute significantly to differences in Tweet rating.

The regression model (Table 16) predicting health-threatening words or phrases used revealed no relationship for the following variables. There was no relationship between measures of health anxiety and perceived diabetes risk with the use of health-threatening words or phrases in Step 1 of the regression analysis. State and trait anxiety were entered into Step 2 of the regression analysis and did not account for any variance in the use of health-threatening words or phrases. Moreover, monitoring and blunting scores in Step 3 of the regression analysis did not contribute significantly to differences in the use of health-threatening words or phrases.

The regression model (Table 16) predicting the use of health-promoting words or phrases revealed no relationship for the following variables. There was no relationship between measures of health anxiety and perceived diabetes risk with the use of health-promoting words or phrases in Step 1 of the regression analysis. State and trait anxiety were entered into Step 2 of the regression analysis and did not account for any variance in the use of health-promoting words or phrases.

Moreover, monitoring and blunting scores in Step 3 of the regression analysis did not contribute significantly to differences in the use of health-promoting words or phrases.

Lastly, the regression model (Table 16) predicting the use of Neutral words or phrases revealed no relationship for the following variables. There was no relationship between measures of health anxiety and perceived diabetes risk with the use of neutral words or phrases in Step 1 of the regression analysis. State and trait anxiety were entered into Step 2 of the regression analysis and did not account for any variance in the use of neutral words or phrases. Moreover, monitoring and blunting scores in Step 3 of the regression analysis did not contribute significantly to differences in the use of Neutral words or phrases.

In summary, none of the predicted relationships were statistically significant. While there were several significant bivariate correlations, the data suggest that types of anxiety, perceived risk, and coping style are not significant predictors of health information processing. Strengths, limitations and implications of these results will be discussed in the next chapter.

3.3 EXPLORATORY ANALYSES

Several exploratory analyses were conducted after testing the main hypotheses. Exploratory correlations are presented in Table 18. An analysis of DPT errors made by participants (i.e., responded in less than 100 ms, did not respond within 2000 ms, or pressed the wrong key to indicate the probe) was conducted. Significant correlations included a positive association between DPT errors and health anxiety, in which higher health anxiety scores were related to more errors made on the DPT. Both health-threatening and health-promoting attentional bias scores were inversely related to errors, suggesting that those who took longer to answer were making fewer errors.

Order of presentation was assessed for relationships with other variables. Order of presentation indicated which part of the health message participants read first (the neutral component was the ending paragraph for both groups); health-threatening component (1) or health-promoting component (2). Order of presentation was positively correlated with health-promoting keywords used, Tweet rating, and health-promoting words or phrases used. Order of presentation had an inverse relationship with number of health-threatening words or phrases used. These correlations suggest a primacy effect. That is, reading the health-promoting component first led to higher recall of health-promoting keywords, higher health-promoting rating of Tweet valence, higher use of health-promoting words or phrases and lower use of health-threatening words or phrases.

Scores for the monitoring subscale were computed without including items from the hostage situation section. This section was removed due to two items having no variance (all participants said they would look for every possible exit and none said they would try and sleep). However, no new correlations became statistically significant and correlations from the full monitoring subscale remained statistically significant in the same direction.

Chapter 4: Discussion

4.1 THE RELATIONSHIP BETWEEN HEALTH INFORMATION PROCESSING AND COPING STYLE, ANXIETY, AND PERCEIVED RISK

This study investigated the impact of coping style on the type of health information that individuals retain and utilize. The study addresses an issue of increasing importance, how individuals utilize health information gleaned from social media venues in their own health decision-making. Prior research suggested that coping style would affect how individuals respond to health information. Prior research in non-health related contexts suggested that individuals who score high on the monitoring dimension would seek out health-threatening information. In contrast, individuals who score high on the blunting dimension would avoid health-threatening information.

This study found that coping style, defined either as monitoring or blunting, was unrelated to performance on a traditional attentional bias measure, the dot probe task. Additionally, coping style did not influence the type of information forwarded in a Tweet constructed for the participants' friends, family, or followers, i.e., the Tweet task. This finding suggests that coping style may not substantially affect how participants use health information on social media. Previous studies have investigated attentional bias at the initial stages of information processing or micro-level. For example, the dot probe task measures reaction times to stimuli at the millisecond level. However, few studies have studied attentional bias at the behavioral level. The present study sought to extend this mode of assessing attention by examining attentional bias not only at the initial processing of health information, but also at the level of using this information, that is, at the macro- or behavioral level. Behavior was assessed by having participants Tweet about health information to their friends, family, and followers.

This mixture of attentional and behavioral measurements provided a more practical scope of what would be affected by coping style, anxiety, and perceived risk for diabetes.

Unexpectedly, health anxiety was related to the type of information participants used in their Tweets to their friends, family and followers. That is, participants with higher levels of health anxiety wrote messages that contained fewer words from the health message that were previously identified as health-promoting. Regression analyses did not reveal any further significant relationships associated with coping style. This lack of findings was surprising given the amount of evidence regarding coping style and information processing (See Section 1.7).

Monitoring and blunting coping style scores were predicted to account for the differences in attention to, and use, of health information on the DPT and Tweet task above and beyond anxiety and perceived risk. Monitoring and blunting coping styles are composed of the coping responses individuals use when exposed to potentially threatening information. The monitoring dimension refers to how much a person seeks and focuses on threat information. The blunting dimension refers to how much a person engages in cognitive distraction or psychological dampening of threat stimuli (Rodoletz, 1995). This study's procedure was derived from Kim et al.'s (2014) study investigating how monitoring and coping would affect attention to health words on a DPT. However, high blunters responded faster for health words on the DPT. That is, blunters were attending to health words rather than avoiding health words. This pattern of responses was opposite of what would be expected for blunters and attentional bias scores. Individuals high in blunting will often avoid emotion-eliciting words.

In the current study, it was hypothesized that higher monitoring scores would be associated with faster times on the DPT and greater use of health-threatening words on the Tweet task. In this study, it was hypothesized that participants with higher monitoring scores would

attend to threatening words. This attention to health-threatening words was thought to influence participants to use more health-threatening words in their Tweets. In contrast, higher blunting scores were hypothesized to be associated with slower response times on the DPT and fewer health-threatening words used on the Tweet task. In this study it was thought that high blunting scores would influence participants to avoid threatening information. This avoidance was thought to lead participants to use fewer health-threatening words in their Tweets. However, neither monitoring nor blunting was significantly associated with attention to, and use, of health information on the DPT and Tweet task.

Several explanations of why this study found that coping style had no effect on attentional bias or use of health-threatening or health-promoting words in participant Tweets are described below. First, this study may not have had enough participants that were considered blunterners. Therefore, the sample was restricted, and a large majority of participants would be considered monitors. In turn, this restriction may have resulted in low variability for attentional bias scores and usage of health-threatening and health-promoting words. Second, due to brevity of display for the DPT word pairs (500 ms), recognition of the stimulus word may have been prevented. In turn, the participant may have not been able to purposely attend or avoid the stimulus word. Third, the participants were asked to write a Tweet immediately after reading the diabetes health message. In turn, this immediate recall task may have resulted in a rote or reflexive response by the participant.

Previous research showed that scores on the Miller Behavioral Style Scale have no correlation with sex, race, age, SES, or levels of depression and anxiety (El-Hag, 2001). However, in this study, there were age and gender effects. That is, females and younger participants were more likely to score higher in Monitoring. Although not predicted, these

demographic findings may contribute to the understanding of how coping style affects young adult health information processing. Prior studies conducted using monitoring and blunting coping style did not indicate a strong effect of age. This current study's finding suggests an emerging cohort effect with this generation of college students. These college students may be more sensitized to threatening situations.

Several findings emerged from the study. As predicted, those participants who scored high on the monitoring subscale, also scored low on the blunting subscale. Conversely, those participants who scored high on the blunting subscale, also scored low on the monitoring subscale. Similarly, as predicted, state anxiety and trait anxiety were predicted to influence attentional bias scores and recall of information. Participants with higher state and trait anxiety were predicted to display an attentional bias for health-threatening words. Meta-analytic findings have shown that anxiety has a robust relationship with attentional bias. The effect of anxiety can be detected in several attentional bias measures such as the DPT, the Stroop task, and eye-tracking tasks. Specifically, participants with high anxiety levels may respond slower on the DPT, are slower to color name on the Stroop task, and may focus on threat words on an eye-tracking task (Bar-Haim et al., 2007).

State anxiety and trait anxiety did not predict scores on the DPT in this study. These null results may have been due to the restricted range of anxiety scores. That is, few participants scored in the upper quartiles of state anxiety and trait anxiety scores. Therefore, because there were no extreme anxiety scores, it became problematic to predict an effect due to lack of variance. However, exploratory analyses revealed that state anxiety was negatively correlated with accepting a list of health services. This finding may be due to the participant being at ease during testing. Health anxiety was not correlated to acceptance of the health services list.

Therefore, the participant did not accept the list because s/he was worried about their health. Moreover, this study's participants scored as predicted in terms of how these measures relate to each other, i.e., state anxiety and trait anxiety were positively correlated to each other. These findings indicate that there was not anything peculiar about this study's sample that would explain the above findings. That is, participants responded to these measures in a way that reflects what prior studies have found. Recommendations for using state and trait anxiety for further health information processing research are discussed in Section 4.5.

Health anxiety was also predicted to have an impact on attention to, and use of, health information. Health anxiety refers to an individual's worry about her own health. Prior studies reveal that higher health anxiety is associated with interference on a health-threatening word Stroop task leading to slower response times (Karademas et al., 2008). Therefore, for this study higher health anxiety was predicted to result in an attentional bias on the DPT. The current study sought to determine if coping style influenced attention to health information after controlling for health anxiety level. However, health anxiety was only related to lower recall of health-promoting keywords. This finding suggesting that there may have been an unintentional forgetting of health-promoting words as level of health anxiety increased. Exploratory analyses revealed DPT errors were negatively associated with health anxiety. This finding suggests that health anxiety may have introduced a slight interference detecting the probe. This interference suggests the initial stages of attentional bias and may have not fully emerged due to the DPT word pairs being displayed too quickly. Future studies may still benefit by including a health anxiety measure as a covariate.

In order to assess the influence of coping style on attention to, and use of, health information, perceived risk for diabetes was measured as a potential covariate. coping style was

predicted to have an impact on performance on the DPT and Tweet task, after controlling for the influence of perceived risk of developing diabetes. Studies have investigated attentional bias and health information in the context of a specific health threat, such as cancer. However, participants may vary on how at risk they are in contracting the health threat (e.g., AIDS). Few studies of attentional bias have examined how perceived risk for a specific health threat may influence health information processing. One such study found that high health anxiety was associated with faster response time on a DPT using self-relevant health-threatening words (Lees et al., 2005). This study sought to extend this research by including a measure of perceived vulnerability for developing diabetes. However, perceived risk of diabetes did not contribute to any differences in participant attention to, and use of, health information, but was positively correlated with state anxiety, trait anxiety, and health anxiety. This suggests a propensity for anxious people to display an elevated risk rating for themselves compared to people without elevated anxiety levels.

Exploratory analyses revealed a primacy effect associated with the order of presentation of the Tweet task. That is, participants who read the health-promoting component of the Tweet task first were more likely to have a higher health-promoting Tweet valence, more health-promoting keywords used in participant Tweets, more health-promoting words or phrases used in participant Tweets, and fewer health-threatening words or phrases used in participant Tweets. While the health message was counterbalanced in an effort to eliminate primacy or recency effects, the findings suggest a strong primacy effect for reading health-promoting information first. This finding is of particular importance to health communication research. Health messages encouraging preventive actions are more effective in changing behavior for preventable diseases (Rothman et al., 1999.) This finding highlights the importance of counterbalancing different

categories of stimuli to account for any primacy or recency effects. More research should be conducted investigating other order of presentation effects. For example, does order of presentation affect recall when there is a delay in recall. Moreover, future studies and interventions may benefit from displaying health-promoting information first in order to incite prevention behavior.

The question of what factors may influence attention to health information remains important. This study attempted to measure attention at a micro-level, using the DPT, which had not been previously used to measure attention to health information presented on a social media platform. Moreover, the study also attempted to extend on prior research by measuring attention and recall at a macro-level, using the Tweet task to assess how participants would use health information in real-life settings. Prior research indicated that state anxiety, trait anxiety, and health anxiety predict differences in attention to, and use, of health information.

Several experimental design features may explain the absence of predicted relationships in the current study. First, the word pairs in the DPT may have been displayed too briefly for participants to process the information thoroughly. Such brevity may have prevented participants from consciously understanding the word and then avoiding it. Second, the Miller Behavioral Style Scale measures monitoring and blunting coping. This coping scale may have been incorrectly identified to predict scores for attention and recall of health information. Several decades of coping research have identified different models of coping that summarize a specific dimension of coping. The Model of Coping Modes (MCM) describes coping styles as individual differences in attention orientation and emotional-behavioral regulation in response to stress (Krohne, 2001). The MCM describes much of what happens at the initial stage of threat processing at the subconscious level. Other dimensions of coping include problem-solving,

emotional-focused and avoidant coping which are more purposeful and behavioral i.e., drinking to distract one's self from problems. Therefore, monitoring and blunting coping scales may be assessing a different dimension of coping than the one that may better predict attention to, and use of, health information. Also, this scale may not have been as reliable or valid as previously reported. Only 1 out of 149 participants scored in the lower quartile of monitoring. Similarly, no participant scored in the bottom quartile of blunting. This restriction in range may have led to a lack of variance.

Diabetes as a threatening health issue may not have been salient in this college sample. The participants in this study had a restricted range of perceived risk for developing diabetes scores despite approximately 68% of participants having at least one relative diagnosed with diabetes. While having a relative with diabetes was positively correlated with perceived risk for developing diabetes, this sample of college students did not seem to perceive themselves at high risk. Therefore, the manipulation of using diabetes health information may not have been sufficiently strong to influence participants. Future studies may benefit from recruiting a sample of participants who are prediabetic and assessing their perceived risk in order to predict attention to, and use of, health information. Future studies may also benefit by having participants distinguish immediate and extended family members with diabetes. Likewise, studies should investigate the paradox of having a relative with diabetes but only having a slightly elevated perceived risk of developing the disease. With approximately two-thirds of the sample having a relative with diabetes just within this study, investigating college student populations is of particular interest as having a relative with diabetes has been correlated with developing diabetes (CDC, 2014).

Approximately half of this study's participants reported using social media daily and approximately 44% of participants use social media hourly. With this widespread and frequent use of social media, public health entities may benefit greatly from using social media for health communication especially when communicating to young adults. Future studies investigating social media use may also benefit from a breakdown of use such as browsing personal profiles versus entity pages.

4.2 STRENGTHS

This study has several strengths and makes contributions to health communication research. Few studies have examined how individuals process health information obtained from social media, specifically how they process and use of health-threatening and health-promoting information. This study attempted to assess social media health information processing at both the micro-level and macro-level. Attention to health-threatening and health promoting words was assessed at the initial stage of processing, or micro-level, using the DPT. Prior studies have investigated attentional bias using the DPT and non-health (e.g., gun) and health-threatening (e.g., death) words, or a combination of both. However, this study specifically assessed attention to categories of health-threatening (e.g., cancer) and health-promoting (e.g., cure) words. Additionally, no study has attempted to investigate attentional bias and how people process health information on social media.

This study attempted to extend traditional attentional bias research by using a novel technique. The innovative health message Tweet task was used to assess health information processing at the behavioral macro-level. Subsequently, the rating and coding of participant Tweets into specific themes allowed for a richer picture of how participants would “share” health

information on social media. This innovation attempted to capture anxiety and coping style effects on cognitive (DPT) and behavioral (Tweet task) measures of information processing.

This study provided tentative evidence on how to better frame diabetes prevention information. Diabetes is an epidemic affecting millions of Americans with age of onset decreasing each year. It is predicted that 333 million individuals around the world will have some form of diabetes by 2025 (Casey et al., 2014). This study used type 2 diabetes information provided by the CDC (2014) in order to assess attention to, and use, of health information in the sample of college students. Findings revealed that health-promoting information is more likely to be shared or retweeted by users than health-threatening or neutral information. This finding is important to any public health entity that attempts to encourage preventive health behavior on social media.

This study also demonstrated participant ability to recall scientific evidence (i.e., health information from the CDC). Chou et al. (2013) caution that individuals have a tendency to share incorrect health information. While accuracy was not assessed in this study, a majority of Tweets used the information provided in the health message rather than anecdotal information. The latter finding will become increasingly important as public health entities shift from traditional media to social media when disseminating health information.

4.3 LIMITATIONS

Several study limitations may have contributed to the lack of statistically significant predictions. This sample of college students may not have reported high anxiety or risk for diabetes. This finding was surprising as approximately 67% of the sample had at least one relative diagnosed with diabetes.

Participant score distributions of monitoring, blunting, state anxiety, trait anxiety, and perceived risk for developing diabetes were truncated. This restriction of range may have led to a lack of variance in the sample. That is, there was not sufficient variance in the sample for the key variables of monitoring and blunting coping to predict attention to, and use of, health information. For example, the monitoring and blunting coping style measure had little variance for the hostage situation section in which all participants chose the monitoring strategies over the blunting strategies. In turn, this may have led to the truncation observed in the lower quartile for the sample distribution of monitoring scores. This finding suggests that the Miller Behavioral Style Scale (1987) may not be valid for predicting attention to and use of health information in this population of college students. Specifically, this measure was developed before acts of terrorism became more common in the U.S. and around the world. Additionally, in recent years there have been many acts of terrorism that people have been exposed to in the media. In turn, this may have led to a higher tendency of vigilance rather than attempts to “block out” the threatening situation. Although, eliminating those items from the measure did not reveal any additional findings, it may be beneficial to reassess the validity of this measure for this generation of college students. This generational effect may have contributed to the decrease in reliability for both monitoring and blunting subscales.

4.4 FUTURE DIRECTIONS

The study’s findings did not support the four predicted hypotheses. Several recommendations are provided for future studies investigating health information processing via social media. Future studies investigating health information processing via social media may illustrate how predictors of attention and recall of health information may act in a college population. Specifically, both monitoring and blunting score distributions were truncated and

may have resulted in a lack of variance among scores. However, it is possible monitoring and blunting coping do not fully explain how individuals seek or avoid information. Therefore, other coping measures such as the Coping Inventory for Stressful Situations or the Mainz Coping Index (discussed in Section 1.6) may better assess health information processing. That is, these coping style measures different coping stages. The MCI measures the initial, almost automatic, stages of processing threatening information. The CISS measures the late stage of coping style by assessing purposeful action taken by the individual. In addition, due to a truncated anxiety distribution, it is recommended that at least one experiment contain one anxiety-induction group, such as one in which participants are told they will have to give a speech at the end of the study. Future studies may also benefit from using other measures related to health behavior such as self-efficacy or resilience.

Future studies may also benefit from using different measurements of attention to, and use of, health information. While the Tweet task was novel and contributes to the health communication literature, it may be beneficial to use a more extensively used measure of recall, such as a word list or sentence completion task. In addition, future studies may incorporate a delay between reading the health message and constructing a Tweet by using a filler task or having participants return to the laboratory after a predetermined amount of time. This delay may help with distinguishing what is simply rote memory and what remained salient with the participant. Participants may have felt the need to replicate the message rather than Tweet what they thought was important.

While the study followed recommended procedures for display time of word pairs (500 ms), information on the DPT may have been presented too quickly. A longer display time is recommended for future studies to provide a better estimate of conscious avoidance or vigilance

of stimuli words. Lastly, to better detect attention to particularly emotion-eliciting stimuli, the use of eye-tracking may benefit future studies by allowing the measurement of time spent reading or focusing on specific content.

4.5 CONCLUSION

The dissemination of public health messages via social media is a growing phenomenon that is changing the health communication landscape. The future of health communication research for the next several decades will be appropriately dedicated to investigating how social media can be better used for health information dissemination. However, currently many health departments and government agencies have not capitalized on the potential of social media to impact public health. Social media's potential impact lies in its interactive and universal nature, farther reach than traditional media, low cost, and its ability to disseminate quickly to a large audience.

This study attempted to fill the gap in knowledge on how individual characteristics, such as anxiety and coping style, may influence health information processing on social media. An innovative approach was used in order to capture effects of anxiety and coping style to predict processing of health information. More research must be conducted to further explore how to more effectively present health information in order to capture the attention of social media users. The identifying factors that influence how individuals process health information will continue to loom large as an important research question in public health. This is particularly true in the context of diabetes prevention, and especially in border communities in which 96,000 people in El Paso alone have been diagnosed with diabetes. The current findings may have been subject to design and instrument limitations. However, future research should endeavor to

identify factors that influence the processing and utilization of health information found on social media.

References

- Alston, L. L., Kratchmer, C., Jeznach, A., Bartlett, N. T., Davidson, P. S., & Fujiwara, E. (2013). Self-serving episodic memory biases: Findings in the repressive coping style. *Frontiers in Behavioral Neuroscience*, 7, 1-10.
- American Diabetes Association. (2015). 2. Classification and diagnosis of diabetes. *Diabetes Care*, 38(Supplement 1), S8-S16.
- Aureille, E. J. (1999; September). Information processing of threat cues as a function of trait anxiety and defensiveness. *Dissertation Abstracts International*, 60, 1340.
- Avero, P., Corace, K. M., Endler, N. S., & Calvo, M. G. (2003). Coping styles and threat processing. *Personality and Individual Differences*, 35(4), 843-861.
- Bar-Haim, Y., Holoshitz, Y., Eldar, S., Frenkel, T. I., Muller, D., Charney, D. S., & ... Wald, I. (2010). Life-threatening danger and suppression of attention bias to threat. *The American Journal of Psychiatry*, 167(6), 694-698
- Bar-Haim, Y., Lamy, D., Pergamin, L., Bakermans-Kranenburg, M. J., & Van Ijzendoorn, M. H. (2007). Threat-related attentional bias in anxious and nonanxious individuals: A meta-analytic study. *Psychological Bulletin*, 133(1), 1-24.
- Barnes, L. L., Harp, D., & Jung, W. S. (2002). Reliability generalization of scores on the Spielberger State-Trait Anxiety Inventory. *Educational and Psychological Measurement*, 62(4), 603-618.
- Blumberg, S. J. (2000). Guarding against threatening HIV prevention messages: An information-processing model. *Health Education & Behavior*, 27(6), 780-795.
- Booth, R. W. (2014). Uncontrolled avoidance of threat: Vigilance-avoidance, executive control, inhibition and shifting. *Cognition and Emotion*, 28(8), 1465-1473.

- Broemer, P. (2002). Relative effectiveness of differently framed health messages: The influence of ambivalence. *European Journal of Social Psychology*, 32(5), 685-703.
- Brosschot, J. F., de Ruiter, C., & Kindt, M. (1999). Processing bias in anxious subjects and repressors, measured by emotional Stroop interference and attentional allocation. *Personality and Individual Differences*, 26(5), 777-793.
- Brosschot, J. F., de Ruiter, C., & Kindt, M. (1999). Recall and recognition of threatening, pleasant, and neutral words in repressors. *European Journal of Personality*, 13(1), 1-14.
- Brysbaert, M., & New, B. (2009). Moving beyond Kučera and Francis: A critical evaluation of current word frequency norms and the introduction of a new and improved word frequency measure for American English. *Behavior Research Methods*, 41(4), 977-990.
- Buzaglo, J. S. (1997, December). Message framing and monitoring attentional style: Tailoring information for women at risk for cervical cancer. *Dissertation Abstracts International*, 58, 3309.
- Caldwell, T. L., & Newman, L. S. (2005). The timeline of threat processing in repressors: More evidence for early vigilance and late avoidance. *Personality and Individual Differences*, 38(8), 1957-1967.
- Casey, R. P., Rouff, M. A., & Jauregui-Covarrubias, L. (2014). Diabetes among Latinos in the southwestern United States: Border health and binational cooperation. *Revista Panamericana de Salud Pública*, 36(6), 391-395.
- Centers for Disease Control and Prevention. (2014). National diabetes statistics report: Estimates of diabetes and its burden in the United States, 2014. *Atlanta, GA: US Department of Health and Human Services, 2014.*

- Chou, W. Y. S., Hunt, Y. M., Beckjord, E. B., Moser, R. P., & Hesse, B. W. (2009). Social media use in the United States: Implications for health communication. *Journal of Medical Internet Research*, 11(4), 1-12.
- Chou, W. Y. S., Prestin, A., Lyons, C., & Wen, K. Y. (2013). Web 2.0 for health promotion: Reviewing the current evidence. *American Journal of Public Health*, 103(1), e9-e18.
- Cisler, J. M., & Koster, E. H. (2010). Mechanisms of attentional biases towards threat in anxiety disorders: An integrative review. *Clinical Psychology Review*, 30(2), 203-216.
- Cisler, J. M., Bacon, A. K., & Williams, N. L. (2009). Phenomenological characteristics of attentional biases towards threat: A critical review. *Cognitive Therapy and Research*, 33(2), 221-234.
- Coffman, C. F. (2015). Twitter posts, gist, and the perceived risk of using a novel recreational drug. (Unpublished). The University of Texas at El Paso, TX.
- Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, 20(1), 37-46.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2013). *Applied multiple regression/correlation analysis for the behavioral sciences*. Routledge.
- Cook, K. E. (2011). Reliability assessments in qualitative health promotion research. *Health Promotion International*, 27(1), 90-101.
- Crowne, D. P., & Marlowe, D. (1960). A new scale of social desirability independent of psychopathology. *Journal of Consulting Psychology*, 24(4), 349-354.

- Dennis, B. (2013, September 9). CDC: More than 200,000 Americans quit smoking after graphic ad campaign. *Washington Post*. Retrieved from <http://www.washingtonpost.com>.
- Derakshan, N., Eysenck, M. W., & Myers, L. B. (2007). Emotional information processing in repressors: The vigilance–avoidance theory. *Cognition and Emotion*, 21(8), 1585-1614.
- Derryberry, D., & Reed, M. A. (2002). Anxiety-related attentional biases and their regulation by attentional control. *Journal of Abnormal Psychology*, 111(2), 225-236.
- Diabetes Prevention Program Research Group. (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *New England Journal of Medicine*, 2002 (346), 393-403.
- El-Hag, N. F. (2001, February). Attentional bias in anxiety: The role of state anxiety, gender, and coping style. *Dissertation Abstracts International*, 61, 4399.
- El Paso Department of Public Health. (2013). Community Health Assessment Final Report.
- Facebook Q1 2017 Earnings (2017, May 3). Retrieved from: <https://investor.fb.com/investor-events/event-details/2017/Facebook-Q1-2017-Earnings/default.aspx>.
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149-1160.
- Fergie, G., Hilton, S., & Hunt, K. (2016). Young adults' experiences of seeking online information about diabetes and mental health in the age of social media. *Health Expectations: An International Journal of Public Participation in Health Care & Health Policy*, 19(6), 1324-1335.
- Ferguson, T. (2007). e-Patients: How they can help us heal healthcare. *Patient Advocacy for Health Care Quality: Strategies for Achieving Patient-Centered Care*, 93-150.

- George, K. S., Roberts, C. B., Beasley, S., Fox, M., & Rashied-Henry, K. (2015). Our Health Is in Our Hands: A social marketing campaign to combat obesity and diabetes. *American Journal of Health Promotion*, 30(4), 283-286.
- Gibbons, M. C., Fleisher, L., Slamon, R. E., Bass, S., Kandadai, V., & Beck, J. R. (2011). Exploring the potential of Web 2.0 to address health disparities. *Journal of Health Communication*, 16(sup1), 77-89.
- Glanz, K. & Schwartz, M. D. (2008). Stress, coping, and health behavior. In K. Glanz, B.K. Rimer & K. Viswanath (Eds.), *Health Behavior and Health Education* (4th ed.) (pp. 211-236). San Francisco, CA: Jossey-Bass.
- Gorka, A. X., LaBar, K. S., & Hariri, A. R. (2016). Variability in emotional responsiveness and coping style during active avoidance as a window onto psychological vulnerability to stress. *Physiology & Behavior*, 158, 90-99.
- Hale, T. M., Pathipati, A. S., Zan, S., & Jethwani, K. (2014). Representation of health conditions on Facebook: Content analysis and evaluation of user engagement. *Journal of Medical Internet Research*, 16(8), 18-33.
- Hock, M., & Krohne, H. W. (2004). Coping with threat and memory for ambiguous information: Testing the repressive discontinuity hypothesis. *Emotion*, 4(1), 65-86.
- Hock, M., Krohne, H. W., & Kaiser, J. (1996). Coping dispositions and the processing of ambiguous stimuli. *Journal of Personality and Social Psychology*, 70(5), 1052-1066.
- Hou, R., Moss-Morris, R., Risdale, A., Lynch, J., Jeevaratnam, P., Bradley, B. P., & Mogg, K. (2014). Attention processes in chronic fatigue syndrome: Attentional bias for health-related threat and the role of attentional control. *Behaviour Research and Therapy*, 52, 9-16.

- Inzucchi, S. E., Bergenstal, R. M., Buse, J. B., Diamant, M., Ferrannini, E., Nauck, M., ... & Matthews, D. R. (2012). Management of hyperglycemia in type 2 diabetes: A patient-centered approach position statement of the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD). *Diabetes Care*, 35(6), 1364-1379.
- Jansson, B., Lundh, L. G., & Oldenburg, C. (2005). Is defensiveness associated with cognitive bias away from emotional information?. *Personality and Individual Differences*, 39(8), 1373-1382.
- Jasper, F., & Witthöft, M. (2011). Health anxiety and attentional bias: The time course of vigilance and avoidance in light of pictorial illness information. *Journal of Anxiety Disorders*, 25(8), 1131-1138.
- Jha, A., Lin, L., & Savoia, E. (2016). The use of social media by state health departments in the US: Analyzing health communication through Facebook. *Journal of Community Health*, 41(1), 174-179.
- Karademas, E. C., Christopoulou, S., Dimostheni, A., & Pavlu, F. (2008). Health anxiety and cognitive interference: Evidence from the application of a modified Stroop task in two studies. *Personality and Individual Differences*, 44(5), 1138-1150.
- Karekla, M., & Panayiotou, G. (2011). Coping and experiential avoidance: Unique or overlapping constructs?. *Journal of Behavior Therapy and Experimental Psychiatry*, 42(2), 163-170
- Kaur, A., Butow, P. N., & Sharpe, L. (2013). Health threat increases attentional bias for negative stimuli. *Journal of Behavior Therapy and Experimental Psychiatry*, 44(4), 469-476.

- Kim, S., Kim, K., & Lee, J. H. (2014). Effects of dispositional coping strategy and level of health anxiety on attentional bias. *Social Behavior and Personality: An International Journal*, 42(7), 1183-1190.
- Kim, S., & Lee, J. (2016). Time course of attentional bias for health-related information in individuals with health anxiety. *Journal of Health Psychology*, 21(8), 1527-1535.
- Klein, R., & Knäuper, B. (2009). Predicting attention and avoidance: When do avoiders attend?. *Psychology and Health*, 24(7), 729-747.
- Klucken, T., Brouwer, A. M., Chatziastros, A., Kagerer, S., Netter, P., & Hennig, J. (2010). The impact of coping style on gaze duration. *PloS one*, 5(11), 1-6.
- Kocovski, N. (2002, August). Attentional biases and coping with social anxiety. *Dissertation Abstracts International*, 63, 1033.
- Krohne, H. W., & Hock, M. (2008). Cognitive avoidance, positive affect, and gender as predictors of the processing of aversive information. *Journal of Research in Personality*, 42(6), 1572-1584.
- Krohne, H. W., & Hock, M. (2011). Anxiety, coping strategies, and the processing of threatening information: Investigations with cognitive-experimental paradigms. *Personality and Individual Differences*, 50(7), 916-925.
- Laborde, S., Lautenbach, F., & Allen, M. S. (2015). The contribution of coping-related variables and heart rate variability to visual search performance under pressure. *Physiology & Behavior*, 139, 532-540.
- Langens, T. A., & Mörtz, S. (2003). Repressive coping and the use of passive and active coping strategies. *Personality and Individual Differences*, 35(2), 461-473.

- Lecci, L., & Cohen, D. (2007). Altered processing of health threat words as a function of hypochondriacal tendencies and experimentally manipulated control beliefs. *Cognition and Emotion*, 21(1), 211-224.
- Lee, H., Turkel, J. E., Cotter, S. P., Milliken, J. M., Cogle, J., Goetz, A. R., & Lesnick, A. M. (2013). Attentional bias toward personally relevant health-threat words. *Anxiety, Stress & Coping*, 26(5), 493-507.
- Lees, A., Mogg, K., & Bradley, B. P. (2005). Health anxiety, anxiety sensitivity, and attentional biases for pictorial and linguistic health-threat cues. *Cognition & Emotion*, 19(3), 453-462.
- Luecken, L. J., Tartaro, J., & Appelhans, B. (2004). Strategic coping responses and attentional biases. *Cognitive Therapy and Research*, 28(1), 23-37.
- MacLeod, C., Mathews, A., & Tata, P. (1986). Attentional bias in emotional disorders. *Journal of Abnormal Psychology*, 95(1), 15-20.
- Miller, S. M. (1987). Monitoring and blunting: Validation of a questionnaire to assess styles of information seeking under threat. *Journal of Personality and Social Psychology*, 52(2), 345-353.
- Miller, S. M. (1995). Monitoring versus blunting styles of coping with cancer influence the information patients want and need about their disease. *Cancer*, 76(2), 167-177.
- Mogg, K., & Bradley, B. P. (2005). Attentional bias in generalized anxiety disorder versus depressive disorder. *Cognitive Therapy and Research*, 29(1), 29-45.
- Moorhead, S. A., Hazlett, D. E., Harrison, L., Carroll, J. K., Irwin, A., & Hoving, C. (2013). A new dimension of health care: Systematic review of the uses, benefits, and limitations of

- social media for health communication. *Journal of Medical Internet Research*, 15(4), 118-133.
- Muris, P., Merckelbach, H., & De Jongh, A. (1995). Colour-naming of dentist-related words: Role of coping style, dental anxiety, and trait anxiety. *Personality and Individual Differences*, 18(5), 685-688.
- Neiger, B. L., Thackeray, R., Burton, S. H., Thackeray, C. R., & Reese, J. H. (2013). Use of twitter among local health departments: An analysis of information sharing, engagement, and action. *Journal of Medical Internet Research*, 15(8), 177-186.
- Newman, L. S., & McKinney, L. C. (2002). Repressive coping and threat-avoidance: An idiographic Stroop study. *Personality and Social Psychology Bulletin*, 28(3), 409-422.
- Oldenburg, C., Lundh, L. G., & Kivistö, P. (2002). Explicit and implicit memory, trait anxiety, and repressive coping style. *Personality and Individual Differences*, 32(1), 107-119.
- Osborn, M. F., Miller, C. C., Badr, A., & Zhang, J. (2014). Metabolic syndrome associated with ischemic stroke among the Mexican Hispanic population in the El Paso/Border region. *Journal of Stroke and Cerebrovascular Diseases: The Official Journal of National Stroke Association*, 23(6), 1477-1484.
- Paul, V. G., Rauch, A. V., Kugel, H., ter Horst, L., Bauer, J., Dannlowski, U., & ... Suslow, T. (2012). High responsivity to threat during the initial stage of perception in repression: A 3 T fMRI study. *Social Cognitive and Affective Neuroscience*, 7(8), 980-990.
- Pennebaker, J. W., Booth, R. J., Boyd, R. L., & Francis, M. E. (2015). Linguistic Inquiry and Word Count: LIWC 2015 [Computer software]. Pennebaker Conglomerates.
- Perkins, H. W. (2002). Social norms and the prevention of alcohol misuse in collegiate contexts. *Journal of Studies on Alcohol, supplement*, (14), 164-172.

- Peters, J. H., Hock, M., & Krohne, H. W. (2012). Sensitive maintenance: A cognitive process underlying individual differences in memory for threatening information. *Journal of Personality and Social Psychology*, 102(1), 200-213.
- Richardson, C. R., Buis, L. R., Janney, A. W., Goodrich, D. E., Sen, A., Hess, M. L., ... & Strecher, V. J. (2010). An online community improves adherence in an internet-mediated walking program. Part 1: Results of a randomized controlled trial. *Journal of Medical Internet Research*, 12(4), 138-153.
- Rodoletz, M. C. (1996, March). Coping with the risk for cervical cancer: The mediating role of dispositional monitoring in the stress response. *Dissertation Abstracts International*, 56, 5182.
- Rothman, A. J., Martino, S. C., Bedell, B. T., Detweiler, J. B., & Salovey, P. (1999). The systematic influence of gain-and loss-framed messages on interest in and use of different types of health behavior. *Personality and Social Psychology Bulletin*, 25(11), 1355-1369.
- Rus, H. M., & Cameron, L. D. (2015). Health Communication in Social Media: Message Features Predicting User Engagement on Diabetes-Related Facebook Pages. *Annals of Behavioral Medicine*, 1-12.
- Salkovskis, P. M., Rimes, K. A., Warwick, H. M. C., & Clark, D. M. (2002). The Health Anxiety Inventory: Development and validation of scales for the measurement of health anxiety and hypochondriasis. *Psychological Medicine*, 32(05), 843-853.
- Schmidt, E., Witthöft, M., Kornadt, A., Rist, F., & Bailer, J. (2013). Negative automatic evaluation and better recognition of bodily symptom words in college students with elevated health anxiety. *Cognitive Therapy and Research*, 37(5), 1027-1040.

- Schwartz, M. D., Lerman, C., Miller, S. M., Daly, M., & Masny, A. (1995). Coping disposition, perceived risk, and psychological distress among women at increased risk for ovarian cancer. *Health Psychology, 14*(3), 232-235.
- Schwerdtfeger, A., & Derakshan, N. (2010). The time line of threat processing and vagal withdrawal in response to a self-threatening stressor in cognitive avoidant copers: Evidence for vigilance-avoidance theory. *Psychophysiology, 47*(4), 786-795.
- Sladek, M. R., Doane, L. D., Jewell, S. L., & Luecken, L. J. (2016). Social support coping style predicts women's cortisol in the laboratory and daily life: the moderating role of social attentional biases. *Anxiety, Stress, & Coping, 1-16*.
- Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). *State-Trait Anxiety Inventory for Adults*. Mind Garden.
- Syn, S. Y., & Kim, S. U. (2016). College students' health information activities on Facebook: Investigating the impacts of health topic sensitivity, information sources, and demographics. *Journal of Health Communication, 21*(7), 743-754.
- Tonia, T. (2014). Social media in public health: is it used and is it useful?. *International Journal of Public Health, 59*(6), 889-891.
- Twitter Inc. (2017, April 26). Retrieved from: <https://investor.twitterinc.com/results.cfm>.
- Vancleef, L. M., Peters, M. L., & De Jong, P. J. (2009). Interpreting ambiguous health and bodily threat: Are individual differences in pain-related vulnerability constructs associated with an on-line negative interpretation bias?. *Journal of Behavior Therapy and Experimental Psychiatry, 40*(1), 59-69.

- van Koningsbruggen, G. M., Das, E., & Roskos-Ewoldsen, D. R. (2009). How self-affirmation reduces defensive processing of threatening health information: Evidence at the implicit level. *Health Psychology, 28*(5), 563-568.
- Vital Strategies. (2010, November 30). Smoke-Free Alexandria. *World Lung Foundation*. Retrieved from <https://www.vitalstrategies.org/resource-center/media-campaigns/country/egypt>
- Wald, I., Shechner, T., Bitton, S., Holoshitz, Y., Charney, D. S., Muller, D., ... & Bar-Haim, Y. (2011). Attention bias away from threat during life threatening danger predicts PTSD symptoms at one-year follow-up. *Depression and Anxiety, 28*(5), 406-411.
- Walker, E. A., Caban, A., Schechter, C. B., Basch, C. E., Blanco, E., DeWitt, T., ... & Mojica, G. (2007). Measuring comparative risk perceptions in an urban minority population: The Risk Perception Survey for diabetes. *The Diabetes Educator, 33*(1), 103-110.
- Walker, E. A., Mertz, C. K., Kalten, M. R., & Flynn, J. (2003). Risk perception for developing diabetes. *Diabetes Care, 26*(9), 2543-2548.
- Williams-Piehot, P., Pizarro, J., Schneider, T. R., Mowad, L., & Salovey, P. (2005). Matching health messages to monitor-blunter coping styles to motivate screening mammography. *Health Psychology, 24*(1), 58-67.
- Wilson, C., & Wallis, D. J. (2013). Attentional bias and slowed disengagement from food and threat stimuli in restrained eaters using a modified Stroop task. *Cognitive Therapy and Research, 37*(1), 127-138.
- Yonker, L. M., Zan, S., Scirica, C. V., Jethwani, K., & Kinane, T. B. (2015). “Friending” teens: systematic review of social media in adolescent and young adult health care. *Journal of Medical Internet Research, 17*(1), e4.

Tables

Table 6: *EBSCOhost databases used for literature review*

PsycINFO	Criminal Justice Abstracts	Information Science & Technology Abstracts (ISTA)	Primary Search
Academic Search Complete	Current Biography Illustrated (H.W. Wilson)	Inspec	Professional Development Collection
Agricola	eBook Collection (EBSCOhost)	Inspec Archive - Science Abstracts 1898-1968	PsycARTICLES
AHFS Consumer Medication Information	eBook History Collection (EBSCOhost)	International Bibliography of Theatre & Dance with Full Text	PsycBOOKS
Alt HealthWatch	Education Full Text (H.W. Wilson)	L'Année philologique	Psychology and Behavioral Sciences Collection
America: History and Life with Full Text	Educational Administration Abstracts	Legal Collection	Race Relations Abstracts
American Doctoral Dissertations	Ergonomics Abstracts	Library Literature & Information Science Full Text (H.W. Wilson)	Regional Business News
Art Full Text (H.W. Wilson)	ERIC	Library	Religion and Philosophy Collection
Art Index Retrospective (H.W. Wilson)	Essay and General Literature Index (H.W. Wilson)	Information Science & Technology Abstracts	RILM Abstracts of Music Literature (1967 to Present only)
Arte Público Hispanic Historical Collection: Series 1	Family Studies Abstracts	Literary Reference Center	RISM Series A/II: Music Manuscripts after 1600
Arte Público Hispanic Historical Collection: Series 2	Film & Television Literature Index with Full Text	MAS Ultra - School Edition	Science & Technology Collection
Avery Index to Architectural Periodicals	Fuente Académica Premier	MasterFILE Premier	Short Story Index (H.W. Wilson)
Bibliography of Native North Americans	Funk & Wagnalls New World Encyclopedia	MedicLatina	Small Business Reference Center
Biological Abstracts	GreenFILE	MEDLINE	Small Engine Repair Reference Center
Biological Abstracts 1969 - Present	Health and Psychosocial Instruments	Mental Measurements Yearbook with Tests in Print	SPORTDiscus
Book Review Digest Plus (H.W. Wilson)	Health Source - Consumer Edition	Middle Search Plus	Teacher Reference Center
Business Abstracts with Full Text (H.W. Wilson)	Health Source: Nursing/Academic Edition	Military & Government Collection	Texas Reference Center
Business Source Complete	Historical Abstracts with Full Text	MLA Directory of Periodicals	The Serials Directory
Chicano Database	Hobbies & Crafts Reference Center	MLA International Bibliography	TOPICsearch
CINAHL	Home Improvement Reference Center	Music Index	Vocational and Career Collection
Communication & Mass Media Complete	Humanities Full Text (H.W. Wilson)	Newspaper Source	MathSciNet via EBSCOhost
Computer Source	Index to Printed Music	Play Index (H.W. Wilson)	Legal Information Reference Center

Table 7: List of neutral and stimulus word pairs

Neutral Words	Stimulus (10 Health-Promoting and 10 Health-Threatening)	Length	Frequency per one million words
Eyebrows	Diabetes	8	3.25
Generated	<i>Blindness</i>	9	1.31
Offered	<i>Disease</i>	7	26.18
Yesterday	<i>Dangerous</i>	9	74.84
N/A	<i>Life threatening</i>	15	796.65 and 11.75
Broomstick	<i>Amputation</i>	10	0.84
N/A	<i>Death</i>	5	216.69
N/A	<i>Pain</i>	4	97.94
N/A	<i>Nerve Damage</i>	11	22.96 and 33.06
N/A	<i>Infections</i>	10	0.92
N/A	<i>Complications</i>	13	4.06
Reservoir	Hazardous	9	1.84
Orange	Cancer	6	22.33
Glove	Bleed	5	10.10
Stockings	Paralyzed	9	3.73
Uniforms	Sickness	8	7.94
Seem	Safe	4	143.20
Boot	Heal	4	11.33
Sand	Cure	4	20.84
Visual	Active	6	11.45
Bookmark	Wellness	8	0.41
N/A	<i>Nutritious</i>	10	0.88
N/A	<i>Improve</i>	7	8.10
Even	<i>Help</i>	4	921.12
Smell	<i>Enjoy</i>	5	82.78
N/A	<i>Healthy</i>	7	24.75
N/A	<i>Live Longer</i>	10	344.59 and 98.94
Considered	<i>Attractive</i>	10	24.63
Watch	<i>Happy</i>	5	333.20
N/A	<i>Feel good</i>	8	627.24 and 2610.14
Sample	<i>Relief</i>	6	14.59

Health-threatening words: n=15 Mean Length (SD) = 8.63 (2.92)

Health-promoting words: n = 15 Mean Length (SD) = 6.53 (2.26)

Neutral words: n = 20 words Mean Length (SD) = 6.8 (2.14)

Health message keywords are italicized

Table 8: *Participant characteristics*

Variable	<i>n</i>	%	<i>M</i>	<i>SD</i>
Age	149		21.34	5.11
Gender				
Female	93	62.4.1		
Male	55	36.9		
Other	1	0.7		
Ethnicity				
Hispanic	122	81.9		
African American	4	2.7		
Asian	1	.7		
White	15	10.1		
Other	7	4.7		
College Level				
Freshman	51	34.2		
Sophomore	48	32.2		
Junior	26	17.4		
Senior	21	14.1		
Other	3	2.0		
Residency				
El Paso, TX	144	96.6		
Ciudad Juarez, CHIH	4	2.7		
New Mexico	1	.7		
Relative with Diabetes	101	67.8		
Accepted Health Services List	107	71.8		

Table 9: *Social media usage and health information sources*

Variable	<i>n</i>	%
Current Usage		
Never	3	2.0
Monthly	4	2.7
Weekly	3	2.0
Daily	74	49.7
Hourly	65	43.6
Social Media Profiles		
Facebook	121	81.2
Twitter	77	51.7
Instagram	129	86.6
Snapchat	135	90.6
Other (LinkedIn, tumblr, pinterest)	12	8.1
Health Information Source		
Primary doctor	123	82.6
University health center	10	6.7
Internet	75	50.3
Family and friends	65	43.6
Other	6	4.0

Table 10: Means, standard deviations, and reliabilities for independent variables

Variable	<i>M</i>	SD	α
Monitoring	12.31	2.22	Pilot: .763; Current: .563
Blunting	5.72	2.42	Pilot: .577; Current: .515
State Anxiety	37.25	10.77	.921
Trait Anxiety	42.61	10.69	.914
Health Anxiety	32.19	6.98	.845
Diabetes Risk	16.71	3.32	.604
Perceived Diabetes Risk Rating	2.26	1.10	-

Table 11: Means, standard deviations, and percentages for dependent variables

Variable	<i>M</i>	<i>SD</i>	%*	κ
DPT – Health-Threatening AB	4.47	30.32	-	-
DPT – Health-Promoting AB	2.31	29.88	-	-
Health-Threatening Keywords	0.24	0.60	17.4	-
Health-Promoting Keywords	0.65	0.67	55.7	-
Health-Threatening Utterances	0.88	1.06	55.0	-
Health-Promoting Utterances	2.54	1.62	87.9	-
Neutral Utterances	0.35	0.68	26.2	-
Tweet Rating	0.86	1.38	-	0.143
Total Word Count	21.08	4.45	-	-

*Percentages of participants ($N = 149$) that had at least one word or phrase in their Tweet for the corresponding category

DPT = Dot Probe Task

AB = Attentional bias score

Utterance = Word or phrase used in participant Tweet

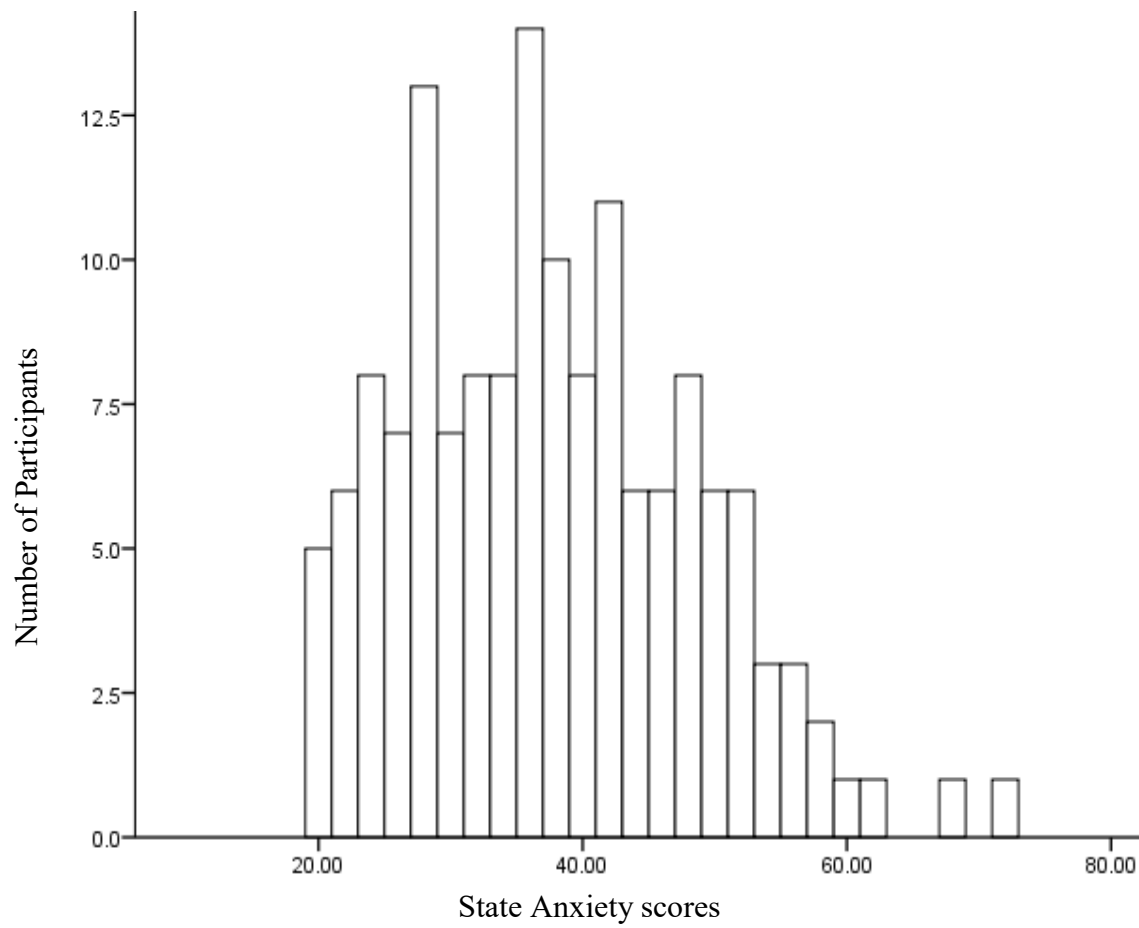


Figure 2: Histogram for State Anxiety scores

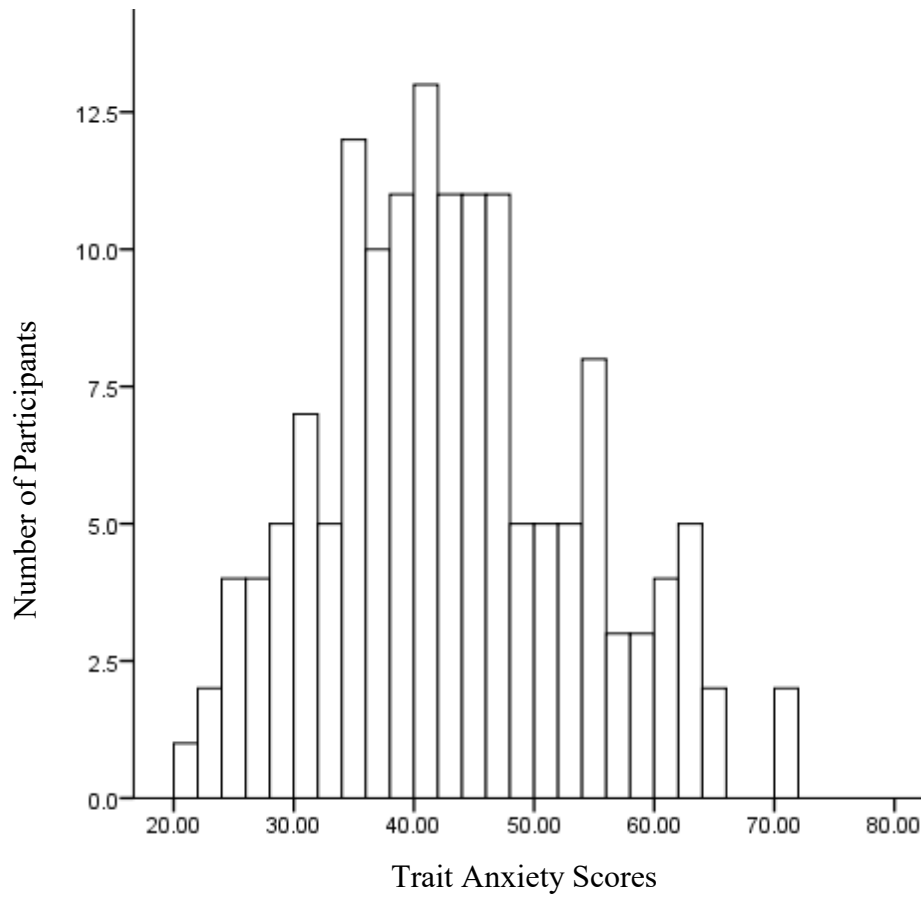


Figure 3: Histogram for Trait Anxiety scores

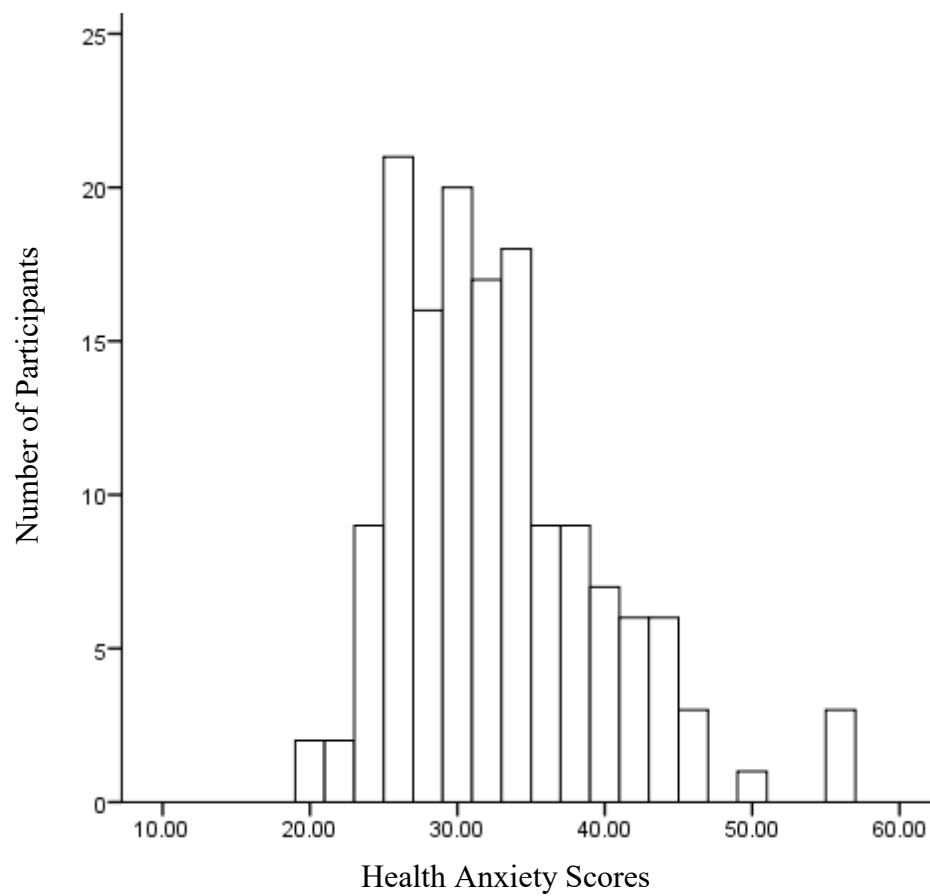


Figure 4: Histogram for Health Anxiety scores

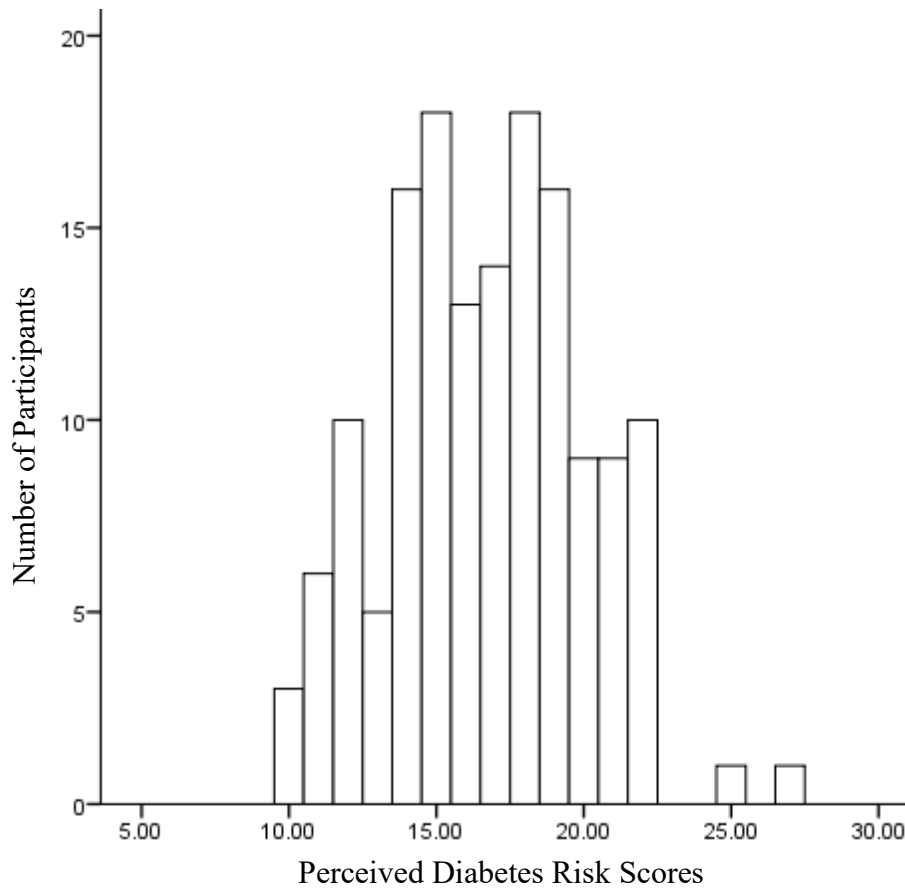


Figure 5: Histogram for Perceived Diabetes Risk scores

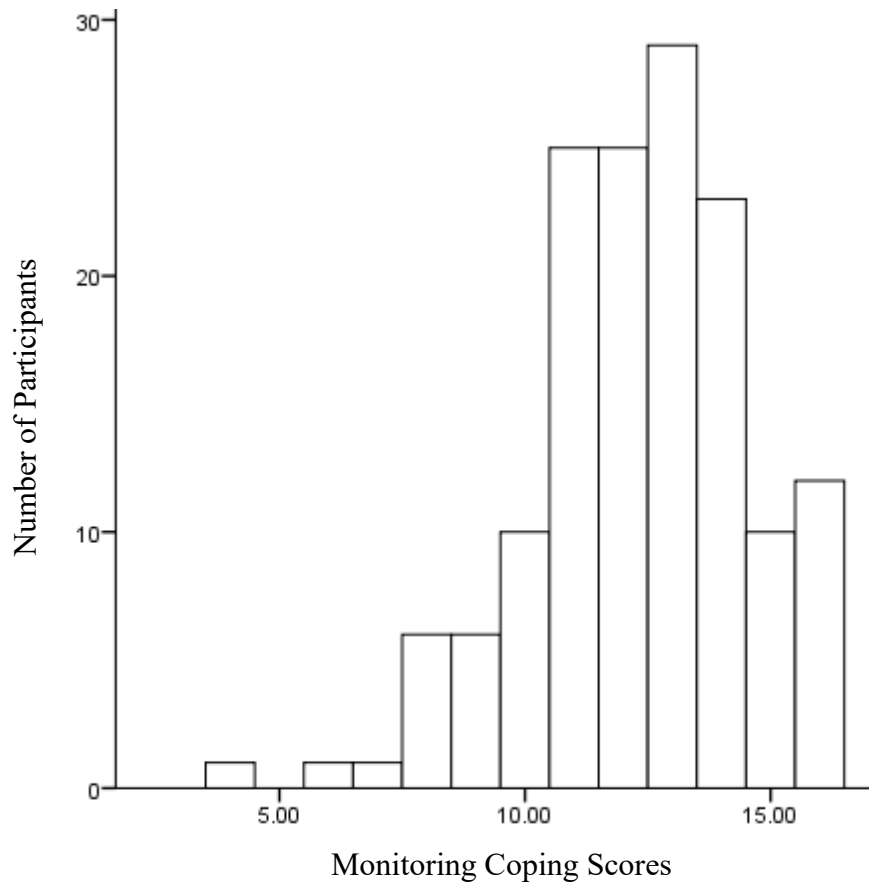


Figure 6: Histogram for Monitoring Coping scores

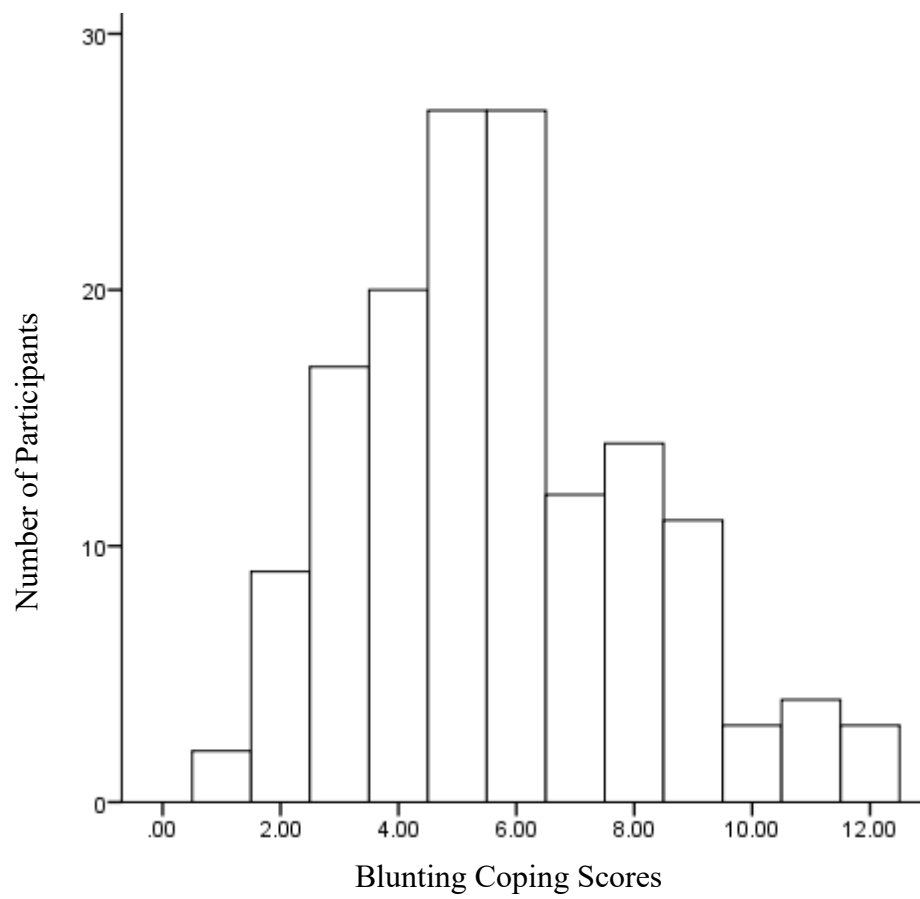


Figure 7: Histogram for Blunting Coping scores

Table 12: *Correlations among key variables*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Monitoring	-												
2. Blunting	-.24**	-											
3. Diabetes Risk	.13	.08	-										
4. Health Anxiety	.25**	-.16	.36**	-									
5. State Anxiety	-.03	-.05	.39**	.36**	-								
6. Trait Anxiety	.11	-.16	.36**	.57**	.69**	-							
7. Threat AB	-.14	-.06	-.04	-.02	.13	.10	-						
8. Promote AB	.03	.06	-.04	-.12	-.02	-.03	.09	-					
9. Threat Keywords	-.03	-.09	-.01	.01	.08	-.03	-.02	.06	-				
10. Promote Keywords	-.02	.08	.05	-.17*	-.04	-.11	.00	.07	-.04	-			
11. Threat Utterances	-.04	-.06	-.14	-.15	-.08	-.10	.06	.01	.51**	-.20**	-		
12. Promote Utterances	.07	.01	.04	.06	.04	.03	.03	.08	-.22**	.48**	-.45**	-	
13. Neutral Utterances	-.11	.02	-.02	.06	-.03	-.04	-.10	-.06	-.08	-.04	-.23**	-.21**	-
14. Tweet Rating	-.06	.06	.03	.01	.00	-.07	.02	.03	-.53**	.31**	-.71**	.58**	-.03

Note: *significant at the $p < .05$ level; ** significant at the $p < .01$ level

AB = Attentional Bias; Utterance = Word or phrase used in participant Tweets

Table 13: *Final hierarchical regression models for DPT Health-Threatening and Health Promoting attentional bias scores*

Variable	Health-Threatening				Health-Promoting			
	B	β	Final t	ΔR^2	B	β	Final t	ΔR^2
<i>Step 1</i>				.002				
Diabetes Risk	-.704	-.077	-.839		-.456	-.051	-.543	.011
Health Anxiety	-.289	-.067	-.648		-.621	-.145	-1.39	
<i>Step 2</i>				.033				
State Anxiety	.352	.125	1.06		.016	.006	.049	.002
Trait Anxiety	.226	.080	.610		.208	.075	.562	
<i>Step 3</i>				.018				
Monitoring	-1.86	-.136	-1.54		1.08	.080	.891	.008
Blunting	-.957	-.076	-.884		.904	.073	.834	

Note: * $p < 0.05$; DPT = Dot Probe Task

Table 14: *Final hierarchical regression model for Health-Threatening and Health-Promoting keywords*

Variable	Health-Threatening				Health-Promoting			
	B	β	Final t	ΔR^2	B	β	Final t	ΔR^2
<i>Step 1</i>				.000				.040
Diabetes Risk	-.007	-.038	-.419		.020	.113	1.26	
Health Anxiety	.004	.052	.052		-.016	-.168	-1.68	
<i>Step 2</i>				.021				.003
State Anxiety	.011	.201	1.72		.003	.037	.362	
Trait Anxiety	-.010	-.181	-1.39		-.005	-.082	-.580	
<i>Step 3</i>				.012				.002
Monitoring	-.011	-.041	-.460		.010	.035	.392	
Blunting	-.029	-.116	-.116		.013	.046	.525	

Note: * $p < 0.05$

Table 15: *Final hierarchical regression model for Tweet ratings*

Variable	Rating			ΔR^2
	B	β	Final t	
<i>Step 1</i>				.001
Diabetes Risk	.019	.046	.493	
Health Anxiety	.020	.099	.948	
<i>Step 2</i>				.016
State Anxiety	.010	.078	.654	
Trait Anxiety	-.024	-.188	-1.42	
<i>Step 3</i>				.005
Monitoring	-.037	-.060	-.664	
Blunting	.019	.033	.381	

Note: * $p < 0.05$

Table 16. *Final hierarchical regression models for Health-Threatening, Health-Promoting, and Neutral words or phrases used in participant Tweets*

	Health-Threatening				Health-Promoting				Neutral			
Variable	B	β	Final t	ΔR^2	B	β	Final t	ΔR^2	B	β	Final t	ΔR^2
<i>Step 1</i>				.034				.004				.005
Diabetes Risk	-.031	-.098	-1.316		.005	.009	.100		.002	.008	.008	
Health Anxiety	-.021	-.136	-1.06		.011	.049	.471		.016	.164	1.58	
<i>Step 2</i>				.000				.001				.007
State Anxiety	.001	.006	.047		.008	.051	.423		-.001	-.023	-.195	
Trait Anxiety	.000	-.004	-.028		-.006	-.038	-.283		-.006	-.101	-.769	
<i>Step 3</i>				.005				.004				.018
Monitoring	-.006	-.012	-.134		.052	.071	.784		-.044	-.143	-1.60	
Blunting	-.034	-.078	-.898		.018	.026	.299		-.001	-.004	-.043	

Note: * $p < 0.05$

Table 17: *Inter-rater agreement for Tweet coding*

Tweet ID	Health-Threatening	Health-Promoting	Neutral
1-30	18 (60%)	17 (56.67%)	25 (83.33%)
31-60	22 (73.33%)	21 (70%)	21 (70%)
61-90	25 (83.33%)	15 (50%)	23 (76.67%)
91-120	24 (80%)	18 (60%)	25 (83.33%)
121-150	16 (53.33%)	16 (53.33%)	24 (80%)

Table 18: *Correlations for exploratory analyses*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Monitoring NoTerror	-												
2. Blunting NoTerror	-.31**	-											
3. DPT Errors	-.02	.11	-										
4. Health Anxiety	.29**	-.18*	.24**	-									
5. Threat AB	-.13	-.11	-.19*	-.02	-								
6. Promote AB	.00	-.01	-.25**	-.11	.09	-							
7. Order of Presentation	.10	-.01	.03	.10	.00	-.11	-						
8. Threat Utterances	-.07	.01	.00	-.15	.06	.00	-.23**	-					
9. Promote Utterance	.10	-.09	-.11	.06	.03	.08	.21**	-.45**	-				
10. Tweet Rating	-.06	-.00	-.12	.01	.02	.03	.21*	-.70**	.56**	-			
11. Promote Keywords	-.00	.00	-.13	-.17*	.00	.07	.20*	-.20*	.48**	.31**	-		
12. Diabetes self-report risk	.24**	-.05	-.01	.30**	-.01	.01	-.04	-.09	.14	.05	.09	-	
13. Age	-.25**	.09	-.09	-.14	.05	.00	.07	-.03	.00	.05	.00	-.06	-
14. Gender	-.16*	.07	.01	-.05	.00	.07	-.06	.06	-.16	-.04	-.10	-.09	.35**

Note: ** $p < .01$; * $p < .05$

AB = Attentional Bias; Utterance = Word or phrase used in participant Tweet

NoTerror = Hostage situation was omitted from subscale

Appendix

Appendix A: Demographics

1. What is your ethnicity?

- ☐ Hispanic
- ☐ Black (non-Hispanic) African American
- ☐ White or Caucasian (non-Hispanic)
- ☐ Asian
- ☐ Native American or Alaskan Native
- ☐ Native Hawaiian or other Pacific Islander
- ☐ Two or more races

Please explain: _____

2. How old are you? _____

3. Do you identify as: ☐ Male ☐ Female ☐ Other Please explain: _____

4. Where do you currently live?

- ☐ A house, apartment, condo or room you rent
- ☐ A house, apartment, or condo you own
- ☐ A family member's house, apartment, or condo
- ☐ Someone else's house, apartment, or condo (that is not family)
- ☐ Shelter /group home

☐ Other: _____ *[write in your response]*

4a. In your current living situation, with whom do you live? *[Check all that apply]*

- ☐ Spouse or Partner
- ☐ Children
- ☐ Parents
- ☐ Other family
- ☐ Friends
- ☐ Roommates
- ☐ Alone (by myself)

5. How many other people, not including yourself, do you live with? _____

6. In the past 12 months, have you lived in Mexico for any part of the time?

Yes ☐ No ☐

7. What is your highest level of education you've completed?

- ☐ High School/ GED
- ☐ Some College
- ☐ Associate's Degree
- ☐ Bachelor's Degree
- ☐ Graduate course work

8. What is your current Grade Point Average (GPA)? _____

9. Please check the box that best describes your employment status.

- ☐ Working at a full-time job
- ☐ Working at a part time job
- ☐ Working odd jobs
- ☐ Not currently working

10. Altogether, what is your annual household income from all sources?
(Including welfare, wages, food stamps, child support, and legal/illegal activities)

\$_____

11. What is your college level?

- ☐ Freshman
- ☐ Sophomore
- ☐ Junior
- ☐ Senior
- ☐ Other

12. Where do you currently live?

- ☐ El Paso County
- ☐ New Mexico
- ☐ Juarez
- ☐ Other

13. Check the statement that best describes your proficiency to speak both English and Spanish
(check only one):

- ☐ I speak only English
- ☐ I speak English fluently, but I do not speak Spanish fluently
- ☐ I speak both languages fluently, but my English is much better
- ☐ I speak both languages fluently, but my English is a little better
- ☐ I speak both languages with equal fluency
- ☐ I speak both languages fluently, but my Spanish is a little better
- ☐ I speak both languages fluently, but my Spanish is much better
- ☐ I speak Spanish fluently, but I do not speak English fluently
- ☐ I speak only Spanish

14. I use social media:

- ☐ Hourly
- ☐ Daily
- ☐ Weekly
- ☐ Monthly
- ☐ Never

15. I have a social media profile on the following services:

- ☐ Facebook
- ☐ Twitter
- ☐ Instagram
- ☐ Snapchat
- ☐ Other_____

16. I get information about my health from:

- ☐ Primary doctor
- ☐ University health center
- ☐ Internet
- ☐ Family and friends
- ☐ Other_____

Appendix B: Spielberg State-Trait Anxiety Inventory Form Y-1

Due to copyright, only the first five items are allowed to be published on this dissertation.

Directions: A number of statements which people have used to describe themselves are given below. Read each statement and then select the appropriate number to the right of the statement to indicate how you feel *right now*, that is, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

		NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1.	I feel calm...	1	2	3	4
2.	I feel secure...	1	2	3	4
3.	I am tense...	1	2	3	4
4.	I feel strained...	1	2	3	4
5.	I feel at ease...	1	2	3	4

Appendix C: Spielberg State-Trait Anxiety Inventory Form Y-2

Due to copyright, only the first five items are allowed to be published on this dissertation.

Directions: A number of statements which people have used to describe themselves are given below. Read each statement and then select the appropriate number to the right of the statement to indicate how you *generally* feel.

		ALMOST NEVER	SOMETIMES	OFTEN	ALMOST ALL THE TIME
21.	I feel pleasant...	1	2	3	4
22.	I feel nervous and restless...	1	2	3	4
23.	I am satisfied with myself...	1	2	3	4
24.	I wish I could be as happy as others seem to be...	1	2	3	4
25.	I feel like a failure...	1	2	3	4

Appendix D: Health Anxiety Inventory – 18

Each question in this section consists of a group of four statements. Please read each group of statements carefully and then select the one which best describes your feelings, over the past six months (or other agreed time period). Identify the statement by selective the letter next to it, i.e. if you think that statement *a.*) is correct, pick statement *a.*).

1. *a.)* I do not worry about my health.
 b.) I occasionally worry about my health.
 c.) I spend much of my time worrying about my health.
 d.) I spend all of my time worrying about my health.

2. *a.)* I notice aches/pains less than most other people (of my age).
 b.) I notice aches/pains as much as most other people (of my age).
 c.) I notice aches/pains more than most other people (of my age).
 d.) I am aware of aches/pains in my body all the time.

3. *a.)* as a rule I am not aware of bodily sensations or changes.
 b.) sometimes I am aware of bodily sensations or changes.
 c.) I am often aware of bodily sensations or changes.
 d.) I am constantly aware of bodily sensations or changes.

4. *a.)* resisting thoughts of illness is never a problem.
 b.) most of the time I can resist thoughts of illness.
 c.) I try to resist thoughts of illness but am often unable to do so.
 d.) thoughts of illness are so strong that I no longer even try to resist them.

5. *a.)* as a rule I am not afraid that I have a serious illness.
 b.) I am sometimes afraid that I have a serious illness.
 c.) I am often afraid that I have a serious illness.
 d.) I am always afraid that I have a serious illness.

6. *a.)* I do not have images (mental pictures) of myself being ill.
 b.) I occasionally have images of myself being ill.
 c.) I frequently have images of myself being ill.
 d.) I constantly have images of myself being ill.

7. *a.)* I do not have any difficulty taking my mind off thoughts about my health.
 b.) I sometimes have difficulty taking my mind off thoughts about my health.
 c.) I often have difficulty in taking my mind off thoughts about my health.
 d.) Nothing can take my mind off thoughts about my health.

8. *a.)* I am lastingly relieved if my doctor tells me there is nothing wrong.
 b.) I am initially relieved but the worries sometimes return later.
 c.) I am initially relieved but the worries always return later.
 d.) I am not relieved if my doctor tells me there is nothing wrong.

9. a.) if I hear about an illness I never think I have it myself.
 b.) if I hear about an illness I sometimes think I have it myself.
 c.) if I hear about an illness I often think I have it myself.
 d.) if I hear about an illness I always think I have it myself.

10. a.) if I have a bodily sensation or change I rarely wonder what it means.
 b.) if I have a bodily sensation or change I often wonder what it means.
 c.) if I have a bodily sensation or change I always wonder what it means.
 d.) if I have a bodily sensation or change I must know what it means.

11. a.) I usually feel at very low risk for developing a serious illness.
 b.) I usually feel at fairly low risk for developing a serious illness.
 c.) I usually feel at moderate risk for developing a serious illness.
 d.) I usually feel at high risk for developing a serious illness.

12. a.) I never think I have a serious illness.
 b.) I sometimes think I have a serious illness.
 c.) I often think I have a serious illness.
 d.) I usually think that I am seriously ill.

13. a.) if I notice an unexplained bodily sensation I don't find it difficult to think about other things.
 b.) if I notice an unexplained bodily sensation I sometimes find it difficult to think about other things.
 c.) if I notice an unexplained bodily sensation I often find it difficult to think about other things.
 d.) if I notice an unexplained bodily sensation I always find it difficult to think about other things.

14. a.) my family/friends would say I do not worry enough about my health.
 b.) my family/friends would say I have a normal attitude to my health.
 c.) my family/friends would say I worry too much about my health.
 d.) my family/friends would say I am a hypochondriac.

For the following questions, please think about what it might be like if you had a serious illness of a type which particularly concerns you (e.g. heart disease, cancer, multiple sclerosis & so on). Obviously you cannot know for definite what it would be like; please give your best estimate of what you *think* might happen, basing your estimate on what you know about yourself and serious illness in general.

15. a.) if I had a serious illness I would still be able to enjoy things in my life quite a lot.
 b.) if I had a serious illness I would still be able to enjoy things in my life a little.
 c.) if I had a serious illness I would be almost completely unable to enjoy things in my life.
 d.) if I had a serious illness I would be completely unable to enjoy life at all.

- 16.** a.) if I developed a serious illness there is a good chance that modern medicine would be able to cure me.
b.) if I developed a serious illness there is a moderate chance that modern medicine would be able to cure me.
c.) if I developed a serious illness there is a very small chance that modern medicine would be able to cure me.
d.) if I developed a serious illness there is no chance that modern medicine would be able to cure me.
- 17.** a.) a serious illness would ruin some aspects of my life.
b.) a serious illness would ruin many aspects of my life.
c.) a serious illness would ruin almost every aspect of my life.
d.) a serious illness would ruin every aspect of my life.
- 18.** a.) if I had a serious illness I would not feel that I had lost my dignity.
b.) if I had a serious illness I would feel that I had lost a little of my dignity.
c.) if I had a serious illness I would feel that I had lost quite a lot of my dignity.
d.) if I had a serious illness I would feel that I had totally lost my dignity.

Appendix E: Risk Perception Survey for Developing Diabetes

Attitudes about Health

This survey will provide important information about how people feel about the risk of getting a chronic disease, like diabetes. There are no right or wrong answers. We are interested in *your* opinions and attitudes. Please answer each question as best as you can.

General Attitudes

For each item, please select the number below the response that BEST DESCRIBES YOUR OPINION.

		Strongly Agree	Agree	Disagree	Strongly Disagree
1.	I feel that I have little control over risks to my health.	1	2	3	4
2.	If I am going to get diabetes, there is not much I can do about it.	1	2	3	4
3.	I think that my personal efforts will help control my risks of getting diabetes.	1	2	3	4
4.	People who make a good effort to control the risks of getting diabetes are much less likely to get diabetes.	1	2	3	4
5.	I worry about getting diabetes.	1	2	3	4
6.	Compared to other people my same age and sex (gender), I am <i>less</i> likely than they are to get diabetes.	1	2	3	4
7.	Compared to other people of my same age and sex (gender), I am <i>less</i> likely than they are to get a serious disease.	1	2	3	4
8.	Worrying about getting diabetes is very upsetting.	1	2	3	4

Your Attitudes about Health Risks

Below is a list of health problems and diseases. For each one, please select the number below the words to tell us if you think **your own personal health** is at “almost no risk,” “slight risk,” “moderate risk” or “high risk” from these problems.

If you, or a family member, already have the disease (or had the disease in the past), please also check (✓) the appropriate line on the right.



	Almost No Risk	Slight Risk	Moderate Risk	High Risk	Have (or had) this disease:	
					Myself	Family Member
9. Arthritis	1	2	3	4	_____	_____
10. Heart Disease	1	2	3	4	_____	_____
11. Cancer	1	2	3	4	_____	_____
12. High blood pressure	1	2	3	4	_____	_____
13. Hearing loss	1	2	3	4	_____	_____
14. Asthma	1	2	3	4	_____	_____
15. Diabetes	1	2	3	4	Type 1 or Type 2	_____
16. Osteoporosis (bone disease)	1	2	3	4	_____	_____
17. Stroke	1	2	3	4	_____	_____
18. Blindness	1	2	3	4	_____	_____
19. Foot amputation	1	2	3	4	_____	_____
20. Infections needing treatment by a doctor	1	2	3	4	_____	_____
21. Impotence (only in men)	1	2	3	4	_____	_____
22. Kidney failure	1	2	3	4	_____	_____

23.	AIDS	1	2	3	4	_____	_____
-----	------	---	---	---	---	-------	-------

Environmental Health Risks

Below is a list of possible hazards or dangerous conditions in the environment around most of us.

For each one, please select the number below the words to tell us if your **own personal health** is at “almost no risk,” “slight risk,” “moderate risk” or “high risk” from each of the following hazards or conditions.

		Almost No Risk	Slight Risk	Moderate Risk	High Risk
24.	Medical X-rays (radiation)	1	2	3	4
25.	Violent crime	1	2	3	4
26.	Extreme weather (hot or cold)	1	2	3	4
27.	Driving/riding in an automobile	1	2	3	4
28.	“Street” drugs (illegal drugs)	1	2	3	4
29.	Air pollution	1	2	3	4
30.	Pesticides	1	2	3	4
31.	Household chemicals	1	2	3	4
32.	Cigarette smoke from people smoking around you	1	2	3	4

Risks of Getting Diabetes for People in the General Public

We would like you to **think about people in the general public** and NOT about your own personal risk of getting diabetes.

Select the number below the words that best describe your opinion about whether each item listed below *increases (or raises) the risk* of someone getting diabetes, *has no effect on the risk*, or *decreases (or lowers) the risk* of someone getting diabetes.

		Increases the risk	Has NO effect on risk	Decreases the risk	Don’t know
33.	Being Asian American	1	2	3	0
34.	Being Caucasian (White)	1	2	3	0
35.	Eating a healthy diet	1	2	3	0
36.	Being Black or African American	1	2	3	0

37.	Being Hispanic	1	2	3	0
38.	Have had diabetes during pregnancy	1	2	3	0
39.	Having a blood relative with diabetes	1	2	3	0
40.	Being 65 years of age or older	1	2	3	0
41.	Exercising regularly	1	2	3	0
42.	Being Native American	1	2	3	0
43.	Controlling weight gain	1	2	3	0

Appendix F: Miller Behavioral Style Scale

The following are descriptions of four situations and after each situation are statements that you may or may not do in each situation. Please mark **Yes** if you would do it or **No** if you wouldn't.

1. Vividly imagine that you are **afraid** of the dentist and have to get some dental work done. Which of the following would you do? Check **all** of the statements that might apply to you.

Yes ☐ No ☐ I would ask the dentist exactly what he was going to do.
Yes ☐ No ☐ I would take a tranquilizer or have a drink before going.
Yes ☐ No ☐ I would try to think about pleasant memories.
Yes ☐ No ☐ I would want the dentist to tell me when I would feel pain.
Yes ☐ No ☐ I would try to sleep.
Yes ☐ No ☐ I would watch all the dentist's movements and listen for the sound of his drill.
Yes ☐ No ☐ I would watch the flow of water from my mouth to see if it contained blood.
Yes ☐ No ☐ I would do mental puzzles in my mind.

2. Vividly imagine that you are being held hostage by a group of armed terrorists in a public building. Which of the following would you do? Check **all** the statements that might apply to you.

Yes ☐ No ☐ I would sit by myself and have as many daydreams and fantasies as I could.
Yes ☐ No ☐ I would stay alert and try to keep myself from falling asleep.
Yes ☐ No ☐ I would exchange life stories with the other hostages.
Yes ☐ No ☐ If there was a radio present, I would stay near it and listen to the updates about what the police were doing.
Yes ☐ No ☐ I would watch every movement of my captors and keep an eye on their weapons.
Yes ☐ No ☐ I would try to sleep as much as possible.
Yes ☐ No ☐ I would think about how nice it's going to be when I get home.
Yes ☐ No ☐ I would make sure I knew where every possible exit was.

3. Vividly imagine that, due to a large drop in sales, it is rumored that several people in your department at work will be laid off. Your supervisor has turned in an evaluation of your work for the past year. The decision about lay-offs has been made and will be announced in several days. Check **all** of the statements that might apply to you.

Yes ☐ No ☐ I would talk to my fellow workers to see if they knew anything about what the supervisor's evaluation of me said.
Yes ☐ No ☐ I would review the list of duties for my present job and try to figure out if I had fulfilled them all.
Yes ☐ No ☐ I would go to the movies to take my mind off things.
Yes ☐ No ☐ I would try to remember any arguments or disagreements I might have had with the supervisor that would have lowered his/her opinion of me.
Yes ☐ No ☐ I would push all thoughts of being laid off out of my mind.

Yes ☐ No ☐ I would tell my spouse that I'd rather not discuss my chances of being laid off.

Yes ☐ No ☐ I would try to think which employees in my department the supervisor might have thought had done the worst job.

Yes ☐ No ☐ I would continue doing my work as if nothing special was happening.

4. Vividly imagine that you are on an airplane, thirty minutes from your destination, when the plane unexpectedly goes into a deep dive and then suddenly levels off. After a short time, the pilot announces that nothing is wrong, although the rest of the ride may be rough. You, however, are not convinced that all is well. Check **all** of the statements that might apply to you.

Yes ☐ No ☐ I would carefully read the information provided about safety features in the plane and make sure I knew where the emergency exits were.

Yes ☐ No ☐ I would make small talk with the passenger beside me.

Yes ☐ No ☐ I would watch the end of the movie, even if I had seen it before.

Yes ☐ No ☐ I would call for the flight attendant and ask him/her exactly what the problem was.

Yes ☐ No ☐ I would order a drink or tranquilizer from the flight attendant.

Yes ☐ No ☐ I would listen carefully to the engines for unusual noises and would watch the crew to see if their behavior was out of the ordinary.

Yes ☐ No ☐ I would talk to the passenger beside me about what might be wrong.

Yes ☐ No ☐ I would settle down and read a book or magazine or write an email.

Appendix G: List of Health Services

Stress Management	Child Crisis Center 2100 N. Stevens El Paso, TX 79930 (915) 562-7955	Child Guidance Center Main Clinic 2701 East Yandell El Paso, Texas 79903 (915) 562-1999 Ysleta Clinic 9001 Cashew, Suite 300 El Paso, Texas 79907
Weight Management	El Paso Diabetes Association 1220 Montana Ave. El Paso, TX 79902 (915) 532-6280	YMCA El Paso 808 Montana El Paso, TX 79902 (915) 533-3941
Tobacco Cessation	Clinica San Vicente Alameda Clinic 8061 Alameda Ave. El Paso, TX 79915 Phone: (915) 859-7545	San Elizario Clinic 13017 Perico Rd. San Elizario, TX 79849 Phone: (915) 851-0999
Family Planning	UMC Woman's Health Center 4824 Alberta Ave, Suite 403 El Paso, TX 79905 (915) 532-5454	Sierra Teen Health Resource Center North East: (915) 755-8336 Central: (915) 532-8336 East: (915) 855-8336

Appendix H: Rules for Coders

- First, words or phrases that are considered health-promoting, health-threatening, neutral, or unclear will be entered into separate columns from the participants Tweet.
- Every *word* or *phrase* in each Tweet will be coded by typing it in either a health-promoting, health-threatening, neutral, or article (e.g., a, the) column and then counted. For example, “exercise” would be counted as a health-promoting word and “drink water” would be counted as one utterance. Words or phrases will only be entered once across column (i.e., a word cannot be in the negative and neutral columns). Words will be separated by semi-colons in the columns. Then each column will be counted for each participant. The columns are health threatening, health promoting, Neutral, and Unintelligible.
- Punctuation will also be coded after its respective word for emphasis including the exact number of punctuation given (exclamation points, question marks, and hashtags). However, periods, commas, and semi-colons will be ignored.
- If a word is unintelligible then it will be entered into the Unintelligible column. If the word is incomplete it will be placed where you think the participant was trying to express.
- Some pairs of words or phrases will need to be coded together and put in the same column to maintain valence (e.g. not bad). Words that show emphasis as part of a word phrase (e.g. should, might, definitely, very, somewhat, etc.) will be coded in the same column.

- Finally, the overall message frame will be coded for each tweet in a column labeled “Overall.” Tweets will be coded based on the following Likert scale from -3 to 3, with -3 being the most health-threatening and 3 being most health-promoting.
- Thoughts that are expression of everyday language are coded together.
- The numbers of diabetes cost and prevalence are to be coded as neutral unless there is emphasis such as an exclamation point or all caps that suggest a deeper meaning.
- Discuss and agree on matches and ratings every thirty Tweets.

Vita

Katherine Marie Aguirre was born in El Paso, Texas. She entered The University of Texas at Austin (UT) in Fall 2005 to pursue a bachelor's degree in Human Biology. She worked for the Executive Vice President and Provost of UT from February 2007 to May 2010 as a Student Associate. She received her Bachelor's of Science in Human Biology during Spring 2010. During Summer 2010, she completed UT's inaugural Health Information Technology and Health Information Exchange Certificate Program. In Fall 2013, she was awarded a Master's of Arts in Clinical Psychology at The University of Texas at El Paso (UTEP.) She has conducted poster and panel presentations for conferences held by the National Institute for Minority Health and Health Disparities (NIMHD), the Society of Behavioral Medicine (SBM), the Society for Prevention Research (SPR), and Research Society on Alcoholism (RSA). She will graduate with her doctorate in Health Psychology in Fall 2017. She is currently a teaching assistant in the UTEP Psychology Department.

Contact Information: kmaguirre525@gmail.com

This dissertation was typed by Katherine Aguirre.