Interactive optimism: a mediator and moderator model for understanding coping

Stephanie Lane Fowler

Follow this and additional works at: http://utdr.utoledo.edu/theses-dissertations

Recommended Citation
Fowler, Stephanie Lane, "Interactive optimism: a mediator and moderator model for understanding coping" (2010). Theses and Dissertations. 838.
http://utdr.utoledo.edu/theses-dissertations/838

This Thesis is brought to you for free and open access by The University of Toledo Digital Repository. It has been accepted for inclusion in Theses and Dissertations by an authorized administrator of The University of Toledo Digital Repository. For more information, please see the repository's About page.
A Thesis

entitled

Interactive Optimism: A Mediator and Moderator Model for Understanding Coping

by

Stephanie Lane Fowler

Submitted to the Graduate Faculty as partial fulfillment of the
requirements for the Master of Arts in Psychology

Dr. Andrew L. Geers, Committee Chair

Dr. John D. Jasper, Committee Chair

Dr. Kamala London, Committee Chair

Dr. Noah Lott, Dean
College of Graduate Studies

The University of Toledo

May 2010
Although the optimism literature diverges in its prediction of coping responses, recent research indicates that dispositional optimism and domain-specific optimism can interact to predict reactions to health threats. Specifically, individuals scoring high in dispositional optimism and low in domain-specific optimism appear to be the most responsive to health threats, whereas those scoring high in both forms of optimists appear to be the least responsive. Currently, only one study has examined the circumstances under which this interactive effect occurs. Furthermore, no study has examined the mechanisms underlying this interactive effect. For the present investigation, threat distance was examined as a moderating variable. Further, level of information processing was proposed as a mediating variable. In a Pilot Study ($N = 64$), participants read about a looming threat or a distant threat and completed two measures capturing level of
information processing. Preliminary evidence supported the notion that dispositional and domain-specific optimism interact to predict level of information processing in the face of a looming (but not distant) threat. For the Main Study ($N = 153$), the procedure was nearly identical with the inclusion of three diverse measures of coping. Unlike the Pilot Study, level of information processing was not predicted by the optimism measures in the Main Study. The predicted three-way interaction was revealed on one of the coping measures (i.e., minimization). Specifically, both forms of optimism combine to predict the minimization of a threat when participants faced a looming threat. The other two coping measures did not yield this same effect. Future directions and limitations are discussed.
2.2.2 Domain-Specific Optimism

2.3 Procedure

2.3.1 Threat Manipulation

2.4 Dependent Measures

2.4.1 Level of Information Processing

3 Results

3.1 Optimism Scales

3.2 Level of Information Processing

3.3 Behavior Identification Form

3.4 Categorization Task

4 Discussion

5 Main Study

5.2 Participants and Design

5.3 Level of Information Processing

5.4 Coping Measures

5.4.1 Minimization

5.4.2 Attention to Additional Information

5.4.3 Memory for Additional Information

6 Results

6.2 Optimism Scales

6.3 Level of Information Processing

6.4 Minimization

6.5 Reading Times for Dental Information
6.6 Memory for Dental Information .................................................. 34

6.7 Mediation .............................................................................. 35

7 General Discussion .................................................................. 36

7.2 Behavior Identification Form Results for Pilot and Main Study .... 37

7.3 Coping Measure Results ....................................................... 38

7.4 Explanations for Non-significant Findings ............................... 40

7.5 Explanation for Discrepant Results among Coping Measures ....... 42

7.6 Summary and Conclusions .................................................... 43

8 References ............................................................................. 46

9 Appendix A ............................................................................. 59

10 Appendix B ........................................................................... 61

11 Appendix C ........................................................................... 63

12 Appendix D ........................................................................... 64

13 Appendix E ........................................................................... 65

14 Appendix F ........................................................................... 68

15 Appendix G ........................................................................... 69

16 Appendix H ........................................................................... 72
List of Figures

3-1 Predicted values for the category belongingness index in the looming threat condition and distant threat condition as a function of dispositional optimism and dental-specific optimism. .........................................................53

3-2 Predicted values for the Behavioral Identification Scale in the looming threat condition and distant threat condition as a function of dispositional optimism and dental-specific optimism. .........................................................54

6-1 Predicted values for the Behavioral Identification Form in the looming threat condition and distant threat condition as a function of dispositional optimism and dental-specific optimism. .........................................................55

6-2 Predicted values for the minimization index in the looming threat condition and distant threat condition as a function of dispositional optimism and dental-specific optimism. .................................................................56

6-3 Predicted values for the dental reading time scores in the looming threat condition and distant threat condition as a function of dispositional optimism and dental-specific optimism. .................................................................57

6-4 Predicted values for the number of correct dental memory items in the looming threat condition and distant threat condition as a function of dispositional optimism and dental-specific optimism. .................................................................58
Introduction

The psychological literature is replete with theories and studies attesting to the important role of expectations for proper human functioning (for a review, see Olson, Roese, & Zanna, 1996). In the realm of social and personality psychology in particular, expectations are often viewed as an extremely valuable determinant of thought, emotion, and behavior. Expectations are not all the same, however, as they differ in many ways, such as in the level of certainty by which they are held (Geers, Wellman, & Fowler, 2009). One characteristic of expectations—the positivity or negativity of the belief—has received a great deal of discussion in the psychological literature (for reviews, see Armor & Taylor, 1998; Chang, 2001; Kirsch, 1999). One question often asked about the importance of the valence of expectancies is: Do positive expectations always lead to good outcomes? Not surprisingly, researchers have divergent thoughts on this point. On one hand, positive—or optimistic—expectations are said to provide individuals with confidence that engaging goals and dealing with problems ultimately results in superior outcomes. Consequently, positive expectations may lead people to pursue goals and persist in the face of obstacles impeding goal pursuit (Carver & Scheier, 2002). On the other hand, optimistic expectations are said to lead to negative outcomes as they can reduce the detection of, or the value assigned to, a risk (Tennen & Affleck, 1987; Weinstein & Lyon, 1999). If people do not feel at risk (Loewenstein, Weber, Hsee, &
Welch, 2001), then they will not engage in the necessary behaviors for securing positive outcomes.

One reason these divergent views have arisen in the literature is that optimistic expectancies have been measured and conceptualized in different ways. Because several forms of optimism have been identified, discrepant conclusions have been drawn from the literature on optimism and coping with health threats. Below, I describe two prominent views of optimism and then discuss how these two conceptualizations relate.

**Dispositional Optimism**

Dispositional optimism refers to a generalized positive outcome expectancy (Scheier & Carver, 1985). People high in dispositional optimism thus have a chronic tendency to believe that future events and actions will yield positive outcomes. Much of the data gathered concerning dispositional optimism has been generated by Scheier and Carver’s behavioral self-regulation model (Carver & Scheier, 1981; 1998; 2000). According to this model, when a desired goal becomes blocked, individuals assess their probability of successfully overcoming this obstruction. Because optimists believe that attaining their goal is highly likely, they will continue to strive toward that goal, even when they encounter obstacles. Pessimists, on the other hand, do not possess a generalized positive outcome expectancy. Instead, these individuals have a chronic tendency to believe that if something can go wrong with a future event, then it will (Scheier & Carver, 1985). Pessimists do not expect to overcome threats and challenges. Subsequently, when faced with an obstacle, pessimists are more likely to give up or disengage from goal pursuit.
Consistent with the tenants of the behavioral self-regulation model, optimistic and pessimistic orientations have been found to be associated with divergent coping strategies. In terms of coping with threats and challenges, optimists tend to adopt approach styles of coping whereas pessimists tend to adopt avoidant styles of coping (Carver & Scheier, 2002; Scheier & Carver, 1993). Approach coping refers to the engagement of behavioral, emotional, or cognitive efforts to actively handle, minimize, or eliminate demands produced by a threat whereas avoidant coping refers to a lack of engagement of these efforts (Suls & Fletcher, 1985). In particular, hundreds of studies demonstrate a positive relationship between dispositional optimism and the active engagement of health problems (i.e., approach coping) as well as the attainment of positive health outcomes (see Solberg-Nes & Segerstrom, 2006 for a review). For example, optimism was found to be positively related with problem-focused coping, positive reinterpretation of a stressor, and inversely related to distancing and denial (Scheier, Weintraub, & Carver, 1986). This relationship between dispositional optimism and active coping has also been found in a wide range of samples including breast cancer patients, HIV patients, Alzheimer’s patients, and coronary artery bypass patients (for reviews, see Carver & Scheier, 2002; Scheier, Carver, & Bridges, 2001 for a review).

Research examining dispositional optimism and coping are in-line with the behavioral self-regulation model (Carver & Scheier, 1998) and support the position that positive expectations for future events can lead to engagement and persistence of a goal in the face of threat. Although the studies described above indicate that generalized positive expectations lead to such active coping, a different picture emerges when researchers examine more domain-specific positive expectations.
Domain-Specific Optimism

Another line of research on optimism focuses on perception of risk. Researchers have assessed perceived risk by asking individuals to rate their chances of experiencing either positive or negative event outcomes in the future. These estimations of future risk may involve comparison to similar others or may focus solely on the self. These more particular expectations can broadly be categorized as measures of domain-specific optimism (Klein & Zajac, 2008). The frequently reported tendency for individuals to underestimate their chances of experiencing an aversive event (e.g., car accident) and to overestimate their chances of experiencing a positive event (e.g., winning the lottery) is referred to as the optimistic bias (Chambers & Windschitl, 2004; Weinstein, 1980; Weinstein & Klein, 1996). This tendency for individuals to overestimate their invulnerability to aversive future events is quite robust (see, Burger & Burns, 1988; Helweg-Larsen & Sheppard, 2001; Klein & Weinstein, 1997; Weinstein, 1980, 1984, 1987), although the strength of the effect varies.

As with dispositional optimism, the relationship between domain-specific optimism and coping has been examined. Since domain-specific optimism indicates a belief that one is at low risk for aversive events, possessing this form of optimism may lead individuals to adopt avoidant styles of coping (c.f. Aspinwall & Brunhart, 1996). For example, in one study, hepatitis C patients who were overly optimistic about their ability to cope with treatment-related side-effects were less prepared for treatment and more likely to discontinue treatment (Treloar & Hopwood, 2008). In another study, researchers found that participants who were high in this form of optimism about their chances of contracting sexually transmitted diseases were more likely to avoid risk-
related information and were less interested in learning more about contraception than were participants low in domain-specific optimistic (Wiebe & Black, 1997). The findings of these studies, and others like them, lead to the notion that high levels of domain-specific optimism can lead to avoidant styles of coping (for a review see Klein & Steers-Wentzell, 2007).

Differences Between Dispositional and Domain-Specific Optimism

As the databases on dispositional and domain-specific optimism have grown, researchers began to consider the relationship between these constructs. Prior research measuring both dispositional and domain-specific optimism supports the view that these two forms of optimism are separate constructs. First, measures of these forms of optimism demonstrate weak and often nonsignificant correlations and in factor analyses the scale items tend to load on different factors (e.g., Davidson & Prkachin, 1997; Fournier, De Ridder, & Bensing, 1999; Geers, 2000; Geers, Wellman, & Fowler, 2009; Radcliffe & Klein, 2002). Second, many studies indicate that these forms of optimism differ in their predictive ability (e.g., Fournier, De Ridder, & Bensing, 1999).

There are undoubtedly many reasons why measures of dispositional and domain-specific optimism relate differently to outcome variables (e.g., the measures differ in their level of event specificity). Importantly, these measures appear to relate to different parts of the threat appraisal process (Geers et al., 2009). According to Geers et al. (2009) assessing one’s relative likelihood for risk (i.e., domain-specific optimism) should relate more to a primary threat-appraisal stage in which individuals scan the environment to determine if a threat is present. Individuals high in domain-specific optimism see themselves as not at risk for experiencing negative outcomes, thereby concluding an
absence of (or minimal) threat in the environment. On the other hand, believing that, in
general, future events will yield positive outcomes may be more closely tied to a
secondary threat-appraisal stage by which individuals assess their resources and abilities
for attaining favorable outcomes. Dispositional optimists, in the face of threat, continue
to pursue goal-directed behavior because they believe they possess the resources to
overcome this threat. The notion that dispositional optimism is less relevant for primary
threat-appraisals than it is for effort mobilization is consistent with prior data on
optimism and the threat-appraisal process. Specifically, Chang (1998) found that
optimists and pessimists differ in the secondary appraisal but not primary appraisal of a
stressor.

Interactive Effects of Dispositional and Domain-Specific Optimism

The research discussed above has lead several researchers to conclude that
dispositional and domain-specific optimism measures tap into different underlying
constructs and involve separate stages of the threat-appraisal process (Davidson &
Prkachin, 1997; Geers et al., 2009). It has further been suggested that these two forms of
optimism may interact in predicting which styles of coping people will adopt. Consistent
with this supposition, Davidson and Prkachin (1997) found that participants high in both
of these forms of optimism showed a decrease in exercise relative to participants high in
dispositional optimism but low in domain-specific optimism (Study 1). In a second study
(Davidson & Prkachin, 1997; Study 2), participants attended a lecture on coronary heart
disease (CHD) and afterward, their memory for this information was assessed.
Participants high in both forms of optimism were more likely to avoid risk information
related to CHD and remember less about CHD relative to participants high in
dispositional optimism but low in domain-specific optimism. Based on these findings, Davidson and Prkachin (1997) suggested that domain-specific optimism serves as a gateway variable such that high domain-specific optimism can short-circuit the usual active coping displayed by individuals high in dispositional optimism.

More recently, Geers et al. (2009) found a similar pattern of results of dispositional and domain-specific optimism on coping. Specifically, in three different studies, individuals high in both forms of optimism reported less interest in and weaker behavioral intentions to gain more information about a threat. Whereas two of these studies focused on dental health problems, one focused on global warming as the threat. Taken together, the findings from the work of Davidson and Prkachin (1997) and Geers et al. (2009) suggests an interactive effect between dispositional and domain-specific optimism, with individuals high in both forms of optimism evidencing more avoidant coping strategies than individuals high in dispositional optimism and low in domain-specific optimism.

*Threat as a moderator.* Although the aforementioned studies reveal dispositional and domain-specific optimism to interact in predicting coping, at least one attempt at replication has not proven successful (Radcliffe & Klein, 2002). Consequently, it would be valuable for researchers to identify the circumstances under which this interaction will take place. As such, the present research will examine the potential moderating influence of threat.

As the literature suggests, health threats seem to moderate the relationship between dispositional optimism and coping (Geers, Wellman, & Lassiter, in press). For example, Geers et al. (2009) found that threat moderated the relationship between the
interactive effects of dispositional and domain-specific optimism on coping. Specifically, in the threat condition, participants high in dispositional optimism but low in domain-specific optimism sought additional information about a health threat whereas there was no interaction between types of optimism in the no-threat condition. These results indicate that there are certain circumstances under which optimism will interact to predict coping. This idea is supported theoretically by Carver and Scheier’s (1998) model of self-regulation in which dispositional optimism is not expected to increase goal-directed behavior similarly under all circumstances. Instead, only when it is clear that an obstacle to goal pursuit exists should dispositional optimism enhance goal-directed behavior (Carver & Scheier, 2002).

*Threat distance.* The studies by Geers et al. (2009) are the only ones to have examined the possibility that threat moderates the interactive effect of dispositional and domain-specific optimism. As such, the present set of studies will provide further data on this issue. Unlike the Geers et al. (2009) study in which presence of a threat (i.e., threat versus no threat) was examined, the current investigation will focus on threat distance (i.e., looming threat versus distal threat). More specifically, threats can either be looming, in which an aversive or harmful stimuli is of immediate presence, or, threats can be distal, in which an aversive or harmful stimuli is of remote presence. For example, knowing that one must suffer a root canal tomorrow is a looming threat whereas knowing that one will suffer a year from now is a distal threat. When people detect looming threats in their environment, they perceive immediate danger. Once an immediate threat is acknowledged, people can either engage it or ignore it (i.e., approach versus avoidant coping). However, there is no need to cope if threats are in distant future. Taken together,
it is predicted that the interactive influence of optimism on coping styles will most likely emerge when there is a looming threat (as opposed to a distal threat) in the environment.

**Level of information processing as a mediator.** To date, no data are available to clarify the psychological mechanisms underlying this optimism interaction on coping. In an attempt to fill this gap, the present study will test for mediation. Mediation differs from moderation in that the former explains the underlying mechanisms of an effect (Baron & Kenny, 1986). That is, mediation illustrates why a certain phenomenon occurs. Moderating variables, on the other hand, change either the strength or direction of a relationship between two variables.

The above notion of threat distance as a moderator brings forward a potential mediator---construal of a threat. That is, threat distance (i.e., looming or distal) may influence the way people construe or process information about that threat. This prediction is based on construal level theory (Liberman & Trope, 1998; Trope & Liberman, 2000; 2003). According to construal level theory, increased psychological distance from a future event leads to an increase in level of abstraction. In other words, when people feel psychologically distant from an event, they tend to process information abstractly whereas when people feel psychologically close to an event, they tend to process information concretely (i.e., concrete construals; Trope & Liberman, 2000; 2003).

Abstract levels of information processing involve extracting the gist of a situation (Nussbaum, Liberman, & Trope, 2006; Smith, Trope, & Liberman, 2006; Trope & Liberman, 2000; 2003). The gist represents what is above and beyond the exact details of an event, making it a meaningful representation. For example, if person A hears that
person B plays guitar five times a week, is registered for battle of the bands, and spent $500 on recording equipment, and then infers that person B is musical, person A has engaged in abstract processing. More specifically, because abstract processing involves extracting the gist, it entails focusing on the important, central aspects of the event.

Concrete levels of construal, on the other hand, involve extracting the details of a situation (Nussbaum, Liberman, & Trope, 2006; Trope & Liberman, 2000; 2003). Events construed at this level are complex, detailed, and contextualized. Because concrete levels of construal allow people to gather the details of an event rather than seeing the overall structure, it is difficult to integrate each piece of information into one coherent picture.

In terms of event or threat construals, evidence suggests that feeling psychologically distant from a future event influences people to process information at abstract levels of construal. There is also evidence showing that feeling psychologically close to an event influences people to process information at concrete levels of construal (e.g., Liberman, Sagristano, & Trope, 2002; Smith & Trope, 2006; Trope & Liberman, 2000; 2003). For example, in one study, participants were prompted to feel either psychologically distant or psychologically close to an event by imagining that event occurring either this weekend or next year. Specifically, participants imagined having a yard sale and were asked to organize and create different categories for each of the yard sale items (e.g., CD’s, toaster, shoes). When organizing the items, psychologically distant participants created fewer categories for the items and were less detailed about the item categories than were psychologically proximal participants indicating that psychological distance lead participants to construe event information in abstract ways whereas
psychological proximity lead participants to construe event information in concrete ways (Liberman, Sagristano, & Trope, 2002).

In addition to the above finding, Smith and Trope (2006) also showed that psychological distance as opposed to proximity leads to abstract levels of information processing. In Study 1, participants were primed with either psychological distance or psychological proximity and were then asked to rate the degree of belongingness of a series of exemplars to their respective categories. Some of the exemplars were highly representative of their categories whereas some exemplars were only moderately or weakly representative. For example, for the category furniture, couch is a highly representative exemplar whereas lamp and refrigerator are moderately and weakly representative exemplars. Psychologically distant participants were more likely to rate moderate and weak exemplars as representative of their categories than were psychologically proximate participants. That is, psychological distance lead participants to extract the gist of the exemplar features, including those that were moderately or weakly representative, and then rate those exemplars as being more inclusive to their categories than did psychologically proximate participants. Psychologically proximate participants did not, on the other hand, rate moderate or weak exemplars as inclusive because these participants were focused on the details of exemplar features. Thus, psychological distance lead to abstract levels of construal whereas psychological proximity lead to concrete levels of construal.

In a second study (Smith & Trope, 2006), participants were primed with either psychological distance or proximity. Next, participants were introduced to the Deese-Rodiger McDermott false recognition paradigm. For this task, participants are quickly
shown a list of words that are closely related to a particular concept. For example, bank, flow, and wind, are all related to the concept river. The list of words is removed and participants are asked to verify which words they saw on the list. The concept word, which is never presented on the list, is the critical lure for a false memory. Participants who report seeing the critical lure are remembering a false memory. In terms of level of construal, abstract levels of information processing lead to greater false memories because the critical lure is inclusive of the overall theme of the list. Thus, participants must extract the gist of how the list of words is related in order to report seeing the critical lure. Consistent with this logic, psychologically distant participants were more likely to verify false memories than were psychologically proximate participants.

In a third study (Smith & Trope, 2006), participants, again, were primed with psychological distance or proximity followed by viewing a series of actions (e.g., making a list). Participants could identify these actions at either low-level or high-level identifications (i.e., writing things down or getting organized). High-level identifications represent meaningful reasons for why an action occurs whereas low-level identifications represent the details for how to perform a particular action. For example, making a list could be identified as a means for getting organized or identified as simply writing things down. Thus, high-level identifications indicate abstract levels of construal whereas low-level identifications indicate concrete levels of construal. Results show that psychologically distant participants identified actions at higher-level (i.e., abstract) identifications than did psychologically proximate participants, thereby illustrating that psychological distance leads to abstract levels of construal. Taken together, these findings demonstrate that psychological distance leads to more abstract levels of information
processing whereas psychological proximity leads to more concrete levels of information processing.

*Psychological distance, optimism, and coping.* One reason why individuals high in both dispositional and domain-specific optimism may display avoidant styles of coping could be because they psychologically distance themselves from a threat. In terms of threat distance as a moderator, as the distance between these individuals and a threat grows smaller, the more inclined these individuals may feel to distance the threat. That is, individuals who believe that the future holds positive outcomes (i.e., dispositional optimism) and also do not see themselves at risk (i.e., domain-specific optimism) may feel more inclined than others to psychologically push away, or distance, a looming threat. If individuals psychologically distance themselves from an immediate threat, then they may process threat information in abstract ways. As stated above, abstract levels of information processing can lead people to focus on the gist of a situation rather than the details of an event. If threat features and details are not salient, then individuals are not equipped with the necessary information to approach or actively engage the threat; therefore, abstract levels of information processing may lead to avoidant coping. In other words, individuals high in both dispositional and domain-specific optimism may be more inclined than others to adopt avoidant coping strategies because they lack the necessary information (i.e., threat details) to actively engage a threat.

However, individuals high in dispositional optimism but low in domain-specific optimism may display active coping styles because they shift down to a concrete level of information processing once they perceive a looming threat. Because these individuals believe that the future holds positive outcomes (i.e., dispositional optimism), but
simultaneously acknowledge they may potentially be at risk (i.e., low domain-specific optimism), they may be more inclined than others to gather the necessary information and details to overcome a threat. If individuals shift to concrete levels of information processing in the face of a looming threat, then threat features and details become salient, thereby equipping these individuals with the necessary information to approach or actively engage the threat; therefore, concrete levels of information processing should lead to approach coping.

Based on the construal level theory research described above, it is proposed that the interactive effects found with dispositional and domain-specific optimism on coping is often mediated by construal level. Specifically, it is proposed that when dispositional optimists are faced with a looming threat—and they perceive themselves to be at risk (i.e., low domain-specific optimism)—they will shift toward processing the event at a concrete level. Consequently, these individuals (high dispositional optimists with low domain-specific optimism) are expected to focus on the details of the problem and actively attend to and cope with the threat. A different set of events are expected to unfold when dispositional optimists face a threat that they do not perceive themselves to be at risk for (i.e., when dispositional optimists also have high domain-specific optimism). As these individuals do not perceive themselves at risk, they are expected to use more abstract levels of thinking when considering a looming threat. As such, it is anticipated that they will not focus on the details of the threatening event and will use avoidant styles of coping.
Hypotheses

Combining the existing literatures on dispositional optimism, domain-specific optimism, and psychological distancing, yields the following hypotheses. First, it is predicted that dispositional and domain-specific optimism will combine to influence coping. This prediction is consistent the research described earlier by Davidson and Prkachin (1997) and by Geers et al. (2009). As was found by these researchers, it is anticipated that individuals high in both forms of optimism will be less active in coping with a threat than individuals high in dispositional optimism and low in domain-specific optimism. Importantly, however, this effect is expected to be moderated by threat distance. Specifically, participants high in both dispositional and domain-specific optimism will display avoidant coping relative to individuals high in both forms of optimism, only when a looming threat is present. That is, this interactive effect of optimism on coping is not predicted to emerge when participants are presented with a distal threat.

Additional predictions are made concerning the issue of mediation. Specifically, it is anticipated that level of information processing will mediate the relationship between the optimism interaction and coping during the presence of a looming threat. It is predicted that, when faced with a looming threat, individuals high in both dispositional and domain-specific optimism will process information at more abstract levels of construal, thereby leading to avoidant coping. On the other hand, it is expected that, when faced with a looming threat, individuals high in dispositional but low in domain-specific optimism will process information at a more concrete level of construal, thereby leading to approach coping. That is, high dispositional and domain-specific optimism will lead to
avoidant coping due to abstract levels of information processing whereas high dispositional but low domain-specific optimism will lead to approach coping due to concrete levels of information processing. Critically, this mediation effect is only expected to happen when individuals are faced with a looming threat.

Current Investigation. To test the above hypotheses in the present investigation, participants will report on their level of dispositional and domain-specific optimism in an initial prescreening session. Next, when in the lab, participants will be asked to read either a looming threat scenario or a distant threat scenario. Both scenarios depict a visit to the dentist in which an abscessed tooth is removed by a root canal. After participants read either scenario, level of information processing will be measured using both the Behavior Identification Form (Vallacher & Wegner, 1989) as well as a categorization task (Rosch, 1975). Finally, in the Main Study, coping will be measured and statistical mediation of construal level will be assessed.
Pilot Study

A Pilot Study was first conducted to test the viability of the proposed methods and to provide some initial data on the central hypotheses. Specifically the particular threat manipulation used in this study (i.e., looming threat versus distant threat) was tested to see if it would moderate the interactive effects for dispositional and domain-specific optimism on level of information processing. It was predicted that individuals high in both dispositional and domain-specific optimism would process information at more abstract levels of construal relative to individuals high in dispositional optimism but low in domain-specific optimism, but only when faced with a looming threat. Thus, the Pilot Study tested whether or not dispositional and domain-specific optimism would interact to predict level of information processing, therefore, no coping measures were included.

Participants and Design

Sixty-four introductory psychology students (44 females) participated in exchange for partial course credit ($M$ age = 18.56, $SD$ = 2.08). Participants were run in groups of up to three but performed on different computers separated by partitions. Participants were randomly assigned to a looming threat condition or a distant threat condition. Dispositional and domain-specific optimism scores were obtained during a pre-screening survey prior to the experimental session.

Measures

Dispositional Optimism: Life Orientation Test-Revised (LOT-R). The LOT-R (Scheier, Carver, & Bridges, 1994) was designed to assess generalized positive outcome
expectancies and served as a measure of dispositional optimism. The LOT-R contains a total of 10 items, four of which are filler items (see Appendix A). Items are rated on a five-point scale with endpoints labeled strongly disagree (0) and strongly agree (4). In order to calculate optimism scores, the three negatively worded items are reversed scored and averaged together with the positively worded items (in this sample, $M = 2.34$, $SD = .683$, $\alpha = .765$). An example of a positively worded item is, “Overall, I expect more good things to happen than bad.” An example of a negatively worded item is, “If something can go wrong for me, it will.” The LOT-R has been used successful to assess dispositional optimism in hundreds of prior studies (see Scheier, Carver, & Bridges, 2001 for a review).

**Domain-Specific Optimism.** The threat examined in this research is a visit to a dentist’s office. As such, domain-specific optimism was assessed within the domain of dental health. Seven questions were used to assess positive outcome expectancies in the domain of dental health (see Appendix B). These items were similar to the situation-specific optimism items created by Weinstein (1980) and were derived from dental-specific optimism items used previously by Geers et al. (2009). Four items assessed participants’ estimated likelihood of experiencing dental health problems relative to other university students of the same sex and age. An example item was, “Compared to other undergraduate students at the University of Toledo of the same sex and age as you, what do you think the chances are that you will have to have a decayed tooth extracted this year?” The remaining three items assessed participants’ estimated likelihood of experiencing a negative outcome without referencing similar others. An example item
was, “What is the chance that you will have a serious problem with your teeth sometime this month?”

Participants responded to all seven dental items using a ten-point scale with endpoints labeled 0%-10% and 90%-100%. This particular scale measured the percentile at which participants felt their outcomes would be distributed. For example, participants choosing the 0%-10% mark felt that the chance of experiencing a particular outcome was between the 0 and 10 percent for the entire distribution of percentages. Scores on all seven dental items were summed to create a dental-specific optimism score for each participant (in this sample, $M = 7.76$, $SD = 1.64$, $\alpha = .906$). All items were worded such that participants were rating the likelihood of experiencing a negative outcome. Therefore, all items were reversed scored so that higher scores on this scale indicate greater dental-specific optimism.

Procedure

Upon arrival, participants were greeted by a female experimenter and directed toward a computer on which the entire study was completed. Once participants received a brief overview of the study and completed a written informed consent, the remaining directions were provided on a computer monitor. The computer program used for this study was MediaLab (Jarvis, 2004).

Threat manipulation. Participants were randomly assigned to read either a looming threat scenario or a distant threat scenario. Participants were first instructed to clear their minds and vividly imagine the scenario as if it were taking place. For the looming threat scenario, participants were asked to imagine that, during their visit to the dentist tomorrow, the dentist will discover an abscessed tooth that will need to be
extracted by a root canal. For the distant threat scenario, participants were asked to image that, during their visit to the dentist *in a year*, the dentist will discover an abscessed tooth that will need to be extracted by a root canal. (see Appendix C for copies of the two scenarios). The scenarios consisted of 132 to 136 words, respectively. Differences in word count were due to the wording of the looming threat versus distant threat manipulation (i.e., *tomorrow* or *in a year*). At the end of the scenarios, participants were prompted to spend a minute thinking about the information they just read. Scenarios were presented for 45 seconds. Pilot testing revealed this was sufficient time for participants to read the scenario information.

**Dependent Measures**

*Level of information processing.* Next, participants completed both a categorization task (Rosch, 1975) as well as the Behavior Identification Form (Vallacher & Wegner, 1989) in order to determine their level of information processing (i.e., abstract versus concrete). These two measures assess how abstractly/concretely individuals are thinking and these measures have been employed in prior construal level research (Smith & Trope, 2006). The order in which participants completed these two measures was randomized.

For the categorization task (see Appendix D), participants were presented with a category title (e.g., *furniture*) followed by an exemplar of that category (e.g., *chair*). Participants indicated the degree of belongingness of each exemplar to its category. Participants responded using a 10-point scale with labels including, *definitely does not belong to the category* (1), *does not belong to the category, but is very similar to members of that category* (5), *does belong to category, but is not a good example of it* (6),
and definitely does belong to the category (10). There were a total of ten exemplars for each of the three categories (i.e., furniture, vehicle, and clothing). Each pair of category and exemplar was presented in random order. Because higher numbers on this scale indicate greater inclusion of exemplars to their categories, high scores on the categorization task indicate abstract information processing (in this sample, $M = .56$, $SD = .25$, $\alpha = .875$).

Exemplars were selected for this study based on their representativeness using Rosch’s (1975) belongingness index. This index provides the degree to which exemplars are highly, moderately, or poorly representative of their categories based on extensive pretesting of these materials. For each of the three categories (e.g., furniture) in this study, three out of ten category exemplars were highly representative (e.g., couch), four out of ten were moderately representative (e.g., lamp), and three out of ten were poorly representative (e.g., stove).

Participants also completed the 25-item Behavioral Identification Form (see Appendix E; Vallacher & Wegner, 1989). This scale provides participants with 25 different actions (i.e., behaviors) and participants are asked to identify each action at either high-level identifications or low-level identifications. Specifically, each action is followed by lower-level and higher-level identifications for which participants choose which alternative best identifies that action. For example, participants were presented with the action “making a list” and could identify that action as, “getting organized” (i.e., higher-level identification) or “writing things down” (i.e., lower-level identification). Lower-level action identifications are consistent with concrete levels of information processing whereas higher-level action identifications are consistent with abstract levels.
of information processing (Trope & Smith, 2006; Vallacher & Wegner, 1989). Higher scores on the Behavioral Identification Form thus reflected more abstract action identifications (in this sample, \( M = 1.58, SD = .22, \alpha = .847 \)). Finally, after completing the above measures, participants were given a chance to ask questions about the study, thanked for their time, and dismissed.
Results

*Optimism scales.* First, LOT-R scores and dental-specific optimism scores were correlated. Consistent with prior studies measuring both dispositional and situation-specific forms of optimism, these scales were not strongly associated, $r = .145, p = .274$ (e.g., Davidson & Prkachin, 1997; Geers, 2000; Radcliffe & Klein, 2002). Participants’ LOT-R scores and dental-specific optimism scores were compared between the two experimental conditions. There were no differences between conditions for scores on these two scales, $t < 1.3, p > .17$.

*Level of information processing.* For the level of information processing measures, two separate hierarchical linear regressions were run to test the primary hypothesis. More specifically, because scores on both of these abstraction measures only yielded a weak and non-significant correlation ($r = .08, p = .29$), each measure was analyzed separately instead of standardizing the scores and combining across measures.

*Behavior Identification Form.* For the first hierarchical linear regression, threat condition (dummy coded), dispositional optimism (standardized), and dental-related optimism (standardized) were entered in the first step of the equation as predictor variables. On the second step, all two-way interaction terms were entered. On the third step, the three-way interaction term was entered. Scores on the Behavior Identification Form (BIF: Vallacher & Wegner, 1989) were first submitted as the criterion variable. No significant main effects or two-way interactions emerged from this analysis. However,
the regression analysis revealed a marginally significant three-way interaction between dental condition, dispositional optimism, and dental-related optimism, $\beta = .403$, $t(59) = 1.720$, $p = .091$. A plot of the regression lines derived from this analysis are plotted in Figure 1. To clarify this three-way interaction and directly assess the primary prediction, simple slope tests were conducted following the procedures outlined by Akin and West (1991), with comparisons made at +1 and -1 standard deviations from the mean on the two continuous predictor variables. As anticipated, when centered high in dispositional optimism, BIF scores increased as dental-specific optimism increased--- but only in the looming threat condition, $\beta = .562$, $p = .045$. Also, as anticipated, this simple slopes analysis did not yield any significant differences in the distant threat condition when comparing dispositional optimists who were high or low in dental-specific optimism, $\beta < .135$, $p > .19$

*Categoryization task.* For the second hierarchical linear regression, predictor variables were entered into each step of the regression equation the same way as in the previous analysis. Scores on the categorization task (Rosch, 1975) were submitted as the criterion variable. No main effects or two-way interactions emerged from this analysis. However, there was a marginally significant three-way interaction between dental-threat manipulation, dispositional optimism, and dental-related optimism, $\beta = .454$, $t(59) = 1.972$, $p = .054$. As with the above finding, threat condition, dispositional optimism, and dental-related optimism combined to predict level of information processing (see Figure 2). Again, to clarify this three-way interaction and directly test the main prediction, simple slope tests were conducted. In the looming threat condition, when centered high on dispositional optimism, dental-specific optimism scores displayed a marginally
significant positive association with categorization task scores, $\beta = .521, p = .064$. Also, as expected, this relationship did not manifest within the distant threat condition when comparing dispositional optimists who were high versus low in dental-specific optimism, $\beta < .225, p > .14$. 
Discussion

It was hypothesized that participants would processes information differently when faced with a looming threat as opposed to a distant threat. This difference in information processing would be due to a combination of both dispositional and dental-specific optimism such that individuals high in both types of optimism, when faced with a looming threat, would process information at more abstract levels relative to individuals high in dispositional but low in dental-specific optimism. Although somewhat weak, the results of the Pilot Study are generally consistent with these predictions. More specifically, in the looming threat condition, participants high in both dispositional and dental-specific optimism processed information more abstractly than participants high in dispositional but low in dental-specific optimism. There were no differences in levels of information processing for participants in the distant threat condition.

Importantly, the anticipated shifts in information processing were revealed with the threat scenarios and construal level measures distributed in the Pilot Study. These results support the viability of the threat manipulation to evoke the necessary changes as well as the sensitivity of the dependent measures to capture these changes. Consequently, these scenarios as well as the dependent measures will be used for the Main Study.
Main Study

The Main Study relied on an almost identical methodology as was employed in the Pilot Study. The primary difference was the inclusion of three coping measures to the end of the study. The addition of these coping measures provided an opportunity to test the current predictions that the interactive effects of optimism influences coping and that construal level mediates this effect. Specifically, the three coping measures include the degree to which participants minimize or trivialize a dental health threat, the amount of time participants spend reading dental health information, and participants’ memory for this dental health information.

It is predicted that, when faced with a looming threat, participants high in both forms of optimism will be more likely minimize a dental health threat, spend less time reading about dental health information, and have less memory for dental health information, relative to participants high in dispositional optimism but low in dental-specific optimism. Finally, it is expected that level of information processing will mediate the interactive effects of dispositional optimism, dental-specific optimism, and threat condition on each of the coping measures.

Participants and Design. A total of 153 participants (92 female) were recruited for the Main Study in exchange for partial course credit ($M = 20.47, SD = 5.51$). However, four participants did not complete the domain-specific optimism scale during the pre-screen and five participants’ data was not recorded by MediaLab due to a malfunction with the program leaving a total of 144 participants in this sample.
Participants were run in groups of up to three and were randomly assigned to read either a looming threat scenario or a distant threat scenario. As with the Pilot Study, dispositional optimism scores (in this sample $M = 2.24, SD = 0.71, \alpha = .780$) and domain-specific optimism scores (in this sample $M = 8.41, SD = 1.77, \alpha = .885$) were obtained during a pre-screening survey prior to the experimental session. The methodology prior to the administration of the coping measures was identical to that of the Pilot Study with the exception of participants completing only one measure of information processing level.

**Level of information processing.** Unlike the Pilot Study in which participants completed two measures of information processing, participants only completed the 25-item Behavior Identification Form (Vallacher & Wegner, 1989) in which they identified an action as either a low-level identification or high-level identification. Because the categorization task is overly lengthy, spending too much time on this task could reduce the effect that the threat manipulation has on the subsequent coping measures. The Behavior Identification Form used in this study was identical to the one used in the Pilot Study. A composite score was again created by summing and averaging responses to all 25 items. Scores ranged from 1 to 2 (in this sample $M = 1.56, SD = 0.23, \alpha = .864$).

**Coping measures**

Participants next completed a variety of coping measures designed to assess behavioral coping. Specifically, participants completed a minimization measure, were given an opportunity attend to information related to dental health and diabetes, and were asked a series of questions pertaining to this health information.

**Minimization.** Participants responded to two items designed to capture minimization (see Appendix F; Jemmott, Ditto, & Croyle, 1986). As noted previously,
minimization is a type of avoidant coping strategy in which people appraise a threat as
less serious than do others not affected by that threat (Lazarus, 1983; Lipowski, 1970).
For example, participants in the present study were asked “How much of a threat to
health is a bacterial tooth infection?” For the second minimization questions, participants
were asked “How important is it to treat a bacterial tooth infection?” Participants
responded to both items using a ten-point scale with endpoints labeled not at all a
threat/important (1) and very much a threat/important (10). Because these two items
yielded the same pattern of results when analyzed separately, a minimization composite
score was created by summing and averaging the items ($r = .52, p < .01, M = 2.93, SD =
1.65$). Both items were reversed scored so that higher scores reflect greater minimization.

Attention to additional information. Participants were next presented with two
sets of information passages. The first set consisted of three passages concerning dental
health and the second set consisted of three passages concerning diabetes. The set of
dental hygiene passages totaled 440 words and the set of diabetes passages totaled 432
words. Thus, either dental hygiene information or diabetes information was presented in
each of the six passages. For example, one of the dental passages was titled “Dental
Health Maintenance” which explains the necessary behaviors for promoting good dental
hygiene. Titles for the other two dental passages were “Toothbrush Technology” and “An
Easier Way to Floss.” For the diabetes passages, one of the passages was titled
“Monitoring Sugar Levels” which explains the instrument used for monitoring blood
sugar and how this instrument affects health. Titles for the other two diabetes passages
were “Types of Diabetes” and “Preventing Diabetes.” Passages were presented one at a
time in random order. Thus, participants saw six passages of information, separately, and
were not limited as to how long participants spent time reading each passage (see Appendix G).

In order to capture behavioral coping responses, amount of reading time for each passage was measured. Reading time is operationalized as a behavioral indicator of approach coping, with longer reading time taken as a measure of greater approach coping. This coping measure is very similar to the measure used successfully in a prior study on optimism and responses to threats (Aspinwall & Brunhart, 1996). Reading times were averaged across the three dental passages to create a dental reading time composite score (in this sample, $M = 38.78$ sec, $SD = 17.53$, $\alpha = .884$).

*Memory for additional information.* As with reading time, memory is operationalized as a behavioral measure of approach coping, with greater memory as evidence of greater approach coping. Participants’ memory for the information in the passages was measured using two different types of recognition questions. Specifically, these recognition questions were comprised of both multiple choice questions in which participants had four answers to choose from and true/false questions in which participants had to identify whether or not they read certain passage information (see Appendix H). More specifically, there were four recognition questions per passage—two multiple choice and two true/false questions—for each of the three dental (diabetes) passages, making a total of twelve recognition questions per set of information (i.e., dental health or diabetes). In addition, it should also be noted that because the true/false items and multiple choice items produced similar patterns when analyzed separately compared to when analyzed together, answers for both types of recognition items were summed and averaged making only one composite score for memory ($r = .574$, $p < .01$, $\alpha = .884$).
The composite score ranged could have potentially ranged from 0 to 12 with higher scores reflecting more correct answers for the presented dental health information. Specifically, for this sample, scores on this measure actually ranged from 3 to 12.

Next, participants answered two manipulation check items (see Appendix I). Participants were asked to think back to the scenario they read at the beginning of the study. Specifically, the first manipulation check item asked “When was the scenario supposed to take place?”, followed by “a. in a year”, “b. tomorrow”, “c. did not say”. For the second manipulation check item, participants were asked, “Where was the scenario to take place?” followed by “a. orthopedic appointment”, “b. dentist appointment”, “c. nutritionist appointment”. Two participants incorrectly answered the first manipulation check item and four participants incorrectly answered the second. However, as the results did not change when we removed the participants who answered these items incorrectly, we opted to include all participants in our data analyses.

After completion of the manipulation check items, participants were then provided information debriefing them on the nature of the study and were then given an opportunity to ask questions. Finally, they were thanked for their time and dismissed.
Results

Optimism scales. First, a correlational analysis was conducted to determine the strength of association between LOT-R scores and dental-specific optimism scores. Consistent with prior research measuring both forms of optimism, scores on these scales were weakly associated with one another, $r = .154$, $p > .075$ (e.g., Geers, 2000; Radcliffe & Klein, 2002). Additionally, scores on the LOT-R and dental-specific optimism scales were compared between the two threat conditions. There were no differences between the threat conditions for scores on either scale, $t < .20$, $p > .81$.

Level of information processing. To determine if both types of optimism interacted to predict level of information processing within the looming threat condition, a hierarchical linear regression was conducted. Threat condition (dummy coded), dispositional optimism (standardized), and dental-specific optimism (standardized) were entered in the first step of the equation as predictor variables. On the second step, all two-way interaction terms were entered. On the third step, the three-way interaction term was entered. Scores on the Behavior Identification Form (Vallacher & Wegner, 1989) were submitted as the criterion variable. Contrary to prediction, this analysis did not yield any significant effects, $\beta < .128$, $p > .26$ (see Figure 3). Next, in order to directly test the precise prediction—that high dispositional and high dental-specific optimists will lead to construing threat information in abstract ways only when a looming threat is present—a simple slopes analysis was conducted (Rosenthal & Rosnow, 1991). Again, following the guidelines of Akin and West (1991), comparisons were made at +1 and -1 standard
deviations from the mean on the continuous predictor variables. The primary simple slopes test did not reveal a significant difference for high dispositional optimists who were either high versus low in dental-specific optimism in the looming threat condition, $\beta < .290, p > .26$. The same simple slopes test was conducted within the distant threat condition and emerged as non-significant, $\beta < .234, p > .30$.

Minimization. To examine the minimization data, scores on the minimization index were submitted to the same hierarchical linear regression analysis used to analyze the level of information processing data. This analysis yielded a main effect for dispositional optimism such that lower dispositional optimism scores reflect greater propensity to minimize the dental threat, $\beta = -.384, t (142) = -2.59, p = .011$. This main effect was qualified by two two-way interactions. For the first two-way interaction, dispositional optimism and dental-related optimism combined to predict minimization composite scores, $\beta = .445, t (143) = 3.07, p = .003$, and for the second two-way interaction, dispositional optimism and threat condition combined to predict minimization composite scores, $\beta = .329, t (143) = 2.40, p = .018$. Additionally, the three-way interaction between dispositional optimism, dental-specific optimism, and threat condition emerged as significant, $\beta = -.306, t (143) = -2.23, p = .028$. No other effects were significant, $\beta s < .09, ps > .58$. A plot of the regression lines derived from this analysis are presented in Figure 4. To clarify the three-way interaction and directly assess the primary hypothesis, simple slopes tests were again conducted. As anticipated, in the looming threat condition, when centered high on dispositional optimism, minimization increased as dental-specific optimism increased, $\beta = .628, p = .012$. Also, as anticipated,
this effect did not manifest in the distant threat condition when comparing dispositional optimists who were high versus low in domain-specific optimism, $\beta < .041, p > .86$.

**Reading times for dental information.** Next, participants’ reading time scores for dental health information were submitted to the same hierarchical linear regression described above. Additionally, reading time scores for an instruction screen prior to the experimental manipulation (standardized) were also entered in as a covariate on the first step of the equation to control for individual differences in reading speed and/or reading ability. This regression analysis did not yield any significant main effects or interactions, $\beta s < .171, ps > .20$ (see Figure 5). A simple slopes analysis was then conducted to directly test the primary prediction that participants high in both forms of optimism will spend less time reading dental health information relative to participants high in dispositional optimism but low in dental-related optimism—only in the looming threat condition. This analysis emerged as non-significant $\beta < -.089, p > .73$. The equivalent simple slopes test conducted in the distant threat condition was also non-significant, $\beta < -.216, p > .34$.

**Memory for dental information.** Last, in order to determine if dispositional optimism, dental-specific optimism, and threat condition all affected participants memory for dental health information, dental health recognition scores were submitted to a hierarchical linear regression with dispositional optimism, dental-specific optimism, and threat condition entered in on the first step of the equation. The three two-way interaction terms were entered in on the second step and the three-way interaction term was entered in on the last step. This analysis only revealed a main effect for dental-specific optimism such that higher scores in dental-specific optimism lead to more correct responses on the
recognition dental questions relative to lower dental-specific optimism scores, $\beta = .254$, $t(132) = 2.26$, $p = .025$. The anticipated three-way interaction was not significant, $\beta = .042$, $p = .762$ (see Figure 6). Again, a simple slope test was conducted to directly assess the main hypothesis and emerged as non-significant, $\beta = .015$, $p = .952$. Additionally, the same simple slopes test conducted within the distant threat condition was not significant, $\beta < -.125$, $p > .58$.

Mediation. It was also expected that the interactive effects of both forms of optimism on coping would be mediated by construal of a threat (i.e., level of information processing). A meditational analysis following the procedures outlined by Baron and Kenny (1986) were used to determine if construal level mediates the interactive effects of both forms of optimism on coping, but only in the looming threat condition. Specifically, the first step in this analysis is to demonstrate that the predictor variable(s) significantly influences the mediating variable. In this case, both forms of optimism must interact to predict level of information processing within the looming threat condition to establish the first step in this analysis. However, as presented earlier in the results section, the regression analysis examining the interactive effects of optimism within the looming threat condition on Behavior Identification Scores was not significant. Therefore, when faced with a looming threat, level of information processing did not mediate the interactive effects of dispositional and dental-specific optimism on type of coping strategy displayed.
General Discussion

The purpose of the current project was to understand when and why optimism influences coping. Both moderating and mediating variables were examined as a means of understanding the optimism-coping relationship. It was expected that both dispositional and domain-specific optimism would influence how individuals cope with a health threat and that threat distance would moderate this effect. Specifically, it was proposed that individuals who were high in both dispositional and domain-specific optimism would display avoidant coping strategies relative to individuals high in dispositional but low in domain-specific optimism in the presence of a looming threat. It was also proposed that level of information processing would mediate this effect. Specifically, abstract levels of information processing were expected to lead to avoidant coping strategies whereas concrete levels of information processing were expected to lead to approach coping strategies.

First, a Pilot Study was conducted to determine if the threat manipulation and level of information processing measures were viable. For the Pilot Study, level of information processing was measured using both the Behavior Identification Form (Vallacher & Wegner, 1989) and a categorization task (Rosch, 1975). For both level of information processing measures, there was supportive evidence that the threat manipulation shifted participants’ levels of construal. Although the sample size was small and the interactions were marginal, the pattern of results was consistent with the predictions.
Bolstered by the findings of the Pilot Study, the Main Study was modeled off of the Pilot Study. The methods and procedures of the Main Study were almost identical to the Pilot Study with the addition of three coping measures. Also for the Main Study, level of information processing was measured using only the Behavior Identification Form (Vallacher & Wegner, 1989).

*Behavior Identification Form Results for Pilot and Main Study*

For the Pilot Study results, there was a marginally significant effect for dispositional optimism, dental-related optimism, and threat condition on the Behavior Identification Form scores whereas in the Main Study this three-way interaction was not significant. Follow-up simple slope analyses further indicated that the level of information processing results in the Main Study were not of the same pattern as the Pilot Study. As the level of information processing data did not conform to prediction, tests for mediation could not be conducted. One explanation for this discrepancy between the Pilot Study and Main Study could be that there were unexpected differences among the two samples. For example, perhaps the optimism scores or BIF scores were very different between the two samples. To directly assess this possibility, scores on the LOT-R ($M_s = 2.34 & 2.24$ $SDs = 0.68 & 0.71$), dental-specific optimism scale ($M_s = 7.76 & 8.41$ $SDs = 1.64 & 1.77$), and BIF ($M_s = 1.58 & 1.56$ $SDs = 0.22 & 0.23$) were compared between the two samples. After a thorough examination, it was concluded that there were no sizable differences between the samples on these measures.

Another possible explanation for the discrepancy could be due to differences in sample demographic characteristics. As such, participant sex, race, and age were compared between the two samples. Again, however, both samples were nearly identical
on these variables. Although participants from both samples can be compared on these variables, perhaps there are a different set of variables that were not recorded that is influencing the discrepancy between the pilot and Main Study results. For example, both samples may have differed in their reading ability or intelligence level---two variables that could potentially affect how abstractly individuals process information. Additionally, both the Pilot Study and Main Study were run during different semesters. Participants taking the study in the spring may have more college experience than participants taking the study in the fall thereby creating more error within the dataset. Another explanation for the discrepancy between the Pilot Study results and Main Study results is that either a Type I error may have occurred in the Pilot Study or a Type II error may have occurred in the Main Study. In order to assess this possibility, further testing is required.

*Coping Measure Results*

For the Main Study, the coping measures included a self-report minimization index, reading times, and memory. It was predicted that participants who were high in both forms of optimism would display more minimization, spend less time reading dental information, and remember less about the information relative to participants high in dispositional optimism but low in dental-specific optimism—only when in the presence of a looming threat. Also, this effect was expected to be mediated by level of information processing such that abstract levels of construal should lead to passive coping (i.e., more minimization, less dental reading time, reduced dental memory) and that concrete levels of construal should lead to active coping (i.e., less minimization, more dental reading time, increased dental memory).
Out of the three coping measures, minimization was the only measure to yield the predicted three-way interaction. After examining this interaction more closely, it was determined that individuals high in both forms of optimism minimized the dental health threat to a greater degree compared to individuals high in dispositional but low in domain-specific optimism. Moreover, this effect was found only in the looming threat condition. As was mentioned previously, minimization is a form of avoidant coping by which individuals reduce the severity of a threat by construing it as less important. These results extend the work by Davidson and Prachkin and Geers et al. (2009) by showing that threat distance is an important moderating variable influencing the extent to when these two forms of optimism will interact. Only when confronted with a looming or proximal threat did both forms of optimism combine to influence minimization. Also, this extends both the dispositional optimism literature and domain-specific optimism literature by showing that these two forms of optimism can combine to predict coping reactions. One must be cautious when drawing conclusions about these results, however. First, as discussed below, this result was only found on one of the three coping measures. Second, this effect was only found within the domain of dental health. It may be that the combined effects of optimism only influence people when facing a dental threat and not a more serious type of health threat such as a diabetes diagnoses. It is also possible that these two types of optimism combine to influence coping under acute health threats—such as the removal of an abscessed tooth—and not chronic health threats—such as cancer treatments or pain therapy. Thus, future research is needed to assess the combined effects of dispositional and domain-specific optimism with different types of health threats and different types of samples.
Unlike the minimization measure, the reading time and memory measures did not yield the anticipated pattern of results. As such, these data do not support the predictions made at the outset of this project. Interestingly, however, the memory measure did yield a main effect for domain-specific optimism. More specifically, individuals higher in domain-specific optimism answered more dental health-related memory questions correctly compared to individuals lower in domain-specific optimism. One possible explanation for this finding is that individuals’ prior knowledge about a particular outcome may influence the extent to which they endorse high-levels of domain-specific optimism. In other words, individuals who are high in domain-specific optimism may not actually be overestimating their invulnerability for negative health outcomes, but instead, are accurate with their assessments because they already possess a wealth of knowledge specific to that health threat. As such, participants high in dental-specific optimism may have already possessed a wealth of dental-related knowledge which allowed these participants to respond correctly to more questions than participants who were low in dental-specific optimism. Future research is needed to tease apart the influence of prior knowledge versus future expectations on domain-specific optimism.

Explanations for Non-Significant Findings

Several explanations may be offered for why reading time and memory coping measures as well as the level of information processing measure did not demonstrate the anticipated three-way interaction in the Main Study. First, it may be that my hypothesis is incorrect and that different types of expectations do not influence either level of information processing or coping styles. However, although the pilot data was marginally significant, it did support the notion that these predictor variables could shift participants’
level of information processing. Also, there was supporting evidence in the Main Study that coping is affected by a combination of these predictor variables. Thus, there is mixed evidence that, when faced with a looming threat, both forms of optimism combine to shift level of information processing in addition to affecting the type of coping styles participants adopt. Before any definitive conclusions can be drawn, more data is required to determine if the primary hypothesis is viable.

Another possible explanation for the null effects in the Main Study is that the threat manipulation was not powerful enough to reliably evoke the anticipated shifts for both level of information processing and reading/time and memory scores. As the Pilot Study and Main Study relied on threat scenarios to manipulate threat, perhaps it may be useful for future research to implement a more direct and self-relevant manipulation. For example, instead of reading about a threat, researchers could directly implement a threat by giving participants negative feedback about their health. This approach would be consistent with several findings in the dispositional optimism literature in which it has been found that optimism is more likely to influences coping under self-relevant conditions (Aspinwall & Brunhart, 1996). Also, Geers et al. 2009 found that directly threatening dispositional optimists with negative health feedback to be a powerful manipulation for them, resulting in changes in the dependent measures such as negative affect and behavioral intentions. Thus, a more powerful and direct threat manipulation could have resulted in the anticipated shifts for level of information processing, reading time, and memory measures. It should be noted, however, that because the pilot data was supportive of the threat scenarios, they were incorporated in the Main Study.
Explanation for Discrepant Results among Coping Measures

It is interesting that of the three coping measures; only the minimization measure yielded the anticipated findings. One explanation for this outcome may be that minimization is a motivational strategy that people can readily use to protect themselves from a threat whereas reading and memory require more cognitive resources. In other words, it may have been easier or more convenient for participants to change their perception of threat importance than to gather and remember additional information about dental health. Thus, reading time and memory may relate to the coping resources whereas minimization may relate to an immediate, motivational strategy for quickly reducing a threat (Kunda, 1987).

Another explanation is that reading time and memory may not have been the best measure to capture coping. However, because a majority of coping studies rely on after-the-fact, self-reported measures, I wanted to incorporate on-line, behavioral-type coping measures that assess how people would respond to a threat when dealing with it at that moment. As minimization, reading time, and memory were operationally defined as either approach or avoidant coping, it was expected that they would all yield similar patterns of results. A final idea that deserves noting is that the minimization items came first in the order of coping dependent measures. As such, this may have given participants an opportunity to immediately cope with the threat which thereby made participants feel better by the time they reached the reading time and memory measures. Thus, because the first opportunity for coping was the minimization measure, participants may not have felt the threatened by the time they reached the reading time and memory measures.
Thus, for the present investigation, a multi-measure approach to coping was utilized as a means for better understanding the optimism-coping relationship. As researchers generally employ only one measure of coping, it was deemed useful to include three measures in current study to expand the literature and to assess convergence among different coping measures. The present findings did not yield convergence but rather found that the self-reported memory measure differed from the reading time and memory measure. It may be that self-report coping measures are different and more mutable as compared to behavioral and memory coping measures. It is also possible that reading time and memory tests yielded divergent results because they are less direct ways to assess coping. For example, reading time may be influenced by factors such as ability or motivation unlike self-reported measures like minimization. Although ability and motivation may play a role in how much time individuals spend reading health information, previous research shows that reading time is a good measure for distinguishing between active and passive coping (e.g., Aspinwall & Brunhart, 1996). As the present investigation examined how individuals cope in the presence of a threat—either looming or distant—future research is needed to determine which measure best captures active and passive coping styles during the presence of a threat.

**Summary and Conclusions**

As noted previously, the relation between optimism and coping has yielded discrepant findings. Although results of the current studies are mixed, they nonetheless raise the prospect that researchers will be in a better position to predict coping behaviors by assessing multiple forms of optimism. Additionally, there was supportive evidence that only under certain circumstances will the interactive effects of both forms of
optimism be the best predictor for coping. In practical terms, these findings indicate that multiple forms of optimism should be considered when patients are faced with an immediate health threat. In considering the implications of these findings, it is important to note that the data do not support that multiple forms of optimism combine to alter all types of coping behavior. Rather, given that minimization was influenced, and that minimizing is defined as a type of avoidant coping strategy, it seems likely that these variables will also combine to predict certain types of coping behaviors. Future research is required to directly assess the type of coping that will be predicted by optimism scales.

In addition, the current findings help bridge both the dispositional optimism and domain-specific optimism literatures. As these two forms of optimism are generally only considered in isolation, there has been an ongoing debate as to the costs and benefits of being an optimist. These research findings support the notion that both forms of optimism may have better predictive ability when examined multiplicatively as opposed to separately, particularly when people are facing an imminent health threat. Similarly, the current findings also provide some support that optimistic expectations can influence information processing when people are faced with a looming threat. This is an important first step to extend the literature on level of information processing into the domain of health. Thus, future research should focus on if optimistic expectations can shift level of information processing for other types of health outcomes.

The present research examined the relationship between optimism, health threats, and coping. The purpose of this research was to expand our knowledge of these variables and how they functioned within the domain of dental health. Ultimately, this research is important because the proper management of health threats is essential for quality and
longevity of life. Thus, by having a complete understanding of how these variables operate in relation to one another, health care providers will be in a better position to assist patients in successfully coping with and overcoming different types of health threats.
References


**Figure 1.** Predicted values for the category belongingness index in the looming threat condition (top) and distant threat condition (bottom) as a function of dispositional optimism and dental-specific optimism in the Pilot Study. Higher numbers indicate greater level of abstraction.
Figure 2. Predicted values for the Behavioral Identification Scale in the looming threat condition (top) and distant threat condition (bottom) as a function of dispositional optimism and dental-specific optimism in the Pilot Study. Higher numbers indicate greater level of abstraction.
Figure 3. Predicted values for the Behavioral Identification Scale in the looming threat condition (top) and distant threat condition (bottom) as a function of dispositional optimism and dental-specific optimism in the Main Study. Higher numbers indicate greater level of abstraction.
Figure 4. Predicted values for the minimization index in the looming threat condition (top) and distant threat condition (bottom) as a function of dispositional optimism and dental-specific optimism in the Main Study. Higher numbers reflect greater minimization.
Figure 5. Predicted values for the dental reading time scores in the looming threat condition (top) and distant threat condition (bottom) as a function of dispositional optimism and dental-specific optimism in the Main Study. Higher numbers indicate longer reading times.
Figure 6. Predicted values for the number of correct dental memory items in the looming threat condition (top) and distant threat condition (bottom) as a function of dispositional optimism and dental-specific optimism in the Main Study. Higher numbers reflect more correct responses.
APPENDIX A

Life Orientation Test-Revised

1) In uncertain times, I usually expect the best.
0 1 2 3 4
Strongly Disagree Neutral Agree Strongly
agree disagree

2) It’s easy for me to relax. (filler)
0 1 2 3 4
Strongly Disagree Neutral Agree Strongly
agree disagree

3) If something can go wrong for me, it will.
0 1 2 3 4
Strongly Disagree Neutral Agree Strongly
agree disagree

4) I’m always optimistic about my future.
0 1 2 3 4
Strongly Disagree Neutral Agree Strongly
agree disagree

5) I enjoy my friends a lot. (filler)
0 1 2 3 4
Strongly Disagree Neutral Agree Strongly
agree disagree
6) It’s important for me to keep busy. (filler).

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Strongly agree</td>
</tr>
<tr>
<td>disagree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7) I hardly ever expect things to go my way.

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Strongly agree</td>
</tr>
<tr>
<td>disagree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8) I don’t get upset too easily. (filler)

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Strongly agree</td>
</tr>
<tr>
<td>disagree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9) I rarely count on good things to happen to me.

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Strongly agree</td>
</tr>
<tr>
<td>disagree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10) Overall, I expect more good things to happen to me than bad.

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly</td>
<td>Disagree</td>
<td>Neutral</td>
<td>Agree</td>
<td>Strongly agree</td>
</tr>
<tr>
<td>disagree</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B

Domain-Specific Optimism Scale

1) Compared to other undergraduate students at the University of Toledo of the same sex and age as you, what do you think the chances are that you will have to have a decayed tooth extracted this year?

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

2) What are the chances that you will have dental surgery in the next 2 years?

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

3) Compared to other undergraduate students at the University of Toledo of the same sex and age as you, what do you think the chances are that you will have to spend over $3,000 on unexpected dental bills over the next 5 years?

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

4) Compared to other undergraduate students at the University of Toledo of the same sex and age as you, what do you think the chances are that your teeth will become several shades darker?

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

5) Compared to other undergraduate students at the University of Toledo of the same sex and age as you, what do you think the chances are that you will some suffer from serious teeth erosion or severe gingivitis?

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

6) What is the chance that you will have a serious problem with your teeth sometime this month?

0-10% 10-20% 20-30% 30-40% 40-50% 50-60% 60-70% 70-80% 80-90% 90-100%
7) What is the chance that you will have a serious problem with your teeth sometime in the next 5 years?

0-10%  10-20%  20-30%  30-40%  40-50%  50-60%  60-70%  70-80%  80-90%  90-100%
APPENDIX C

Dental Threat Scenarios

Please picture yourself tomorrow. Picture that, at this time tomorrow, you arrive for your long awaited dentist appointment. Your back tooth has been aching constantly and your gums appear red and swollen.

At your dentist appointment tomorrow, the dentist discovers that, just below your sore tooth, pus is slowly leaking from your swollen gums, a clear sign of a bacterial infection. The dentist tells you that the only way to fix your tooth is to perform a root canal, a procedure in which a drill is used to drain the pus and infection from your tooth and gums. Tomorrow, just as you are about to have a root canal, the dentist reminds you that tooth and gum infections are easily avoided by maintaining proper dental hygiene.

Please imagine yourself in a year. Imagine that, in a year, you arrive for your long awaited dentist appointment. Your back tooth has been aching constantly and your gums appear red and swollen.

At your dentist appointment next year, the dentist discovers that, just below your sore tooth, pus is slowly leaking from your swollen gums, a clear sign of a bacterial infection. The dentist tells you that the only way to fix your tooth is to perform a root canal, a procedure in which a drill is used to drain the pus and infection from your tooth and gums. In one year, just as you are about to have a root canal, the dentist reminds you that tooth and gum infections are easily avoided by maintaining proper dental hygiene.
APPENDIX D

Categorization Task

<table>
<thead>
<tr>
<th>Furniture:</th>
<th>Vehicle:</th>
<th>Clothing:</th>
</tr>
</thead>
<tbody>
<tr>
<td>COUCH</td>
<td>AUTOMOBILE</td>
<td>SOCKS</td>
</tr>
<tr>
<td>DESK</td>
<td>YACHT</td>
<td>PANTS</td>
</tr>
<tr>
<td>LAMP</td>
<td>TRACTOR</td>
<td>STOCKINGS</td>
</tr>
<tr>
<td>REFRIGERATOR</td>
<td>SLED</td>
<td>NYLONS</td>
</tr>
<tr>
<td>BOOKCASE</td>
<td>GO-KART</td>
<td>SCARF</td>
</tr>
<tr>
<td>DRESSER</td>
<td>TRUCK</td>
<td>BRA</td>
</tr>
<tr>
<td>CLOCK</td>
<td>TRAIN</td>
<td>SKIRT</td>
</tr>
<tr>
<td>SHELF</td>
<td>ELEVATOR</td>
<td>PURSE</td>
</tr>
<tr>
<td>MAGAZINE RACK</td>
<td>SUBWAY</td>
<td>BOOTS</td>
</tr>
<tr>
<td>TABLE</td>
<td>MOTORCYCLE</td>
<td>SHIRT</td>
</tr>
</tbody>
</table>

1---2---3---4---5---6---7---8---9---10

definitely does not belong, but is very similar to members of that category
definitely belongs
does not belong, but is not a good example of category
APPENDIX E

Behavior Identification Form

1. Making a list
   a. Getting organized
   b. Writing things down

2. Reading
   a. Following lines of print
   b. Gaining knowledge

3. Joining the Army
   a. Helping the nation’s defense
   b. Signing up

4. Washing Clothes
   a. Removing odors from clothes
   b. Putting clothes into the machine

5. Picking an apple
   a. Getting something to eat
   b. Using a yardstick

6. Chopping down a tree
   a. Wielding an axe
   b. Getting firewood

7. Measuring a room for carpeting
   a. Getting ready to remodel
   b. Using a yardstick

8. Cleaning the house
   a. Showing one’s cleanliness
   b. Vacuuming the floor
9. Painting a room
   a. Applying brush strokes
   b. Making the room look fresh

10. Paying the rent
    a. Maintaining a place to live
    b. Writing a check

11. Caring for houseplants
    a. Watering plants
    b. Making the room look nice

12. Locking the door
    a. Putting a key in the lock
    b. Securing the house

13. Voting
    a. Influencing the election
    b. Marking a ballot

14. Climbing a tree
    a. Getting a good view
    b. Holding on to branches

15. Filling out a personality test
    a. Answering questions
    b. Revealing what you’re like

16. Toothbrushing
    a. Preventing tooth decay
    b. Moving a brush around in one’s mouth

17. Taking a test
    a. Answering questions
    b. Showing one’s knowledge

18. Greeting someone
    a. Saying hello
    b. Showing friendliness

19. Resisting temptation
    a. Saying “no”
    b. Showing moral courage

20. Eating
a. Getting nutrition
b. Chewing and swallowing

21. Growing a garden
   a. Planting seeds
   b. Getting fresh vegetables

22. Traveling by car
   a. Following a map
   b. Seeing countryside

23. Having a cavity filled
   a. Protecting your teeth
   b. Going to the dentist

24. Talking to a child
   a. Teaching a child something
   b. Using simple words

25. Pushing a doorbell
   a. Moving a finger
   b. Seeing if someone’s home
Minimization Measure

How much of a threat to health is a bacterial tooth infection?

(1) Not at all important
(2)
(3)
(4)
(5)
(6)
(7)
(8)
(9)
(10) Very important

How important is it to treat a bacterial tooth infection?

(10) Not at all important
(11)
(12)
(13)
(14)
(15)
(16)
(17)
(18)
(10) Very important
APPENDIX G

Health Information Classified by Type

Dental Health Maintenance: Proper dental hygiene strengthens the enamel on your teeth and protects your gums from becoming decayed. By not keeping up with dental hygiene, your chances of developing gingivitis and other painful ailments, such as tooth erosion and bacterial infections, increases by 80%. Other consequences of poor dental hygiene include teeth discoloration and halitosis (bad breath).

The techniques you apply when practicing these behaviors are another important aspect of proper dental hygiene. The American Dental Association has recently discovered brushing and flossing techniques that maximize dental health. Such techniques include brushing the back molars in circular motion and softly rubbing floss between each tooth, which loosens food and strengthens your gums. For example, when brushing your teeth, you should use light pressure and soft bristled tooth brushes. The soft brushing and flossing helps protect the enamel on your teeth.

Toothbrush Technology: Help keep teeth and gums healthy by using innovative tooth brushing technology. Ultreo, Inc introduces a new toothbrush that combines ultrasound waveguide technology with sonic bristles to clean teeth. The name of the product is called WaveCleaner and it transforms inactive bubbles into pulsating bubbles to remove plaque bacteria from hard-to-reach areas.

“The combined effect of ultrasound waveguide technology and precisely tuned sonic bristle action takes power brushing to new heights,” said Christopher McInnes, PhD, principal scientist for Ultreo, Inc. “During a recent survey of users, nine out of 10 people who used WaveCleaner thought their teeth felt smooth and clean after brushing and seven out of 10 said they preferred WaveCleaner to the power toothbrush they were currently using.”

According to the Ultreo Inc, WaveCleaner removes stains from teeth in 14 days and reduces gingivitis in 30 days. It is safe to use on gums, natural tooth surfaces, and dental work.
An Easier Way to Floss: Flossing has never been so easy. Research recently presented at the American Dental Association’s (ADA) annual conference in Philadelphia says that there is a viable alternative to flossing—namely, the WaterPik Dental Water Jet.

The WaterPik Dental Water Jet is a device that operates by delivering high water pressure and pulsation that cleans areas below the gum more effectively than a traditional toothbrush or even the dental floss. It delivers 1,200 pulsations/minute and a pressure of 55-90 psi (pounds per square inch), a combination that was termed ideal by university researchers in over 46 clinical studies.

Analyzing the data from these studies, researchers concluded that the WaterPik Dental Water Jet was 93% more efficient in cleaning plaque and debris and thus reducing bleeding gums that are a sure indicator of underlying gum disease. The device also massages and stimulates gums thereby ensuring a better blood supply to the area.

Types of Diabetes: Diabetes is a disease in which the body does not produce or properly use insulin. Insulin is a hormone that is needed to convert sugar, starches and other food into energy needed for daily life. The cause of diabetes continues to be a mystery, although both genetics and environmental factors such as obesity and lack of exercise appear to play roles.

Type 1 diabetes results from the body's failure to produce insulin, the hormone that "unlocks" the cells of the body, allowing glucose to enter and fuel them. It is estimated that 5-10% of Americans who are diagnosed with diabetes have type 1.

Type 2 diabetes results from insulin resistance (a condition in which the body fails to properly use insulin), combined with relative insulin deficiency. Most Americans who are diagnosed with diabetes have type 2.

Monitoring Sugar Levels. Monitoring blood sugar level is vital for many people. In order to do so, people use a glucometer which is a device for determining the approximate concentration of glucose in the blood. It is mostly used by people with diabetes and hypoglycemia. A small drop of blood, obtained by pricking the skin, is placed on a disposable test strip, which then the meter reads and uses to calculate the blood glucose level. The meter then displays the level in milligrams.

Within the last few decades, a primary goal of the management of type 1 and type 2 diabetes has been the achievement of closer-to-normal levels of glucose in the blood for as much of the time as possible, guided by the glucometer several times a day. The benefits include a reduction in the occurrence rate and severity of long-term complications from hyperglycemia as well as a reduction in the short-term, potentially life-threatening complications of hypoglycemia.

Diabetes Prevention. Pre-diabetes is a serious medical condition that can be treated. Good news is that a recently completed Diabetes Prevention Program study conclusively
showed that people with pre-diabetes can prevent the development of type 2 diabetes by making changes in their diet and increasing their level of physical activity. They may even be able to return their blood glucose levels to the normal range.

While the Diabetes Prevention Program study also showed that some medications may delay the development of diabetes, diet and exercise worked better. Participants’ diet consisted of whole grain wheats, fresh vegetables, and lean proteins. Foods that were avoided include starches, sugars, and fats. Also, another effective treatment was exercise. Just 30 minutes a day of moderate physical activity, coupled with a 5-10% reduction in body weight, produced a 58% reduction in diabetes.
APPENDIX H

Multiple Choice Questions to Health Passages

1. In the passage, *Toothbrush Technology*, what was the name of the group who created the new toothbrush?
   a. Masco Corporation
   b. Dental Physicians, L. L. C.
   c. Preventive Dentistry Products, Inc
   d. Ultreo, Inc

2. In the passage, *Toothbrush Technology*, what was the name of the toothbrush?
   a. WaveCleaner
   b. RADIUS
   c. Supersmile
   d. Dr. Fresh

3. In the passage, *Toothbrush Technology*, the toothbrush ran on lithium batteries.
   a. True.
   b. False.

4. In the passage, *Toothbrush Technology*, the toothbrush uses ultrasound technology to clean teeth.
   a. True.
   b. False.

5. In the passage, an easier way to floss, what was the name of the product recently introduced?
   A) Hydro Floss
   B) Butler gum expanding floss
C) WaterPik  
D) DenTek triple clean

6. In the passage, *An Easier Way to Floss*, the recently created product was presented at which group’s annual conference?

   A) American Dental Education Association  
   B) American Academy of General Dentistry  
   C) American Dental Association  
   D) National Dentistry Organization

7. In the passage, *An Easier Way to Floss*, the flossing product relies on a bees wax coating to clean more thoroughly between teeth.

   a. True.  
   b. False.

8. In the passage, *An Easier Way to Floss*, the flossing product was 93% more effective than other flossing products on the market.

   a. True.  
   b. False.

9. The passage *Dental Health Maintenance* asserts that:

   a. Regular fluoride use can repair damaged tooth enamel.  
   b. There are certain brushing and flossing techniques that maximize dental health.  
   c. Most people, aged 18 or older, have experienced plaque build-up and gingivitis.  
   d. If gingivitis (gum disease) goes unchecked, permanent damage can be done to the roots of the teeth as well as the bone that surrounds them.

10. Which piece of information was included in the passage *Dental Health Maintenance*:

    a. Consuming the recommended daily allowance of calcium can strengthen tooth enamel and prevent decay.  
    b. Mouthwash is a helpful complement to brushing and flossing. It kills free-floating bacteria in the mouth that can cause gingivitis.  
    c. Most people, aged 18 or older, have experienced plaque build-up and gingivitis.  
    d. By not keeping up with dental hygiene, your chances of developing gingivitis and other painful ailments, such as tooth erosion and bacterial infections, increases by 80%.

11. In the passage *Dental Health Maintenance*, it is stated that, since a toothbrush can only clean one tooth at a time, people should spend at least three minutes brushing their teeth.

    a. True.
b. False.

12. In the passage *Dental Health Maintenance*, it is stated that proper dental hygiene strengthens the enamel on your teeth and protects your gums from becoming decayed.

   a. True.
   b. False.

13. Taking 100 milligrams of vitamin B everyday can help lower your chances of developing diabetes.

   a. True.
   b. False.

14. In the passage *Types of Diabetes*, it is estimated that _____ percentage of Americans who are diagnosed with diabetes have Type 1.

   a. < 5%
   b. 5-10%
   c. 10-15%
   d. > 15%

15. Type 2 diabetes results from insulin resistance.

   a. True.
   b. False.

16. In the passage *Types of Diabetes*, it is noted that the cause of diabetes is:

   a. Lack of diet and exercise
   b. Genetic components such as obesity
   c. A combination between environmental and genetic factors
   d. Vitamin B deficiency

17. Glucometers determine the approximate concentration of glucose in the body by examining what fluid:

   a. Hemoglobin
   b. Plasma
   c. Blood
   d. Saliva

18. Glucometers display the amount of glucose level in the body in which unit of measurement:

   a. Centigrams
   b. Milligrams
19. In the passage *Monitoring Sugar Levels*, it is stated that checking glucose levels more than five times a day can lead to false feedback on subsequent readings.
   a. True.
   b. False.

20. The first glucometer was invented in 1974 by German physician Hans Frankel-Weissmann.
   a. True.
   b. False.

21. It was stated in the *Diabetes Prevention* passage that pre-diabetic people can prevent the development of ________ by making changes in their diet and exercise.
   a. Mellitus diabetes
   b. Type 2 diabetes
   c. Gestational diabetes
   d. Type 1 diabetes

22. In the passage *Diabetes Prevention*, pre-diabetic participants greatly reduced their development of diabetes by exercising
   a. 20 minutes a day
   b. 25 minutes a day
   c. 30 minutes a day
   d. 45 minutes a day

23. In the passage *Diabetes Prevention*, it was concluded that medications, such as Cymbalta, are most effective for treating diabetes.
   a. True.
   b. False.

24. Only 40% of pre-diabetic people can return to their normal glucose levels even after a change in their diet and exercise.
   a. True.
   b. False.