IMPROVING PATIENT OUTCOMES THROUGH PHYSICIAN COMMUNICATION: MESSAGE FRAME AND PRESENTATION MODE INFLUENCE ON THE WALKING BEHAVIOR OF TYPE 2 DIABETICS

by

Christian J.W. Ledford

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Committee:

_____ Director

_____

_____

_____

_____ Department Chairperson

_____ Program Director

_____ Dean, College of Humanities and Social Sciences

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By

Christian J.W. Ledford
Master of Science
Colorado State University, 2000

Dissertation Director: Gary L. Kreps, Professor
Department of Communication

Spring 2011
George Mason University
Fairfax, Va.

DEDICATION

This work is dedicated to my father, Ken Williams. May we walk many more steps together in this life.

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I first acknowledge the many people who struck out with me on this adventure – foremost, Chris, who listened when I needed to think out loud, who answered when I needed a different perspective, who acted when I needed a hand, and who loved me through it all, may this be our first in a lifetime of collaboration; my three girls and mini-RAs, Caely, Abby Grace, and Hally Cate, who let me sleep late after night classes and who sat patiently through research meetings and clinic appointments, I can only hope that it all planted a seed of love for research; and all of the women who surrounded our family with meals, childcare, and prayer as I attempted to balance my life, my mom – Phyllis Williams, my mother-in-law – Ginger Ledford, Marianne Booth, Sara Arthur, Emily Fincher, Ashley Edwards, and Molly O'Rourke.

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ABSTRACT

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Christian J.W. Ledford, Ph.D.

George Mason University, 2011

Dissertation Director: Dr. Gary L. Kreps

The following study examined interpersonal (physician to patient) communication strategies for promoting walking exercise to type 2 diabetic patients assigned to primary care clinics. The study evaluated two message design variables – message frame and presentation mode – as potential influencers of communication and adoption success. This multimethodological study included a qualitative analysis of physicians' current exercise promotion and a quantitative test of the effectiveness of message frames and presentation modes. This was a single-site, 6-week, prospective intervention study, with a 2x3 factorial, non-equivalent comparison group quasi-experiment study design. Results provided evidence for the effectiveness of gain frames in promoting exercise behaviors. Also found here was an interaction effect of presentation mode and patient activation on exercise behavior.

Chapter 1

Introduction

An estimated 25.8 million people or 8.3% of the American population have diabetes (CDC, 2011). However, through regular exercise, diagnosed type 2 diabetics can directly improve blood sugar control (Swartz, Strath, Miller, et al., 2007; Swartz, Strath, Bassett, et al., 2003). Exercise also indirectly improves sugar control by promoting weight management. Improving blood sugar control and managing weight through regular exercise can help type 2 diabetics improve their health and reduce their risk of mortality.

The model of participatory decision making, which encourages patient's inclusion in decision making and self-management, proposes five steps for physicians to encourage patient participation (Epstein, Alper, & Quill, 2004). Step one is to understand the patient's experience and expectations. Two is to build partnerships by enacting relationship-building activities. Three is to provide evidence, including uncertainties. The researchers emphasize that physicians should present uncertainty in lay terms. The fourth step is to present recommendations after the physician has discussed clinical evidence and patient values, and the final step is to check for understanding and

agreement. The current study intervention specifically addresses step three in which physicians present evidence-based exercise recommendations and potential benefits.

Studies have established the efficacy of exercise interventions to affect behavioral and physiological outcomes (Kirk, Barnett, Leese, et al., 2009; Bravata, Smith-Spangler, Sundaram, et al., 2007; Swartz et al., 2007; Araiza, Hewes, Gashetewa, et al., 2006; Engel & Lindner, 2006; Swartz et al., 2003). Current clinical guidelines recommend that physicians advise diabetic patients to perform 150 minutes per week of aerobic activity (ADA, 2009). These recommendations provide as benefits improvement in blood glucose control, reduced cardiovascular risk factors, weight loss, and improved well being. Specifically, with regard to the messages promoted in this study, 150 minutes of exercise weekly can lower glycosylated hemoglobin (A1c – the standard measure of average blood glucose level) by 0.66% (Boule, Haddad, Kenny, et al., 2001). Despite the American Diabetes Association (ADA)-endorsed, evidence-based recommendations, physical activity as a self-management technique is underutilized (Kirk, Barnett, Leese, et al., 2009).

The following study examined interpersonal (physician to patient) communication strategies for promoting walking exercise to type 2 diabetic patients assigned to primary care clinics. The study evaluated two message design variables – gain/loss framing and presentation mode – as potential influencers of communication and adoption success.

The content of the intervention is distinguished by its attention to the focus of message frame and presentation mode to a chronically ill population. Research

investigating the influence of gain and loss framing generally includes healthy or at-risk populations as participants (Maheswaran & Meyers-Levy, 1990; Jones, Sinclair, & Courneya, 2003; Latimer, Rivers, Rench, et al., 2008; Gerend & Sias, 2009; Park, Simmons, Prevost, & Griffin, 2010; Gallagher, Updegraff, Rothman, & Sims, 2011). This study proposed that chronically ill patients attend and process promotional health messages differently than previously-studied healthy populations.

The specific aims were to:

Aim 1. Design and implement a communication intervention to interpersonally disseminate exercise recommendations for type 2 diabetics through the physician-patient dyad.

Aim 2. Assess the impact of the communication intervention on patients' (a) communication satisfaction and (b) perceived persuasiveness of the message.

Aim 3. Assess the impact of the communication intervention on patients' (a) exercise-related knowledge and attitudes; (b) exercise behavior intentions; and (c) observed exercise behaviors.

Aim 4. Examine interactions between the frame and presentation mode of a message and patient outcomes, specifically: (a) whether the frame/presentation 'fits' patient preferences and (b) whether frame/presentation is associated with exercise behavior intentions and behavior.

Theoretical Framework

Patient activation. One explication of the self-management patient role in the physician-patient relationship is patient activation. Measured on a continuous scale, patient activation is a specific type of involvement, in which patients are more involved in the management of their health (Williams, McGregor, & Zeldman, 2005). The activated patient believes that his or her role as a patient is important, that he or she has the confidence and knowledge necessary to take action, that he or she enacts behaviors to maintain and improve his or her health, and that he or she continues behaviors even under stress (Hibbard, Stockard, Mahoney, et al., 2004; Hibbard, Mahoney, Stock, et al., 2007; Williams & Heller, 2007).

In the context of chronic disease, activated patients recognize that they are responsible for their own care, which motivates them to seek disease-related information and support to enable self-management. These patients take action, ask questions of the provider, and participate in decisions about treatment (Griffin, Kinmonth, Veltman, et al, 2004; Cortes, Mulvaney-Day, Fortuna, et al, 2009). They are collaborative partners with the provider in their health care (Hibbard, Mahoney, Stock, & Tusler, 2007). Patient activation is especially critical in chronically-ill patients as they follow complex treatment regimens, monitor their conditions, and make lifestyle changes (Hibbard, Mahoney, Stockard, & Tusler, 2005).

Patient activation is linked to the concept of empowerment (Wagner, Bennett, Austin, et al., 2005). However, Alegría et al. (2008) differentiate the two concepts,

specifying that patient activation refers to the skill-building process and empowerment refers to a capacity-building process that leads patients to perceive that they are capable of and confident about making decisions and are able to have better control over their health and health care process.

In this case of chronic disease, the actual diagnosis of a disease would induce involvement in message processing for those messages targeting behaviors associated with that disease. However, among, diabetics and other chronically ill populations, patients vary in their level of involvement in care. Patient activation is one measure of this type of involvement (Hibbard, Mahoney, Stockard, & Tusler, 2005). Patients who are highly active in the management of their diabetes know and perceive the risks associated with the disease and therefore process messages centrally. Patients who are not active in their diabetes self-management do not perceive the risks of the disease similarly and therefore process persuasive messages peripherally.

Involvement. One individual-level variable that influences how someone processes persuasive messages is involvement, sometimes conceptualized as personal relevance (Petty et al., 1981). This personal meaning and intrinsic interest has also been more specifically termed 'issue involvement' (Kirby, Ureda, Rose, et al, 1998). In prior studies of healthy or at-risk populations, authors assumed that those with the highest perceived risk of developing a condition will process a message centrally. Studies manipulated involvement or personal relevance through scenarios that present an immediate risk or a delayed risk, relying on the temporal nature of involvement (Maheswaran & Meyers-Levy, 1990) or assessed participant

involvement through measures of perceived susceptibility, worry, information seeking behavior, and personal importance (Kirby, Ureda, Rose, et al, 1998; Millar & Millar, 2000).

For this investigation of persuasive messages targeting a chronic population, the study presents a secondary layer of involvement. For this study population of type 2 diabetics, they are already diagnosed with chronic disease and are no longer 'susceptible' to developing the disease. Rather than susceptibility as a factor of involvement, this study posits that patient activation determines the processing route of health messages. In the study population, the researcher proposes that not all diagnosed diabetics process messages centrally. This additional variable determines who, among a chronically ill population, will process messages either peripherally or centrally. This study further conceptualizes patient activation, making connections between patient activation and regulatory focus.

Regulatory focus and fit. From a personality-trait perspective, individuals are either pervasively focused on hopes and aspirations and pursue goals that seek advantages (promotion-oriented) or focused on duties and obligation and pursue goals that avoid disadvantages (prevention-oriented) (Rothman, et al., 2006). Promotion-oriented individuals aspire to an ideal self and are motivated by accomplishments, hopes, and aspirations whereas prevention-oriented individuals are concerned with safety, duties, and obligations (Higgins, Idson, Freitas, Spiegel, & Molden, 2003). In the context of health behavior, promotion-focused individuals perform health behaviors in pursuit of an ideal self whereas the prevention-focused individual performs health behaviors to prevent negative consequences.

Coinciding with this perspective is regulatory fit, which theorizes that messages are more persuasive when the framing of the message fits the individual's focus. Therefore, messages that present advantages are more persuasive for promotion-oriented audiences, and messages that present disadvantages are more persuasive for prevention-oriented audiences (Lee & Aaker, 2004; Latimer, Rivers, Rench, et al., 2008).

The researcher proposes that the role of individual patient activation, as a level of involvement, operates similarly to the concept of individual regulatory focus: activated patients are promotion-oriented, and non-activated patients are prevention-oriented.

The regulatory fit concepts in the health literature typically address prevention and promotion orientation within healthy populations for whom messages are directed to prevent disease. It is unknown whether the diagnosis of a chronic disease affects a person's regulatory focus. Therefore, the following research question is posed.

RQ: For the diabetic patient, how are patient activation and regulatory focus related?

Proposed in this study is that, for type 2 diabetics, patient activation is the attitudinal and behavior set that reflects a promotion-orientation past the moment of diagnosis, which then becomes treatment involvement. See Figure 1.

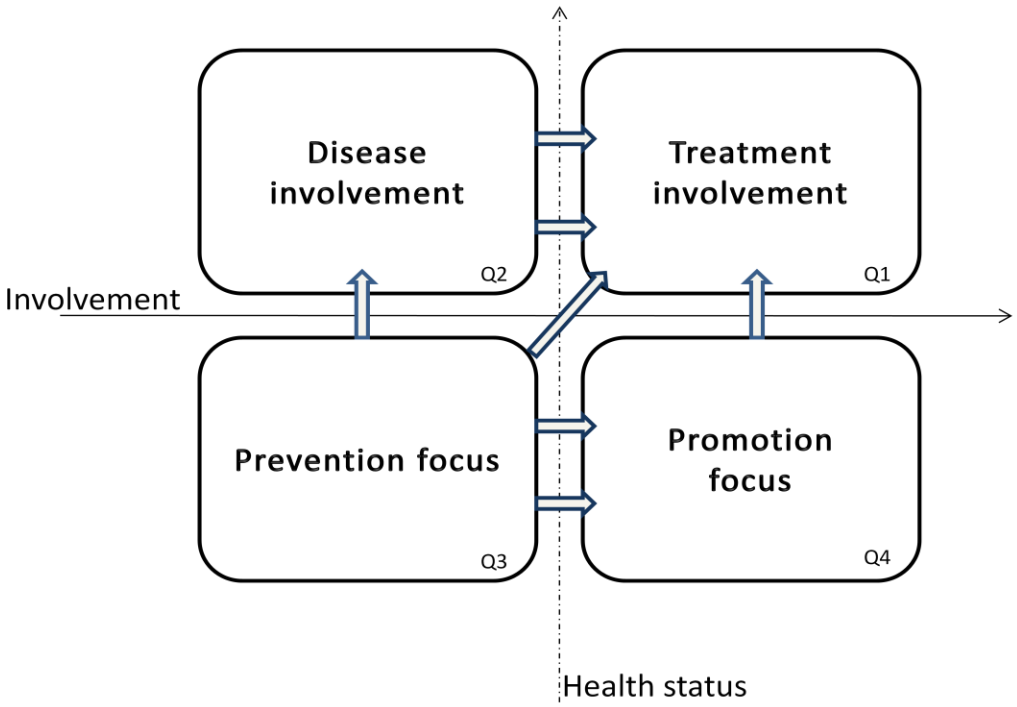


Figure 1. Model of patient activation as an extension of regulatory focus through diagnosis

The bottom row (below the x-axis) in Figure 1 depicts a healthy, or pre-diagnosed, population, which literature generally divides into individuals who are involved (Q4) or not involved (Q3). In this healthy state, regulatory focus literature represents the pervasive attitudes and values of these individuals. The involved are promotion-oriented (Q4), while the non-involved are prevention-oriented (Q3). This study looks at what happens to individuals' involvement if they are diagnosed with a chronic illness. Once the individual crosses the center line (x-axis) with a diagnosis, individuals may retain their same level of health involvement, but here those attitudes

would manifest differently; for the diagnosed patient who is not involved, this attitudinal and behavioral perspective would be disease involvement (Q2). These individuals, through diagnosis, are inherently involved in issues pertaining to their health; however, their lack of interest and participation in their health translates to such a low degree of involvement that it is not the type of involvement that theorists intended in earlier literature. The diagnosis is different for the promotion-oriented individual. Diagnosis magnifies these individuals' involvement, resulting in active participation in treatment and care, or treatment involvement (Q1).

While the differentiation between pre-diagnosis is solid, or firm, the line between involvement and non-involvement is permeable. The author proposes that just as individuals change behavior, patients can be activated throughout the lifespan. The point of diagnosis is one prime crosspoint for activation. Following diagnosis, treatment acceleration (movement from drug therapy to insulin therapy) or consequences (hospitalization) may also provide time-point crossovers to involvement.

Elaboration likelihood model. The elaboration likelihood model (ELM), a dual-process persuasion theory, explains how a person processes a persuasive message and the effects the message will have (Petty & Cacioppo, 1986). The theory posits that individuals vary in their willingness and ability to process a message. The elaboration continuum postulates that message receivers vary in their motivation to elaborate upon the merits of a message (Petty & Wegener, 1999). The model describes two processing routes that lead to persuasion – the central and peripheral route. At the high end of the

elaboration continuum, the central route, individuals who are highly motivated to process messages are likely persuaded by their contemplative consideration of the information presented. At the low end of the elaboration continuum, the peripheral route, individuals who are less motivated to process a message are likely persuaded by a cue peripheral to the central merit of the persuasion rather than the value of the information presented (Salovey & Wegener, 2003). Persuasion through this route is induced by peripheral cues such as source characteristics and heuristics and is more easily attained although generally temporary and superficial (Petty & Wegener, 1999).

When elaboration is high, when the receiver is motivated and able to assess the message argument merits, the receiver is more likely to effortfully process all available relevant information. However, when elaboration is low, when the receiver is less motivated and less able to assess the merits of a message, the receiver scrutinizes information to a lesser degree. For receivers at this level of the elaboration continuum, a source tends to strengthen persuasion regardless of the message qualities (Petty & Cacioppo, 1983). When elaboration is moderate, subjects use cues such as source characteristics to determine how much to think about the message.

Guided by this model, when non-credible sources present a health promotion message to low to moderately involved audiences, the audience does not elaborate the message whereas messages presented by a credible source are elaborated (Jones, Sinclair, & Courneya, 2003). The current study draws on this finding in its selection of physicians as a credible source to deliver the persuasive message. Patients trust physicians and

select them as their preferred source of health information (Hesse, Nelson, & Kreps, 2005).

Gain and loss message framing. Drawing from prospect theory, this study takes a psychological approach to message framing that investigates how message framing influences information processing and the subsequent decision-making processes (Borah, 2011). Prospect theory proposes a relationship between how the framing of consequences affects rational decision making, researchers have proposed a relationship between the characteristics of proposed health behaviors and the appropriate message frame for a persuasive appeal (Kahneman, & Tversky, 1979; Tversky & Kahneman, 1981; Kahneman, & Tversky, 1984).

Tversky and Kahneman (1981) conducted a study in which they contrasted how respondents made public health decisions based on the number of people that could either be 'saved' from a disease outbreak or the number of people who would 'die' in that same outbreak. While the probability was equal for saving and for losing lives, the information was presented within the frame of saving or of losing lives. The resulting prospect theory postulated that individuals seek risk when presented with loss but avoid risk when presented with gains (Tversky & Kahneman, 1981).

Applied to communication theory, gain frames emphasize the advantages (gain) of enacting a target behavior whereas loss frames emphasize the disadvantages (loss) of not enacting the target behavior. As in prospect theory, when the proposed behavior is

risky, potential losses are more persuasive whereas when the proposed behavior is low risk, gains are more persuasive (O'Keefe & Jensen, 2007).

Within health promotion, this theory purports that messages encouraging preventive behaviors, which are low risk, will be most persuasive when the advantages of their enactment are emphasized. Low-risk behaviors that have been associated with gain-framed message positive effects include sunscreen use (Detweiler, Bedell, Salovey, et al, 1999), infant car seat use (Christophersen & Gyulay, 1981), physical activity (Jones, Sinclair, & Courneya, 2003; McCall & Martin Ginis, 2004; Latimer, Rench, Rivers, et al, 2008), cervical cancer prevention (Rivers, Salovey, Pizarro, et al., 2005), nutrition promotion (Arora & Arora, 2004), and safe driving behaviors (Millar & Millar, 2000).

Conversely, messages encouraging behaviors that involve risk will be most persuasive when the disadvantages of not enacting the behavior are emphasized. This risk includes not just physical hazard of the behavior but also the risk of an uncertain outcome. Perceived risky behaviors which have been associated with loss-framed message effects include human papillomavirus vaccination (Gerend, Shepherd, & Monday, 2008; Gerend & Sias, 2009), measles, mumps, and rubella vaccination (Abhyankar, O'Connor, & Lawton, 2008), HIV testing (Kalichman & Coley, 1995), cervical cancer detection (Rivers, Salovey, Pizarro, et al., 2005), and mammography (Schneider, Salovey, & Apanovitch, 2001; Gallagher, Updegraff, Rothman, & Sims, 2011).

Reasons for these message framing effects is less clear. Salovey and Wegener (2003) recommend four potential explanations for frame effects. First, it is unclear whether message frames operate as cues or as more central processing factors. Second, message frames may differ in argument strength, gain messages operating as stronger arguments for prevention behaviors and loss messages operating as stronger arguments for screening behaviors. Third, biased processing may occur due to factors in the persuasion setting prompting a change in the desirability of the target behavior or the perception of risk. Fourth, message frames may prompt different levels of processing of the messages, through expectancy, expectancy violation, or affective differences.

The intersection of the ELM and framing develops in studies which propose that framing effects occur only when respondents are involved with the health issue (Rothman & Salovey, 1997; Millar & Millar, 2000; Salovey & Wegener, 2003; Hevey, Pertl, Thomas, et al., 2010; Gallagher, Updegraff, Rothman, et al, 2011). Results show that loss-frame messages for screening behaviors are more persuasive only for involved participants and that gain-frame message for prevention behaviors are more persuasive only for involved participants; both reinforce the connection involvement plays in framing effects (Meyers-Levy & Maheswaran, 2004; Millar & Millar, 2000; Hevey, Pertl, Thomas, et al., 2010). Gallagher, Updegraff, Rothman et al (2011) particularly stipulated that it is involvement (susceptibility) regarding the health condition that moderates the framing effects.

The following hypotheses postulate patient activation as a measure of involvement. Therefore, framing effects will appear in individuals involved with the treatment of their diabetes – those with a promotion-orientation, those who are activated patients. For the intervention behavior, literature has established the effectiveness of gain frames. Additionally, the hypotheses are informed by the proposition that patient activation is similar to the promotion orientation of regulatory focus and that messages that fulfill regulatory fit will be most persuasive. The health promotive nature of the intervention behavior also provides a natural fit for promotion-oriented individuals.

> H1: For the activated patient (treatment involvement), the gain-framed message will be perceived as (a) more persuasive and will result in (b) greater intention to enact the behavior and (c) greater enactment of the behavior than the loss-framed message.

Presentation mode. In ELM, individuals who centrally process appeals find stronger messages more convincing (Petty, Cacioppo, & Goldman, 1981). While Petty and Cacioppo (1986) acknowledge that their work did not definitively conceptualize what constitutes a strong message, one potential conceptualization of argument strength is presentation mode, through which the message is presented verbally, numerically, or graphically. In the dissemination of clinical recommendations and treatment options, physicians may present the risk or the benefit of a behavior in any or all of these three modes.

Studies provide evidence for using statistics in persuasive arguments. Statistical presentation can increase awareness of risk (Marteau, Saidi, Goodburn, et al., 2000), whereas risk research shows that individuals overestimate risk when it is presented verbally, i.e., rare, common, low risk, which can lead to avoidance of risk messages and proposed behaviors (Tversky & Kahneman, 1981). The incorporation of individualized risk estimates has been associated with consistently positive effects (Edwards, 1998). Presenting actual risk estimates reduce patient overestimation of risk; however, this can results in a reduction of the patient's intention to comply with medication recommendations (Tversky & Kahneman, 1981).

The persuasive effect of numerical evidence may be explained by the elaboration likelihood model which proposes that individuals who are involved in the health topic will process the message centrally and be better targeted with strong arguments. A potential conceptualization of strong is the inclusion of statistical evidence rather than verbal or graphic arguments alone. The persuasive effects of statistical evidence for individuals who process the argument centrally have been established (Slater & Rouner, 1996).

Drawing from the conceptualization of numerical presentation as a potential factor of strong arguments, the researcher proposes the following relationship between patient activation and presentation mode.

H2: For the activated patient (treatment involvement), the statistical argument message will be perceived as (a) more persuasive and will result

in (b) greater intention to enact the behavior and (c) greater enactment of the behavior than the graphically-presented message.

The persuasive effect of graphically presented messages also has an interpretation within the elaboration likelihood framework. While graphics improve patient understanding (Stone, Yates, & Parker, 1997), they also result in greater affective responses to persuasive messages (Chua, Yates, & Shah, 2006; Timmermans, Ockhuysen-Vermey, & Henneman, 2008). Graphics, operating as a message cue, influence the decision making of peripheral processors (Nenkov, Inman, Hulland, & Morrin, 2009). Specific to this study, the contrast presented by the graphic to depict a change in behavior will act as a cue for the peripheral processor, capturing the patient's attention (Chua, Yates, & Shah, 2006). This assumption that graphics act as a heuristic to peripheral processors guides the following hypothesis.

H3: For the non-activated patient (disease involvement), graphically-presented message will be perceived as (a) more persuasive and will result in (b) greater intention to enact the behavior and (c) greater enactment of the behavior than the numerically-presented message.

The testing of these hypotheses will provide direction to physicians how to frame and present the arguments for self-management recommendations to chronically-ill patients.

This study included two phases: message development and message intervention, including testing of the study hypotheses. In the first phase, draft messages were tested for participant understanding, ease of use, and the message frame manipulation. Then, qualitative methods explored how physicians communicate exercise promotion to type 2 diabetics in the ambulatory setting and specifically investigated the following research questions. The second phase drew on the first phase to implement the clinic intervention.

Chapter 2

Message Development

Message development included two phases, message pretesting and an investigation of current physician promotion of exercise to type 2 diabetics. The kernel of the exercise message was the ADA recommendation to walk 30 minutes a day 5 days a week. This message was in itself, without presenting effects of the exercise, the control condition for the study.

The gain-framed message listed as the benefits of walking exercise stronger heart and bones, stress relief, improved insulin performance, improved blood circulation, lower risk of heart disease, and lower A1c. Loss-framed messages presented the loss of these benefits when walking exercise was not enacted.

For presentation mode, the condition difference focused on the decreased A1c benefit. In the words group, the message presented the benefit/loss "significantly reduce your HgA1c." The numbers message presented the specific potential to "reduce your A1c by .66." followed by examples of a hypothetical baseline A1c and the effective decrease. The images message included bar graphs, which are recommended for making comparisons (Schapira, Nattinger, & McAuliffe, 2006; Lipkus, 2007), that visualized the decrease in A1c without attributing a numerical value, i.e., the y-axis was blank.

Message Pretesting

A pretest was conducted to assess the reader's perception of the gain- and loss-framed messages. The pretest design was a 2x3 factorial, quasi-experiment. See Table 1. In the message development and validation phase, participants were asked to read the conditioned message and then complete a survey of demographic variables, a message frame check, perceived persuasiveness, and argument strength. Participants were also asked to comment on the form, design, and understandability of the messages and survey instrument. The primary variable of interest was the message frame check. The paper-and-pencil instrument was administered in April 2010.

Table 1. Frame by presentation mode conditions

		Presentation mode		
		Semantic (words)	Statistics (numbers)	Graphic (images)
Frame	Gain	Gain-Words	Gain-Numbers	Gain-Images
	Loss	Loss-Words	Loss-Numbers	Loss-Images

Measures. Demographic measures included age, gender, ethnicity, and diabetes diagnosis. The survey also asked about current exercise behavior.

A single 7-point semantic differential item was used for the message frame check. The item was anchored by "You can gain health benefits by walking" and "You may lose potential benefits by not walking."

A 7-item 7-point semantic differential scale was used to measure perceived persuasiveness (Slater & Rouner, 1996). Items included: effective/ineffective, not persuasive/persuasive, moving/not moving, challenging/not challenging, thought provoking/not thought provoking, unconvincing/convincing, and influential/not influential.

The argument strength scale developed by Zhao, Strasser, Capella, Lerman, and Fishbein (in press) was used to measure argument strength. Likert-style items included: "The message's reason for walking 30 minutes five days a week was… …believable; …convincing; …important to me;" "The message's advice helped me feel confident about how best to walk 30 minutes five days a week;" "The message's advice would help my friends walk 30 minutes five days a week;" "The message's advice put thoughts in my mind about wanting to walk 30 minutes five days a week;" The message's advice put thoughts in my mind about not wanting to walk 30 minutes a day five days a week;" "Overall how much did you agree/disagree with the message's advice?;" and "Is the reason the message gave for walking 30 minutes five days a week a strong/weak reason?"

Participants. Forty-three participants, a convenience sample of university students and personal contacts of the researcher (who did not work in persuasion or message design research), completed the pilot test message surveys. Mean age was 27.30 (range 18 – 63, s.d. 14.39). The sample was 65.1% female. Three of the participants had been diagnosed with diabetes.

Results. A one-way between-subjects ANOVA was conducted to compare the effect of message frame on frame check in gain and loss conditions. There was not a significant effect of message frame on the frame check variable $F(1, 41) = 2.413$, $p = .128$. However, the mean differences were in the expected direction. Where 1 is "you can gain health benefits" and 7 is "you may lose potential benefits," the loss condition mean was 3.674, and the gain condition mean was 2.600.

Participant feedback. In addition to the statistical manipulation check, the message frame check item prompted the most questions during administration. Participants did not perceive a difference between the two ends of the semantic differential.

Current Physician Practice

Message development continued through an assessment of how physicians currently presented exercise recommendations to type 2 diabetics. The second phase investigated the following three research questions.

RQ1: What patient-centered strategies are physicians using in the promotion of exercise to type 2 diabetics?

RQ2: How are physicians framing the recommended enactment of exercise behaviors in terms of gains and losses?

RQ3: What presentation modes are physicians using in their exercise recommendations?

Using a grounded theory approach, the researcher systematically analyzed physician narratives regarding the clinical promotion of exercise to type 2 diabetics (Corbin & Strauss, 1990).

Participants. The setting for the investigation was the family medicine clinic at which the intervention would occur. Participants included 25 family medicine physicians, all of whom were potential physician communicators for the intervention. Nineteen participants were male, and 6 were female. Participants had been providing patient care from 1 to 23 years (mean 7.4, median 6). All participants had completed their intern year and were licensed physicians; 14 were board-certified in family medicine. Since the participants provided care at a teaching hospital, in addition to providing care for their own patient panel, some participants were also administrators and faculty members who oversaw patient care provided by residents, resident interns, and medical students.

Procedures. After Institutional Review Board approval at both the investigator's and the physicians' institutions, participant recruitment occurred through the family medicine department. All physicians who had completed their intern years were invited to participate.

As physicians volunteered to participate, the investigator used an open-ended, structured interviewing style to gather the research data from July to September 2010. All of the interviews were conducted in person by the investigator at a time and hospital location chosen by the participant. Following written informed consent, interviews

included a single question, “During a clinical appointment, how do you encourage type 2 diabetics to exercise?” The investigator also specified that the patient would be between 40 and 80 years old. The respondents were encouraged to answer the question by addressing the interviewer as they would the patient to whom they were recommending the behavior. This interview style resulted in physician statements such as “then I would ask the patient about…” followed by what the physician’s counsel would then be to varying answers to the question.

The investigator recorded hand written field notes throughout the interview and additional notes of impressions following the interview. The 25 interviews ranged from 3 to 10 minutes in duration. This interview length seems appropriate considering average face-to-face patient care in family medicine appointments is 10.7 minutes (Gottschalk & Flocke, 2005).

Data analysis. Data analysis began as soon as the first interview was conducted (Corbin & Strauss, 1990). Each set of interview field notes was reviewed by the investigator to discern information about potential themes. Potential themes and emergent codes were further examined as purposive sampling continued to include physicians treating type 2 diabetics (Coyne, 1997). Triangulation among pieces of information from interviews was continued until the interviews were completed. The investigator then conducted an open coding process and analyzed field notes line by line and recorded the final themes as they emerged. Axial coding then related subcategories and further developed categories. During axial coding, the investigator identified causal

conditions that determined the process of physician-patient exercise promotion. The constant comparative method was used to saturate categories (Conrad, 1978).

To further investigate the research question in this study, themes directly related to the patient-centered communication, message framing, and presentation mode were further analyzed. These themes were further inspected in all transcript data to more deeply assess codes that created the axis of the resulting model of "physician-patient exercise promotion." In final analysis for this study, the investigator generated the emergent themes into integrated patterns, through the constant comparison process (Glaser, 2002).

As a validation strategy, all participant physicians were invited to review findings as a member check. Researchers individually presented the resulting themes and model to seven participant physicians who volunteered to complete the member check. These participants reviewed then judged the accuracy and credibility of the findings (Creswell, 2007). All seven participants validated the results.

Results. Through data analysis, five primary themes emerged – patient assessment, diabetes description, establishing need, exercise recommendation, and patient involvement.

Theme 1: Patient assessment. Physicians began the patient encounter with an assessment of the patient's physical condition, including the patient's medical history but more specifically patient weight and body mass index. Respondents indicated that this assessment had two purposes: 1) to assess the patient's ability to exercise, and 2) to direct

their own customization of the message, determining if weight loss was the primary goal of exercise.

Theme 2: Diabetes description. Physicians described discussing diabetes in two contexts. First, respondents used the interaction as an opportunity for diabetes education. Physicians described the "disease process" and "cardiovascular risk factors."

In addition to the facts of diabetes, physicians also chose to discuss more counseling-like attributes such as the effect of diabetes on the patient's lifestyle – "Diabetes doesn't take a break so you can't either." Some physicians blended these two approaches while others presented either diabetes as a process, an education-oriented approach, or diabetes as a lifestyle, a counseling-oriented message approach.

Theme 3: Establishing need. Physicians approached exercise recommendations by establishing a need for the patient to enact exercise. Physicians presented the need in terms of the benefits of exercise or the consequences of not exercising. Table 2 presents sample benefits and consequences statements as presented in the establishing need messages.

Table 2. Example quotes from emerging themes

Theme	Physician quote
Establishing the need	
Benefits of exercise	"Reduce weight"
	"Impact/improve glucose control"
	"Improve A1C score"
	"make you feel better, live longer"
	"decrease need for medications"
Consequences of not exercising	"stroke"
	"heart attack"
	"don't want to lose a toe"
Exercise recommendation	
Strategies of exercise	"cardiovascular exercise such as walking or a stationary bike"
	"aerobic exercise"
	"reward yourself when you meet a goal"
Exercise tactics	"parking farther away"
	"use a pedometer"
	"split up 30 minutes into 15 minutes twice a day"
As numeric, concrete recommendations	"exercise approximately 5 days a week for 30 minutes"
	"3 to 5 days a week, 20-30 minutes daily"
	"calculate target heart rate, 220 minus age times .75 for your age"
As semantic recommendations	"at a pace where you are short of breath"
	"exercise more days than not"
	"until you break a sweat"
	"start slow and build up"
	"more active today than yesterday"
	"feel your heart rate go up"

However, nine physicians did not present a message that established the need. Table 3 presents the number of physicians framing messages in benefits versus consequences. One physician also specified that he or she would tailor messages he or

she would deliver to a male versus a female patient, indicating that he or she generally would present consequences to men and benefits to women.

Table 3. Physician framing of the need for exercise

No. of physicians who presented…	
…the benefits of exercise	12
…the consequences of not exercising	2
…both benefits and consequences	2
…neither benefits nor consequences	9

Also included in this thematic category was the recurring message to patients that medication alone does not work and diabetes requires a lifestyle change, which includes exercise and diet.

Theme 4: Exercise recommendation: strategies and tactics. The primary exercise recommendation was the standard of care guideline to exercise 30 minutes, 5 days a week. Some physicians did modify that recommendation based on their physical assessment of the patient. Physicians presented exercise recommendations both as strategies and tactics. Strategies were broad clinical recommendations, while tactics were specific skill building messages. Table 2 presents example quotes of exercise recommendations.

In presenting exercise recommendations, physicians differed in their use of numeric, concrete instruction or semantic direction. Examples of physicians' differing messages are in Table 2.

Theme 5: Patient involvement. Physicians involved patients in the exercise recommendations through goal setting and tactical development. Through goal setting, physicians, together with the patient, set exercise goals and diabetes management goals, emphasizing those that were realistic and practical to achieve.

Physicians helped patients develop exercise tactics through an assessment of patient preferences. Physicians indicated the practice of asking patients what their current exercise behavior was, what activities patients' found "fun and enjoyable," and what social support system they had. Respondents also indicated an assessment of patient barriers to exercise. Physicians then recommended exercise behaviors that met the preferences of and addressed the barriers to the patient.

Throughout all five themes, physicians used an advanced level of vocabulary and medical terminology, such as cardiovascular, insulin production, "BMI," and glucose control.

Emerging model. Through data analysis and the generation of the primary themes grounded in the data – patient assessment, diabetes description, establishing need, exercise recommendation, and patient involvement, the following model emerged (See Figure 2.). The model of physician-patient exercise promotion describes the communication process physicians followed in promoting exercise to type 2 diabetics.

While most physicians described this process as a proactive, typical discussion they would have with diabetes patients, two respondents emphasized that with previously diagnosed type 2 diabetics they were more reactive in their discussions of exercise, either waiting for the patient to ask or asking a single rhetorical question during an appointment.

Physicians primarily described a linear process in which they would progress from stage to stage as depicted in Figure 2. Physicians described a patient encounter that began with a patient assessment, followed by a description of diabetes and the establishment of need for exercise, then exercise recommendation. However, physicians who did not present benefits and consequences followed the diabetes description with exercise recommendations without establishing the need for exercise (This is graphically depicted with the arrow to the right of the flow chart.). Then following the recommendation to exercise, physicians would involve the patients through goal setting and/or tactical development.

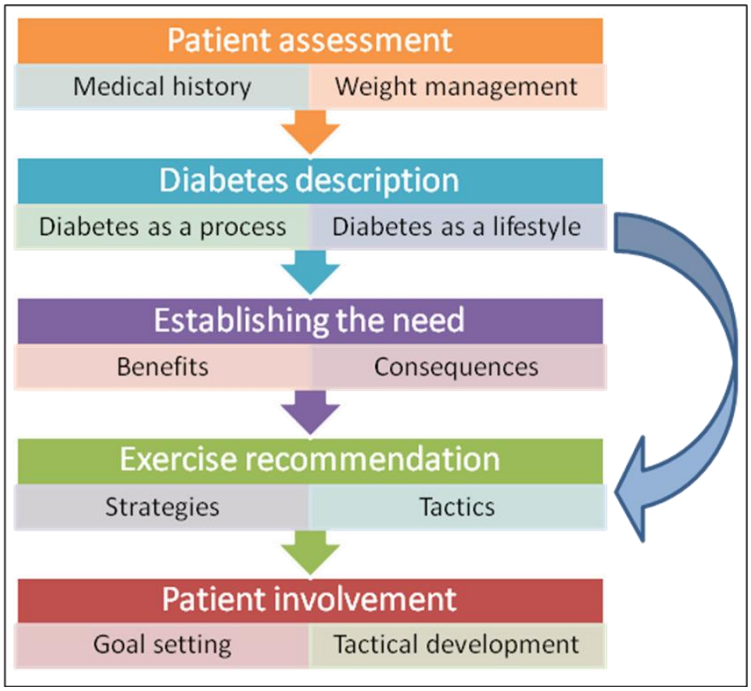


Figure 2. The model of physician-patient exercise promotion

Chapter 3

Intervention Methods

This was a single-site, 6-week, prospective intervention study. The study design used a 2x3 factorial, non-equivalent comparison group quasi-experiment (See Table 4.). The study proposes a repeated measures between-subjects design 1) to allow for truer dissemination of message frames and presentation modes and 2) to prevent additive effects of message treatments from varying message frame or presentation mode conditions.

Table 4. Frame by presentation mode cell assignment

		Presentation mode		
		Semantic (words)	Statistics (numbers)	Graphic (images)
Frame	Gain	Gain-Words	Gain-Numbers	Gain-Images
	Loss	Loss-Words	Loss-Numbers	Loss-Images
Non-equivalent control group				

Procedures

In message development, the researcher pre-tested study messages and worked with physicians to design realistic, evidence-based messages for use in the conditions. These messages followed the model that emerged from phase 1, in which physicians would 1) take a patient assessment, 2) describe diabetes, 3) establish the need for exercise, 4) present exercise recommendations, and 5) set patient goals.

For the semantic condition, the researcher drew from message development interviews to synthesize responses into the semantic word condition and frame them appropriately. For the statistical condition, the ADA standard of care recommendation was the central statistical argument. To design the graphic messages, the researcher followed evidenced-based recommendations (Edwards, Elwyn, & Mulley, 2002; Schapira, Nattinger, & McAuliffe, 2006; Lipkus, 2007), which endorse graphs, specifically bar graphs here, for communicating statistics with patients. See Appendix B-H for intervention messages.

Twenty physician co-researchers (3 per cell, except 2 for loss-numbers) were recruited and trained. Physician training was critical to the understanding of the message manipulations. Training included one-on-one interviews from message development, which were followed by an explanation of the study manipulations, and a group presentation about the study at morning report training. The researcher was also constantly accessible on-site to the physicians throughout the study. Each physician presented a single condition – one message frame/presentation mode message type. The

researcher assigned physicians (three per condition) based on the physician interviews from message development, attempting to match their study message to their most natural presentation. This decision is intended to preserve the validity of the message type and prevent physician mispresentation.

Also to preserve group treatment differences, the physician followed a patient handout with appropriate message framing and presentation mode to guide their discussions with patients. This handout also provided redundancy to increase the accuracy of message transmission (Hsia, 1968). Additionally, to monitor condition validity, a representative random sample of the interpersonal intervention messages was be audio-recorded and transcribed to validate presentation of control, gain, and loss frame groups.

The promotional intervention and measurement was a six-week process for each patient that included eight weeks of patient appointments. Following physician recruitment, the researcher along with the clinic liaison established an appointment schedule for each physician. Appointments were available to patients in both morning and afternoon clinics, Monday through Friday from September 20, 2010, through November 12, 2010.

The researcher then invited patients from the clinic's diabetes educator database via a recruitment letter (See Appendix A.). Patients were instructed to call or email the researcher to participate. As patients volunteered, they requested appointment times and dates, which placed them in condition. Therefore, condition assignment while not

random was designed to 1) facilitate patient participation and 2) place patients in conditions without regard to individual level factors.

At patient appointment, the researcher completed informed consent; patient height and weight was recorded by the clinic nursing staff for BMI calculation; the patient completed the baseline instrument, including measures of knowledge, attitudes, and behaviors prior to the consultation (See Appendix I.); and the researcher trained the patient on pedometer use. Pedometer use has been identified as a reliable measurement of exercise behavior (Strycker, Duncan, Chaumeton, et al., 2007). Each patient received a Tanita PD-724 3-Axes pedometer and an accompanying diary. This model pedometer was selected for 1) its ability to monitor the body's movement from side-to-side as well as forward movement, 2) its ability to be worn around the neck, in a pocket (pants or shirt), or in a bag, and 3) its 7-day memory of step counts.

Following consent and training with the researcher, physicians presented the standard of care exercise recommendations within the appropriate frame/mode condition. The physician also programmed the patient's weight and step length into the pedometer to ensure accurate capture of steps by the pedometer. The physician gave the patient the printed handout (with conditioned message) to take home.

Following the appointment, the physician completed a three-item Likert-style instrument plus an open-ended section for comments. The three items included: "I presented the message within the designed frame, i.e., gain/loss/control;" "The patient 'forced' me to go off message, crossing gain/loss frame;" and "The patient was active in

discussion and asking questions." These three items were intended as another validation check on the message frame and presentation as well as a measure of physician-perceived patient activation.

After the appointment, patients completed a shorter survey of message evaluation and intentions measures (See Appendix J.).

Patients took home a one-week pedometer survey (See Appendix K.) with a self-addressed stamped envelope to record their first week pedometer readings and mail it back to the researcher.

Two weeks following the appointment intervention, the researcher mailed each patient a booster message adapted from each condition's patient handout presented at the appointment. Then two weeks following the booster message, patients were mailed a survey (See Appendix L.), measuring attitudes and behaviors, to complete and return.

Figure 3 displays the intervention timeline for each patient.

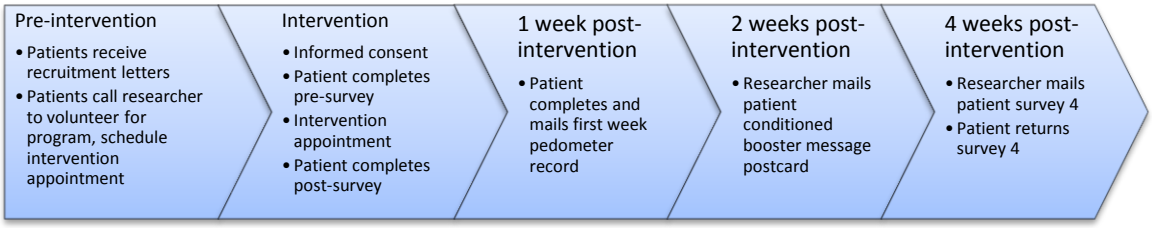


Figure 3. Patient intervention timeline

Participants

The setting for the intervention was the DeWitt Army Community Hospital, a military hospital located in the metropolitan Washington, DC, area. The hospital system provides primary care to more than 30,000 military members, dependents, and retirees. Within the family medicine clinic at this facility, family medicine resident and staff physicians provide primary care to type 2 diabetics. The intervention was delivered on-site as part of regular primary health care.

This study focuses on male and female type 2 diabetics since this type accounts for about 90% to 95% of all diagnosed cases of diabetes in adults (CDC, 2007). Additional inclusion criteria were age (between 40 and 80 years of age) and absence of contraindications for exercise.

Measures

The primary behavioral variable of interest was the steps counted by the pedometer, which should be recorded daily in the participant's diary. For data purposes, analysis used a one-week average of the seven days prior to instrument completion. Surveys also included a question for the participant to estimate the number of minutes engaged in walking exercise over the seven days prior.

Attitudinal variables (measured on Likert scales) regarding exercise and ability to exercise, diabetes beliefs (including agreement with the concept that exercise positively influence sugar control), self-efficacy, and subjective norms were measured. In the survey following intervention, message, source (physician), knowledge, and

communication variables were measured. A validity measure was also included to check the patient's at some level recognizes the gain/loss differentiation of the frames.

Presentation mode preference. At the baseline survey, participant preference of presentation mode was assessed by three Likert-style items on a scale of 1 to 7, "I like to learn more about my diabetes using statistics and numbers;" "I prefer to learn new ideas with pictures, graphs, and tables;" and "I make decisions based on the experiences and stories I've heard my friends and family tell."

Disease-related beliefs. Patient disease-related beliefs were assessed before and after intervention and at one-month following intervention. Four Likert-style items (on a scale of 1 to 7) from the Diabetes Health Threat Communication Questionnaire (Lawson, Bundy, & Harvey, 2007) measured disease-related (specifically diabetes) beliefs. Items include "Diabetes is a serious illness;" "Diabetes interferes with my life;" "Diabetes affects my life everyday;" and "I worry about the possibility of developing future complications from my diabetes."

Exercise-related knowledge and attitudes. Knowledge about walking's effects were measured before and after intervention and one month following intervention with four items: "Walking helps my heart and bones get strong;" "Walking relieves stress;" "Walking helps my insulin work better;" and "Walking improves my blood circulation." These items reflected statements made in the gain- and loss-framed patient handouts.

Measures to assess exercise-related beliefs were adapted from Ajzen's (2004) attitude measures for the Theory of Planned Behavior: "I think that walking for my health will be……pleasant., …beneficial., …good., …valuable."

Self efficacy. Self efficacy was assessed both before and after the intervention. Two different scales were used. At the initial assessment, self-efficacy in relation to walking exercise was assessed using Marcus, Selby, Niaura, and Rossi's (1992) confidence items. Items included: "I am confident I can participate in regular exercise when…I am tired; …I am in a bad mood; …I feel I don't have the time; …I am on vacation; …it is raining or snowing."

After the intervention, self efficacy was measured again with this first set of items and additionally with a measure of self-efficacy regarding general diabetes management behavior adapted from a self-efficacy measure used by Naik, Kallen, Walder, and Street (2008). The six post-intervention items included: "There is a lot that I can do to control my diabetes;" "What I do can determine whether my diabetes gets better or worse;" "Nothing I do will affect my diabetes;" "I have power to influence my diabetes;" "The course of my diabetes depends on me;" "My actions will have no effect on the outcome of my diabetes." At the one-month survey, both sets of items were used.

Social norms. Social norms were measured before and after intervention and at one month following the intervention. Three semantic differential items included: "Most people who are important to me walk 30 minutes five days a week – completely true/completely false;" "The people in my life whose opinions I value…30 minutes five

days a week – walk/do not walk;" and "Many people like me walk 30 minutes five days a week – extremely likely/extremely unlikely."

Patient activation. The licensed patient activation measure (PAM), including four-level segmentation, developed by Hibbard, Stockard, Mahoney, and Tusler (2004) was used to assess participant patient activation prior to intervention. The full PAM includes Likert-style 22 items (α=.91). Items included:

> "I am confident that I can take actions that will help prevent or minimize some symptoms or problems associated with my health condition."
>
> "I am confident that I can find trustworthy sources of information about my diabetes and my health choices."
>
> "I am confident that I can follow through on medical recommendations my health care provider makes, such as changing my diet or doing regular exercise."
>
> "I understand the nature and causes of my diabetes."
>
> "I know the different medical treatment options for my diabetes."
>
> "I have been able to maintain the lifestyle changes for my health that I have made."
>
> "I know how to prevent further problems with my diabetes."
>
> "I know about the self-treatments for my diabetes."
>
> "I have made the changes in my lifestyle, like diet and exercise that are recommended for my diabetes."
>
> "I am confident I can figure out solutions when new situations or problems arise with my health condition."
>
> "I am able to handle symptoms of my diabetes on my own at home."

"I am confident that I can maintain lifestyle changes, like diet and exercise, even during times of stress."

"I am able to handle problems of my diabetes on my own at home."

"I am confident I can keep my health problems from interfering with the things I want to do."

"Maintaining the lifestyle changes that are recommended for my diabetes is too hard to do on a daily basis."

Of these 22 items, a proprietary scoring system uses 13 items to create both a continuous patient activation measure on a scale of 0 to 100, as well as a four-level segmentation (Hibbard, Mahoney, Stockard, & Tusler, 2005). The four-level segmentation begins at level 1, patients who do not perceive control in their health management whether because it is overwhelming, they have no confidence, or are unaware, and continues through level 4, patients who enact self-management behaviors and have made recommended behavior changes but who may have difficulty maintaining behaviors over time or during times of stress. Level 2 identifies patients who have low confidence in self-management, may lack basic knowledge regarding self-management behaviors, and likely look to the physician to manage their health. Level 3 identifies patients who have basic self-management knowledge, some confidence and some success. See Appendix M for licensing information.

Regulatory focus. Regulatory focus was measured on two scales – prevention-orientation and promotion-orientation (Lockwood, Jordan, & Kunda 2002) – which combined 7-point Likert-style items.

Promotion-orientation items included:

“I frequently imagine how I will achieve my hopes and aspirations.”

“I often think about the person I would ideally like to be in the future.”

“I typically focus on the success I hope to achieve in the future.”

“I often think about how I will achieve success.”

“In general, I am focused on achieving positive outcomes in my life.”

“I often imagine myself experiencing good things that I hope will happen to me.”

“Overall I am more oriented toward achieving success than preventing failure.”

Prevention-orientation items included:

“In general, I am focused on preventing negative events in my life.”

“I am anxious that I will fall short of my responsibilities and obligations.”

“I often think about the person I am afraid I might become in the future.”

“I often worry that I will fail to accomplish my life goals.”

“I often imagine myself experiencing bad things that I fear might happen to me.”

“I frequently think about hoe I can prevent failures in my life.”

“I am more oriented toward preventing losses that I am toward achieving gains.”

“I see myself as someone who is primarily striving to become the self I “ought” to be – to fulfill my duties, responsibilities, and obligations.”

Manipulation checks. Three levels of manipulation checks were conducted to assess the frame manipulation. For the patient perception of framing, feedback from the pretest indicated that the single-item semantic differential used as a frame check in the pretest was confusing. Therefore, three 7-point Likert-style items operated as a frame check after the intervention. The first item, "The doctor told me today about walking's influence on my diabetes," was designed to assess a difference between the control group which would receive a message that included instructions and no stated effects of walking exercise on diabetes. The second and third items, "The doctor told me today about the benefits of walking for exercise" and "The doctor told me today about the consequences of not walking for exercise," were designed to capture the patient's perception of the message's gain or loss framing.

For the physicians' perception of frame manipulation, two items were completed for the physician to complete following the patient appointment. The physician indicated agreement with "I presented the message within the designed frame, i.e., gain/loss/control" and "The patient 'forced' me to go off message, crossing gain/loss frame" on a 1 to 7 point scale.

For the third level of frame manipulation check, the third patient appointment of each day was recorded and then transcribed. The researcher coded the patient encounters for framing presentation.

Source credibility. The physician (as source) credibility scale developed by McCroskey and Teven (1999) was used to measure source credibility following the

intervention. The scale included three dimensions of credibility: competence, character, and caring. The 18 7-point semantic differential items included: intelligent/unintelligent, trained/untrained, expert/inexpert, informed/uninformed, competent/incompetent, bright/stupid, cares /doesn't care about me, has/doesn't have my interests my heart, not self centered/self centered, concerned/unconcerned with me, sensitive/insensitive, understanding/ not understanding, honest/dishonest, trustworthy/untrustworthy, honorable/dishonorable, moral/immoral, ethical/unethical, and genuine/phony.

Perceived persuasiveness. The perceived persuasiveness scale (Slater and Rouner, 1996) used in the pre-test was also used in the intervention phase: before, after, and one month following the intervention.

Communication satisfaction. Communication satisfaction was measured after the intervention using items adapted from Cheraghi-Sohi, Bower, Mead, McDonald, Whalley, and Roland's (2006) map of patient preferences. The four 7-point Likert-style items included: "The doctor treated me with respect;" "The doctor listened to me;" "The doctor gave me enough time to ask questions;" and "The doctor clearly explained the benefits of walking."

Argument strength. The argument strength scale (Zhao, Strasser, Capella, Lerman, & Fishbein, in press) from message development was also used following the intervention.

Behavioral intention. Four measures addressed behavioral intention after the intervention and one month following. Two were related to pedometer use and two to

walking. The 7-point Likert-style items were: "I plan to wear my pedometer every day for the next month;" "I plan to walk for 30 minutes five days a week for the next month;" "I will wear my pedometer every day for the next month;" and "I will walk 30 minutes 5 days a week for the next month."

Behavior. At the initial survey, patient exercise behavior was assessed with an item asking the patient to record how many minutes each day of the previous week the patient had exercised.

Following the intervention, behavior was measured with two variables. Patients were instructed to record daily step counts from the Tanita PD-724 3-Axes pedometer's 7-day memory for the previous week. For the same time period, patients were again asked to record how many minutes each day of the previous week the patient had exercised.

Overall Design Strengths and Limitations

A quasi-experiment is preferable to a 'strict' experiment because of its ecological validity in its inclusion of the clinical system and message presentation by the personal physician. The quasi-experiment also provided the ability to test for intervention success that an observational study would not. The researcher's intent was to produce pragmatic ("boots on the ground") implications at study completion in addition to the theoretical applications of results.

However, clinical experiments also present challenges. The clinic, while a relatively closed system, did not allow for the control of a laboratory experiment.

Messages were presented interpersonally by physicians not researchers. Ethical considerations also allowed for potential condition violation if the patient asked questions that would require the restatement of promotional messages in a different frame. The hectic nature of the clinic and the complex appointment system presented time challenges for the physician to present promotional messages. The potential also existed for cross-contamination in the shared waiting room.

The premise of ecological theory is that behavior change results from synergistic and multiple effects in a complex social system. The intervention and assessment were well-suited to create and study communication behavior change in this real-world setting. The ability to link physician-message-patient measures allowed the researcher to draw valid conclusions about the impact of the intervention on patient outcomes. Thus, the strength of this study design lay in its ecological and external validity.

Chapter 4

Intervention Results

Participants

Recruitment letters were mailed to 1,520 patients. Throughout recruitment, 142 patients volunteered to participate. Of these, 133 successfully scheduled appointments. However, three volunteers chose not to participation in the intervention following consent. Therefore, 130 patient volunteers participated in the clinical intervention. Figure 4 presents the flow of participants through each stage of the intervention experiment.

Of the 130 patients who participated in the intervention (and completed both the pre-intervention and post-intervention survey, 105 patients (80.77%) completed and returned the one-week post-intervention pedometer record, and then 84 patients (64.62%) completed and returned the five-week post-intervention pedometer record and survey.

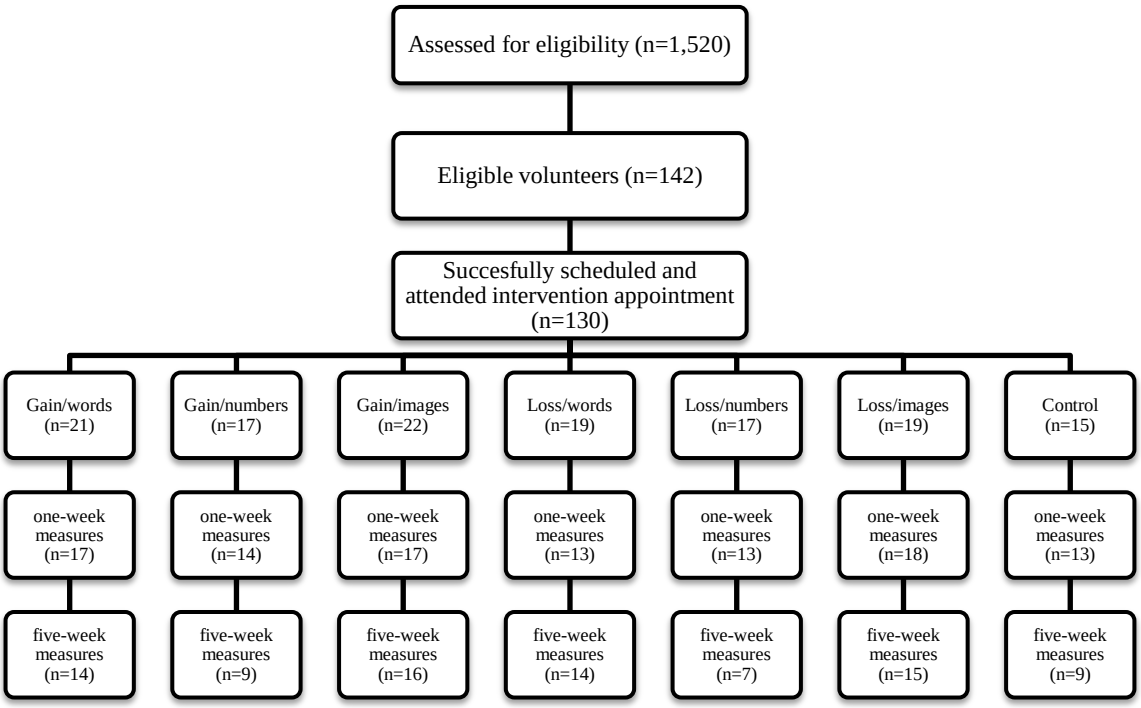


Figure 4. Flow of participants

Table 5 presents the study sample characteristics. Since patients were grouped with non-random placement, statistical tests checked for significant associations of the demographic variables and condition. Cross-tabulation chi-squares assessed the categorical patient variables (gender, ethnicity, education) for grouping into conditions. No significant associations were found. One-way analysis of variance tested the continuous patient variables (age, years since diagnosis, A1c prior to intervention). Again, no significant associations were found.

Table 5. Sample characteristics

		n	% of N=130
Gender	Female	62	47.7%
	Male	68	52.3%
Ethnicity	White	80	62.5%
	Black or African-American	37	28.9%
	Asian	5	3.8%
	Hispanic	4	3.1%
	American Indian or Alaska native	1	.8%
	Native Hawaiian or other Pacific islander	1	.8%
Education	High school diploma or GED	7	5.4%
	Some college	28	21.9%
	Associate's degree	11	8.5%
	Bachelor's degree	25	19.5%
	Some graduate school	10	7.8%
	Graduate degree	43	33.6%
	Professional degree (J.D., M.D.)	4	3.1%
	Mean	Range	S.D.
Age	59.81	40-79	8.840
Years since diabetes diagnosis	8.03	0-34	8.025
A1c prior to intervention	7.229	5-11.9	1.156

Data Analysis

Survey analysis. Quantitative analyses were conducted using the SPSS Version 16.0. Tests of statistical significance were set at a pre-determined alpha level of 0.05 (two-tailed).

Measures and scale reliability. All measures were assessed on a 1 to 7 scale; scales were transformed to provide continuity where 7 was the 'positive' end of the item.

Disease-related beliefs. The four Likert-style items from the Diabetes Health Threat Communication Questionnaire (Lawson, Bundy, & Harvey, 2007) had acceptable reliability, Cronbach's α=.733. The scale mean was 5.70, range 2.5 to 7.

Exercise-related knowledge and attitudes. The four baseline items measuring knowledge about walking's effects were averaged, mean=5.843 (range 2.75-7). The measures of attitudes toward walking were also averaged to construct an attitude scale, which has high reliability, Cronbach's α=.946. The attitude mean was 6.389 (range 4.25 – 7). At the initial assessment, the scale measuring self-efficacy toward walking exercise had acceptable reliability, Cronbach's α=.795. The scale mean was 5.601 (range 1.75-7).

After the intervention, self efficacy was measured a second time with this first set of items; again the scale had good reliability, Cronbach's α=.873. Additionally, the scale of self-efficacy regarding general diabetes management behavior was constructed from a self-efficacy measure used by Naik, Kallen, Walder, and Street (2008). Here, scale reliability was low, Cronbach's α=.596.

Social norms. The social norm scale before intervention also had high reliability, Cronbach's α=.919. The scale mean was 3.683 (range 1 – 7).

Patient activation. The 13-item patient activation measure (PAM) scale developed by Hibbard, Stockard, Mahoney, and Tusler (2004) had high reliability, Cronbach's α=.851. The study population mean was 51.298 (s.d. 11.414, range 16.5-100). For the four-level segmentation of patient activation, 33.6% participants were identified as level 1; 36.7% as level 2; 19.5% as level 3; and 10.2% as level 4.

Regulatory focus. Regulatory focus was measured on two scales – prevention-orientation and promotion-orientation (Lockwood, Jordan, & Kunda 2002). Both scales had high reliability, prevention-orientation, Cronbach's α=.816; promotion-orientation, Cronbach's α=.846. The prevention-orientation mean was 4.150 (range 1.125-7); the promotion-orientation mean was 5.357 (range 1.571-7).

Source credibility. The physician credibility scale (McCroskey & Teven, 1999) had high reliability, Cronbach's α=.954. The scale mean was 6.721 (range 3.722 – 7).

Perceived persuasiveness. The perceived persuasiveness scale (Slater and Rouner, 1996) had acceptable reliability, Cronbach's α=.770. The scale mean was 6.225 (range 3.5 – 7).

Communication satisfaction. The physician communication satisfaction scale constructed from Cheraghi-Sohi, Bower, Mead, McDonald, Whalley, and Roland (2006) had high reliability, Cronbach's α=.967. The mean was 6.773 (range 3.8 -7).

Argument strength. The argument strength scale as computed according to Zhao, Strasser, Capella, Lerman, and Fishbein (in press) had low reliability, Cronbach's α=.698. After this result, the argument strength scales was recomputed, dropping the "put thoughts in my mind about not wanting to walk" item. The reliability then improved, Cronbach's α=.761. On this iteration, the argument strength mean was 6.562 (range 4.75 – 7.00).

Manipulation checks. Three levels of analysis were conducted to operationalize frame differences – a patient-perceived check, a physician-perceived check, and a researcher-perceived check.

Three 7-point Likert-style items operated as a frame check after the intervention. Analysis of variance with contrast was used to test the patient's perception of message frame. For the control item, "The doctor told me today about walking's influence on my diabetes," there was not a significant effect of frame (gain, loss, control) on perception, $F(2,125) = 1.586$, $p<.05$. For the item intended to identify patient perception of gain framing, "The doctor told me today about the benefits of walking for exercise," there was not a significant effect of frame (gain, loss, control) on perception, $F(2,125) = 1.054$, $p<.05$. And for the item intended to identify patient perception of loss framing, "The doctor told me today about the consequences of not walking for exercise," there was a significant effect of frame (gain, loss, control) on perception, $F(2,127) = 77.592$, $p<.01$. Planned contrasts revealed that receiving the loss framed message significantly increased perception of loss framing compared to receiving the gain message, $t(125)=6.068$, $p<.01$, r=.47.

A secondary frame check was the physician's feedback on two items. For the item, "I presented the message within the designed frame, i.e., gain/loss/control," the mean response was 6.429 (range 5 to 7), where 1 is strongly disagree to 7 strongly agree. For the item, "The patient 'forced' me to go off message, crossing gain/loss frame," the mean response was 1.992 (range 1 to 7). Table 6 presents the frame condition

differences. The two frame check items were negatively correlated, *Pearson's r*=-.412, $p<001$. A one-way ANOVA tested physician-perceived frame check differences by frame condition. For frame presentation, no significant difference was detected. However, loss group physicians perceived they were forced off frame more than gain group physicians, $F(1,111)=10.052$, $p<.005$.

Table 6. Physician-perceived frame check group differences

	Message frame					
	Gain		Loss		Control	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
"I presented the message within the designed frame."	6.458	.597	6.278	.529	6.923	.277
"The patient 'forced' me to go off message."	1.723	1.096	2.500*	1.476	1.077	.277

*p<.005

The third frame check was the audio-recording of physicians presenting the messages. Nineteen patient encounters (gain condition n=8, loss condition n=9, control condition n=1) were successfully recorded and transcribed. For each transcript, the physician messages were coded for number of gain and loss messages communicated. This coding was converted into a percentage to represent the ratio of gain messages to

total messages. The percentages were then averaged across each frame condition. For the gain condition, physicians presented an average 100% gain messages. For the loss condition, physicians presented an average 16.43% gain messages. A one-way ANOVA showed this difference to be significant, $F(1,16)=96.552$, $p<.001$. The one control-condition patient interaction was not included in this analysis as the control message presented neither benefits nor consequences; the control recorded encounter stayed on the control message.

Communication variables. Table 7 presents the correlation matrix of the communication variables of interest to the study.

Table 7. Correlation matrix of communication variables

	Mean	S.D.	2	3	4	5
1. Patient activation measure (pre-test)	51.298	11.414	.162	.209*	.193*	.253**
2. Physician credibility	6.721	.526		.616**	.550**	.644**
3. Communication satisfaction	6.773	.497			.544**	.441**
4. Perceived argument strength	6.529	.461				.521**
5. Perceived persuasiveness	6.225	.788				

** Correlation is significant at the .01 level (2-tailed).
* Correlation is signification at the .05 level (2-tailed).

Relationships among variables. Another guide for exploring variables of interest is the theory of planned behavior (TPB), which specifies variables of interest to studies of behavior change (Ajzen, 2002). Table 8 presents the Pearson's correlations among variables of interest post-intervention.

Table 8. Correlation matrix of variables related to TPB

	Mean	S.D.	2	3	4	5	6	7	8	9
1. Diabetes Health Threat Communication Questionnaire (post-test)	5.700	1.023	.092	.309**	.241**	.189*	.096	-.075	.307**	.076
2. Patient activation measure (pre-test)	51.298	11.414		.232**	.140	.347**	.275**	.202*	.290**	.079
3. Knowledge about walking (post-test)	5.843	1.021			.284**	.325**	.271**	.068	.446**	-.046
4. Attitude toward walking (post-test)	6.389	.687				.318**	.140	.128	.533**	.279**
5. Self-efficacy toward walking (post-test)	5.601	.961					.273**	.270**	.502**	.188
6. Self-efficacy toward diabetes management (post-test)	6.462	.591						-.020	.292**	-.089
7. Social norms of walking (post-test)	3.683	1.786							.190*	.141
8. Intention to walk (post-test)	6.579	.585								.343**
9. Pedometer average one week following intervention	5437.471	2652.126								

** Correlation is significant at the .01 level (2-tailed).
* Correlation is signification at the .05 level (2-tailed).

Theoretical exploration. The first theoretically proposed relationship in this study was the research question, for the diabetic patient, how are patient activation and

regulatory focus related. Here, patient activation positively correlated with promotion-orientation r=.267, p=.002, but not with prevention-orientation, r=.026, p=.769. This provides support for the proposed relationship between regulatory focus and involvement that patient activation represents promotion-orientation in the intersection between the two concepts.

Another variable of interest that would relate to regulatory focus is perceived threat of the illness. Here, the measure of threat, DHTCQ, positively correlated with both prevention r=.234, p=.008, and promotion-orientation, r=.186, p=.037.

Intervention effects. Knowledge of the effects of walking on diabetes increased significantly. There was a significant difference in the scores for knowledge pre-intervention (mean=5.860, s.d.=1.024) and post-intervention (mean=6.599, s.d.=.526) conditions, $t(119)$=9.141, p=.000. The intervention, however, did not have a significant effect on walking attitudes.

Social norms and self-efficacy also changed positively following the intervention. There was a significant difference in the scores for social norms concerning walking pre-intervention (mean=3.703, s.d.=1.814) and post-intervention (mean=4.036, s.d.=1.743) conditions, $t(118)$=2.522, p<.05. There was a significant difference in the scores for self-efficacy toward walking pre-intervention (mean=5.594, s.d.=.959) and post-intervention (mean=5.958, s.d.=.867) conditions, $t(122)$=5.791, p=.000.

These intervention effects were across conditions. A univariate analysis of variance testing message frame and presentation mode effects on each dependent variable

showed no condition differences for change in knowledge, attitude, social norms, or self-efficacy.

Hypothesis testing. Prior to the tests of the hypothesized effect of message frame and presentation mode on perceived persuasiveness, two additional variables were tested as dependent variables. First, for the dependent variable communication satisfaction, a full-factorial model analysis of covariance (ANCOVA) included the fixed factors message frame and presentation mode and covariates patient activation and baseline physical activity. In the model, only the covariate patient activation had a significant association with the dependent variable, $F(1,101)=7.001$, $p<.01$, *partial* $\eta^2=.07$. No main effect was detected for frame or presentation mode.

The full factorial ANCOVA was then tested on the dependent variable argument strength. In the model, the covariate patient activation had a significant association with the dependent variable, $F(1,101)=7.426$, $p<.01$, *partial* $\eta^2=.07$. The covariate baseline activity also had a significant association with argument strength, $F(1,101)=8.340$, $p<.01$, *partial* $\eta^2=.08$. Controlling for covariates, message frame was significantly associated with argument strength, $F(1,101)=4.428$, $p<.05$, *partial* $\eta^2=.04$. Participants attributed the greatest argument strength to the loss-framed message ($mean_{adj}= 6.628$) as compared to the gain-framed message ($mean_{adj}= 6.435$) and the comparison message ($mean_{adj}= 6.315$).

The full-factorial ANCOVA was then tested on the dependent variable perceived persuasiveness, including the fixed factors message frame and presentation mode and

covariates patient activation and baseline physical activity. In the model, the covariate patient activation had a significant association with the dependent variable, $F(1,101)=7.901$, $p<.01$, *partial* $\eta^2=.07$. No main effect for message frame or presentation mode was detected.

For testing of the hypothesized interaction effects, a custom model ANCOVA included main effects for message frame and presentation mode and interaction effects for message frame by patient activation and presentation mode by patient activation. In the model, the covariate patient activation had a significant association with the dependent variable, $F(1,99)=6.507$, $p<.05$, *partial* $\eta^2=.06$. No interaction effect for message frame by patient activation was detected. Therefore, hypotheses 1(a) was not supported. Neither was an interaction effect for presentation mode by patient activation detected; therefore, hypotheses 2(a) and 3(a) were not supported.

For the same ANCOVA model with attitude toward walking as the dependent variable, the test detected no main effects for frame or presentation mode on the dependent variable exercise-related attitudes. The covariate patent activation was significantly related to exercise-related attitudes, $F(1,97)=4.011$, $p<.05$, *partial* $\eta^2 = .04$.

The customized model ANCOVA was repeated with the dependent variable intention to walk. Again, no main effect or interaction effects for either message frame or/by presentation mode were detected on walking intention. The covariate patient activation was significantly related to intention to walk 30 minutes per day for at least

five days per week, $F(1,97)=13.870$, $p<.001$, *partial* $\eta^2=.13$. Therefore, hypotheses 1b, 2b, and 3b were not supported

To test hypotheses 1c, 2c, and 3c, a full-factorial model ANCOVA included message frame and presentation mode main effects with covariates baseline activity and patient activation on the dependent variable one-week pedometer steps. Controlling for covariates, there was a marginally significant association between message frame and pedometer steps, $F(1,88)=3.754$, $p=.056$, *partial* $\eta^2=.05$. The same ANCOVA was performed on the dependent variable five-week pedometer steps. Controlling for covariates, the frame effect is no longer significant.

To test across the dependent variables, a repeated-measures (RM) ANCOVA was tested using message frame and presentation mode as fixed factors and patient activation and baseline activity as covariates. The dependent variable was the repeated-measure value across week one pedometer readings and week five pedometer readings. In the full-factorial model, controlling for the covariates, message frame was significantly related to steps, $F(1,62)=4.057$, $p<.05$, *partial* $\eta^2=.06$. Figure 5 presents the adjusted means for message frame main effects. No significant main effects were detected for presentation mode.

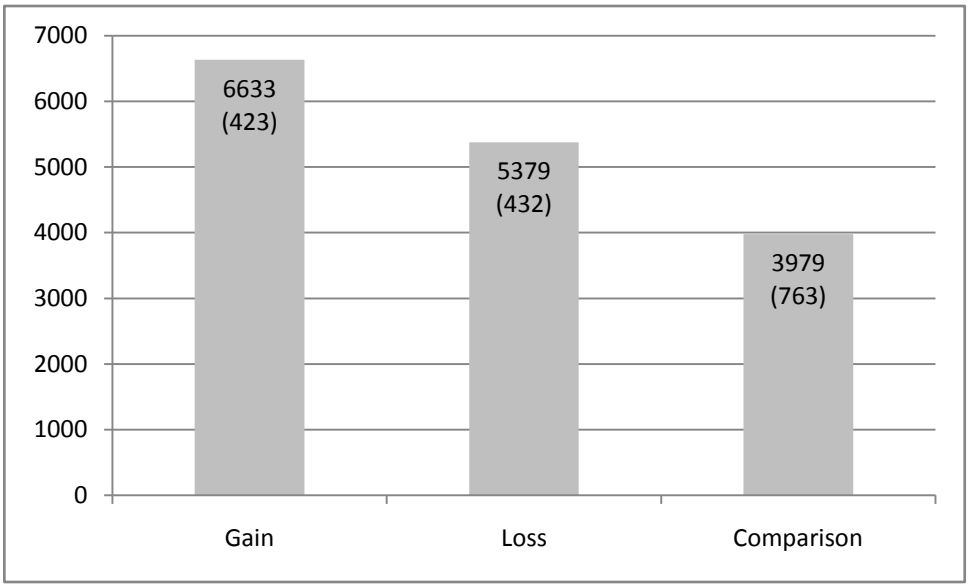


Figure 5. Message frame effects on behavior across repeated measures pedometer steps. Numbers at top of bars are adjusted group means (standard errors).

To extend the test to include the hypothesized interaction of message frame with patient activation, interaction terms of patient activation by message frame and patient activation by presentation mode were included in a customized model of the RM ANCOVA and tested with only the treatment cases. In this model, there were no significant message frame main effects or message frame by patient activation interaction effects associated with behavior. Therefore, hypothesis 1c is not supported.

This customized RM ANCOVA model including patient activation interactions did, however, detect significant presentation mode main effects on behavior, $F(2,53)=3.458$, $p<.05$, *partial* $\eta^2=.12$, and significant presentation mode by patient activation interaction effects, $F(2,53)=3.252$, $p=<.05$, *partial* $\eta^2=.11$. This result

provides support for the patient activation by presentation mode interaction hypothesized in 2c and 3c.

To visualize these effects, the RM ANCOVA was replicated using the PAM 4-level segmentation as a fixed factor. Figure 6 presents the presentation mode by patient activation interaction effects on the repeated-measure behavior. For inactivated patients (level 1), the graphically-presented message resulted in greater pedometer steps than the numerically-presented messages; whereas for the activated patients (level 4), the statistically-presented message resulted in greater pedometer steps than the graphically-presented message.

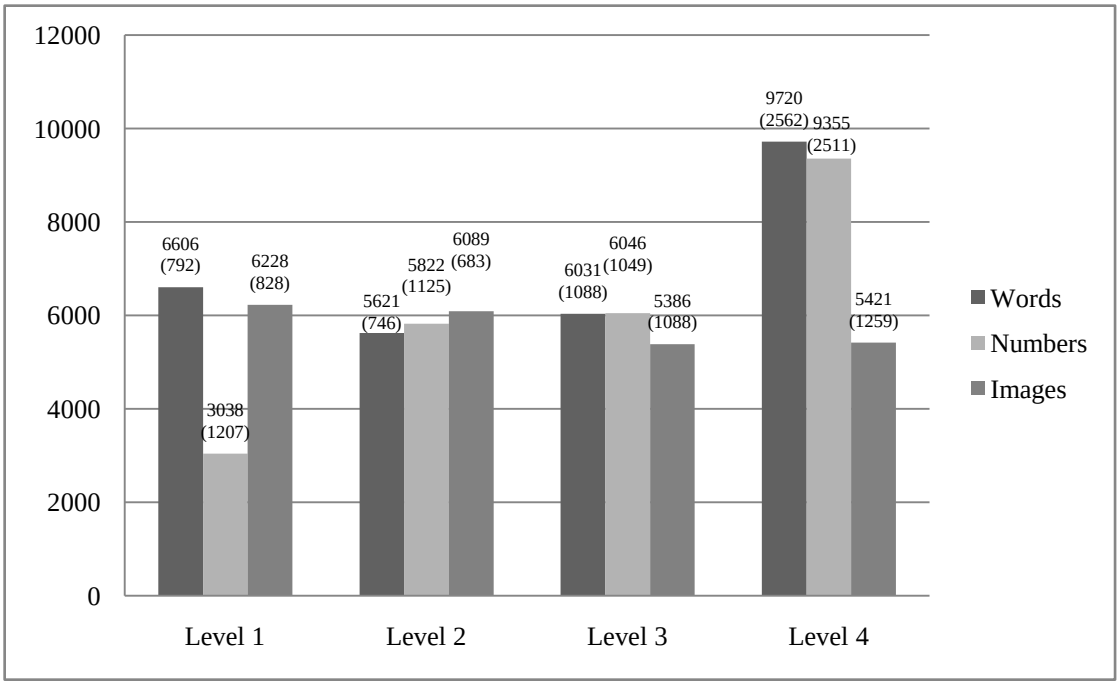


Figure 6. Presentation mode by 4-level patient activation interaction effects on behavior. Numbers about the bars are adjusted group means (standard errors).

Chapter 5

Discussion

A recent study showed that American adults average 5,117 steps per day (Bassett, Wyatt, Thompson, et al., 2010). Ultimately, this intervention was successful in its promotion of walking behavior, in that it delivered promotional walking messages to 130 type 2 diabetic patients, increasing patient knowledge of walking's beneficial effects on diabetes management, positively influencing social norms about walking, and increasing patient self-efficacy toward walking. Moreover, the gain and loss treatment groups at both one and five weeks averaged more than 5,400 steps (the control group less at 4,769 and 4,865 steps). This result alone contributes to the evidence for clinic promotion of walking.

This study was designed to identify ecologically-valid message variables that could affect physician success in persuading type 2 diabetics to enact the ADA physical activity recommendations. Theoretically-driven, the study explored the intersection of regulatory focus and involvement as they operate within the persuasion frameworks of prospect theory and the elaboration likelihood model.

Message Frames

Results here support past research findings that gain-framed messages are more effective in promoting exercise behaviors. While consistent with previous research, this contradicts this study's hypothesis that framing effects would occur only for activated patients. This result is evidence of the concept that gain and loss message effects ultimately depend not on individual receiver factors but the target behavior itself. In this study, walking was accepted as a promotion behavior rather than a preventive behavior (O'Keefe & Jensen, 2011).

Prospect theory addresses the balance of risk in the targeted behavior and potential outcomes (Rothman, Bartels, Wlaschin, & Salovey, 2006). When the behavior is associated with a low risk, gain frames are more effective; whereas behaviors associated with high risk are more effectively influenced by loss frames (Bartels, Kelly, & Rothman, 2010). Walking is not likely perceived as a risky behavior. Likewise, enacting walking does not have questionable effects. Most people understand that it will benefit them. Among this population or any population, a riskier behavior such as a drug therapy could result in a different outcome. When the patient is presented the potential gains and losses of a drug that has its own associated risks, the patient must calculate which risk is more temporal, severe, and applicable to his or her self.

Another explanation for the positive gain message effects in this study is the kernel state (O-Keefe and Jensen, 2011) difference. When contrasting gain and loss effects in this study, to preserve the comparability of the messages, loss was presented

simply as loss of potential gains. The presentation of more severe losses may have strengthened the loss message, such as neuropathy, potential loss of limbs, and ultimately death. This type of loss presentation was identified in physician interviews in which a physician discussed "losing a toe" as a consequence of not walking. Diabetes is a complicated illness influenced my multiple factors, and while not walking would not singly lead to any of these outcomes, not walking may contribute to the mismanagement of diabetes that might lead to one of these results.

While framing effects were detected in the one week behavior and across the repeated measure, effects were not detected at five weeks. In this interim, patients received a booster message according to the frame. A potential influence of behavior is the message's delivery medium. The mailed, written medium postcard did not have the same effect as the interpersonally-delivered message.

Part of this study's theoretical exploration included the role of regulatory focus in prospect theory hypotheses. This study explored the relationship between patient activation and regulatory fit for the diabetic patient. As hypothesized, patient activation positively correlated with promotion-orientation. Also, a relationship was detected between disease threat and regulatory focus. The threat measure positively correlated with both prevention and promotion-orientation but more so with prevention orientation. This may be a signifier that perceived threat measured by the DHTCQ is similar to the perceived risk that a prevention-orientation aims to reduce.

Results clearly emphasize the role of patient activation. Patient activation influenced communication and intention variables. While it was significantly associated with behavior, it did not moderate message frame effects. Following intervention, while the gain frame had a significant effect on behavior, there was not a difference between central (activated) and peripheral (non-activated) processors. This finding contradicts previous studies that establish framing effects only for involved participants (Rothman & Salovey, 1997; Millar & Millar, 2000; Salovey & Wegener, 2003; Hevey, Pertl, Thomas, et al., 2010). However, this finding provides evidence that message frames, rather than acting as argument factors, are cues (Nenkov, Inman, Hulland, & Morrin, 2009) that operate as persuasive factors to peripheral processors.

In this case, the message frame as a cue could also have affected the patient's level of activation and therefore position on the elaboration continuum (Salovey & Wegener, 2003). The patient activation measure was assessed prior to the intervention but not following. One hypothesis for the reason of framing effect of the low activation patients is that the gain-framed messages acted as a force for activating these patients.

Understanding message frame effects – contributing to the theory base. Salovey and Wegener (2003) recommend four potential explanations for message frame effects: questions of cue effects, differential argument strength, biased processing, and levels of processing. The current study included measures that related to these possible explanations.

Cue effects. The first potential explanation is the concept that message frames prompt higher processing and scrutiny, rather than operating as simple cues in persuasion (Nenkov, Inman, Hulland, & Morrin, 2009). Salovey and Wegener (2003) present as evidence for this argument studies that show long-term message frame effects (Schneider et al, 2001), which contradict the ELM proposition that cued effects achieved through the peripheral route are temporary (Petty & Wegener, 1999). Results in this study, however, did not establish long-term message effects. The framing effect was significant one week following the interpersonal intervention, but not significant at five weeks following, even with a mailed booster message. Therefore, this study supports the role of framing as a cue effect rather than as a higher processing factor.

Argument strength. Salovey and Wegener (2003) secondly proposed that gain and loss frames may differentiate in argument strength. While the current discussion has already addressed the potential differentiation of kernel states that could affect this proposition, argument strength was an included measure in the current study. In results here, the loss-framed message was assessed as a stronger argument than the gain-framed message, indicating that it was not argument strength that prompted the message frame effect.

Biased processing. The persuasion setting here was a natural setting for exercise promotion messages, through which patients had likely received previous promotional messages. As an interpersonally delivered message, physician-level measures may have

had an influence with regard to this concept. However, patient perception of communication satisfaction with physician was not related to message frames.

Levels of processing. The one potential measure included here was attitude toward the target behavior. Results showed that message frame did not influence attitude toward walking. However, the study did not include measures of message expectancy. Patients may expect a certain type of message frame from physicians. The presentation of messages could create an expectancy violation (Burgoon & LePoire, 1993) and prompt greater message processing. If patients had routinely received loss-framed messages from physicians, gain-framed messages could prompt more processing and then behavior change.

Presentation Mode

In this study, physicians used both verbal and numeric messages across the emerging model's stages. Numeric messages were primarily in the exercise recommendation stage, providing concrete direction to patients. However those who used verbal message presentation delivered ambiguous messages that allowed the patient to interpret what appropriate levels of exercise activity was, a practice not uncommon in medicine overall (Nakao & Axelrod, 1983). This ambiguity could lead to patients enacting behavior that the patient qualifies as exercise but that the physician would not.

The other example of numeric messages was in the establishing need theme when some physicians used numeric messages to discuss weight loss. However, no physician discussed numeric statistics when discussing insulin or glucose control. For the high

involvement patient, the elaboration likelihood model suggests that statistics could build a stronger argument and thus provide a more effective establishment of need message (Slater & Rouner, 1996).

Results here present evidence for this interaction. While presentation mode presented no main effects on the dependent variables, presentation mode by patient activation interaction was significant. As predicted by the elaboration likelihood model, the statistically-presented message had a greater positive effect on behavior for activated patients while the graphically-presented message had a greater positive effect on behavior for inactivated patients. This provides evidence that statistics as an argument are most effectively used in targeting patients who are activated (central processors) or conversely that graphs are effective in targeting patients who are not activated (peripheral processors).

While patient activation did not act as a moderator for framing effects, it did moderate presentation mode effects. This indicates that presentation mode effects are individually dependent. However, in this study, a confounding factor with regard to presentation mode may have been patient numeracy skills. The primary message presented in this intervention was the effect of walking behavior on A1c, a numerical measure presented as a percentage. The presentation mode factor compared the presentation of words, statistics, and images, but each was ultimately representing a numerical concept. While this study assessed patient activation, it did not assess general numeracy (Osborn, Cavanaugh, Wallston, et al, 2010) or diabetes-related numeracy

(Huizinga, Elasy, Wallston, et al, 2008). Higher numeracy skills have been associated with greater self efficacy and lower A1c (Osborn, Cavanaugh, Wallston, et al, 2010). Additionally, numeracy skills also account for graphicacy (understand information in graphic form) skills (Brown, Culver, Osann, et al., 2011).

Results here also provide insight into the various levels of measures that can be used in a behavior change study. Included here are recall, attitudinal, intention, and behavior variables. An interesting finding is that the main and interaction effects found for the message variables were primarily on the behavioral measures. Had the study only collected attitudinal and intention measures, the effect would not have been found. This has important implications for communication research, recommending that behavioral measures be used more frequently.

Limitations

The greatest strength of this study, its ecological validity presenting an intervention from physicians to patients, may also have been its greatest limitation. While the study design and data analysis accounted for covariates and individual factors, participant recruitment and participation presented limitations of selection bias and ceiling effects on the variable patient activation. Patients were not incentivized to participate so motivation was likely internal that was a part of patient activation.

Ecological validity also presented a challenge with the targeted audience. The broad age range of 40 to 80 years old could have been segmented further to better design messages and survey measures and instruments. The extended list of measures resulted

in a lengthy initial and follow up instrument, which could cause fatigue, particularly among the more senior adults in the intervention. This consideration of instrument length also prevented the inclusion of thought-listing items often included in studies within the ELM framework. The two open-ended items that did prompt thought listing were responded to by approximately five percent of participants, potentially because of instrument fatigue.

Additionally, as indicated in the investigation of current physician practice, participating physicians overwhelmingly preferred gain frames as a presentation style; this could have resulted in more natural presentations of gain than loss frames.

The design of presentation mode messages, while experimentally comparative, was not as strong for their individual modes as literature recommends. First, the word message presented the verbal benefit of the A1c decrease but did not develop the message further. Inclusion of narrative evidence, which has been shown to have an effect on risk perception (deWit, Das, & Vet, 2008) and a positive effect on health promotive behavior (Lemal & Van den Bulck, 2010), could alter the comparable effects of the verbal message. Second, the depiction of the loss message was difficult to achieve. While bar graphs are effective in presenting comparative risks (Schapira, Nattinger, & McAuliffe, 2006; Lipkus, 2007), there is no evidence for creating visuals to depict the specific concept of benefit versus lack of benefit. A different graphical display of this concept, such as a pictorial or iconic, may have had more impact on patients.

Implications for Practice

As the physician-patient model continues to shift from a paternalistic toward a consumerist approach, physicians may need more communication training, specifically in persuasive strategies such as message framing. Results here specify that for type 2 diabetics messages should include gain-framed messages as reasons for exercising. Additionally, training could address the utilization of multimodal messages to address both the establishment of need and exercise recommendations. Exercise promotion messages should be supported by statistics when talking to activated patients and by graphs when talking to non-activated patients.

The important role of patient activation also suggests that physicians could better tailor messages and interventions if patients completed annual measures of patient activation that could be a psycho-social measure linked to their medical records just as physiological measures of height and weight are now. Measures of promotion-orientation and prevention-orientation could also provide useful in tailoring messages. The positive effect of patient activation on communication satisfaction and intention also provide evidence for efforts to increase patient activation among patient panels. A potential theoretical connection here is between patient activation and the transtheoretical stages-of-change model (Slater, 1999). Patient activation efforts could also have a beneficial effect on moving patients from one stage to the next as they consider proposed behavior change.

The qualitative analysis of physicians' current practice showed that physicians use gain and loss framing when presenting the "establishing the need" theme. Physicians differed in their presentation of gains versus losses and appeared to differ in the presentation by individual characteristics and preferences rather than by personalization of the message to the patient. The one case of personalization by patient was the physician who described customizing the need message by gender. Of those physicians presenting a framed need message, the majority of respondents used a gain frame, which is the evidence-based framing recommendation in literature (Rothman, Bartels, Wlaschin, et al., 2006; Edwards, Elwyn, Covey, et al., 2001). Additionally, if type 2 diabetics are assumed to be highly involved in the issue due to their diagnosis, the framing effect is reinforced (Meyers-Levy & Maheswaran, 2004; Millar & Millar, 2000). However, in debrief, none of the participants were familiar with the gain/loss framing literature and expressed a preference for the gain frames based on physician personality and experience.

Another theoretical implication is the choice by nine of 25 of the physicians to present recommendations without establishing the need for the behavior. Without the establishment of need, physicians are not providing a persuasive context for the recommended behavior. These physicians may unconsciously be relying on their perceived expertise as a source to enact patient behavior change (Jones, Sinclair, & Courneya, 2003). However, for the high involvement patient, this source cue will likely

not be strong enough to initiate central message processing for the patient (Petty & Wegener, 1999).

Like any profession, medicine has its own vocabulary, which physicians default to as they talk to patients about diabetes as a disease and about exercise recommendations. Differing patient levels of health, science, and math literacy, however, dictate that physicians customize messages to patient levels. In physician interviews, this study found medical vocabulary related to diabetes that may provide a barrier to patient understanding, particularly the newly diagnosed who is not yet steeped in the medical terminology.

APPENDIX A: Recruitment letter

Dear Patient:

We write to invite you to participate in the "Walk with DeWitt" program, a study of improving patient outcomes through physician communication. In partnership with researchers at George Mason University, we are looking at how much patients, who have been diagnosed with type 2 diabetes, walk daily and how that walking activity influences their diabetes management.

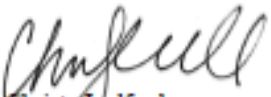
Volunteers will receive a pedometer to track how much walking they accomplish over six months. Along with the pedometer, you will receive a diary to record your daily walking progress. If you choose to volunteer, your participation will begin with an appointment at the DeWitt Family Medicine Clinic and will end with a follow-up appointment six months from that date. You will also be asked to complete four surveys over the six-month period that will ask questions about your physical activity. We will also request 21 patients to allow us to audio record their initial discussion with the physician so that we can document what the physicians say and the types of questions patients ask.

If you would like to participate or have questions about the program, please contact Mrs. Christy Ledford via e-mail at walkwithdewitt@gmail.com or by telephone at 703-805-0571. Mrs. Ledford will follow this letter with a telephone call within two weeks to answer any questions you may have. If you choose to not participate in this study and prefer to not be contacted further, please also e-mail or call Mrs. Ledford.

Thank you for your time and attention.

Sincerely,

Maj. Marc Childress, M.D., MC
Faculty Physician
DeWitt Army Community Hospital



Christy Ledford
Department of Communication
George Mason University

APPENDIX B: Intervention message – control

WALK WITH DEWITT

The American Diabetes Association recommends walking as exercise. For most people, it's best to aim for a total of about 30 minutes a day, at least 5 days a week.

If you haven't been very active recently, you can start out with 5 or 10 minutes a day and work up to more time each week. Or split up your activity for the day—try a brisk 10-minute walk after each meal.

Other ways to fit walking exercise into your day…

- Walk instead of drive whenever possible.
- Take the stairs instead of the elevator.
- Walk around while you talk on the phone.
- Work in the garden, rake leaves, or wash the car.
- Play with the kids.
- Carry things upstairs in two trips instead of one.
- Park at the far end of the shopping center lot and walk to the store.

The A-1-C check is the blood glucose check "with a memory." It tells you what your average blood glucose level has been for the past 2 to 3 months.

My last A-1-C was ____.

My target for my A-1-C is _____.

APPENDIX C: Intervention message – gain by words

WALK WITH DEWITT

The American Diabetes Association recommends walking as exercise. Walking exercise makes your heart and bones strong, relieves stress, helps your insulin work better, and improves blood circulation. In addition, it cuts your risk for heart disease by lowering your blood glucose, blood pressure, and cholesterol levels. Research shows that if you walk 30 minutes a day, at least 5 days a week you can significantly reduce your HgA1C.*

If you haven't been very active recently, you can start out with 5 or 10 minutes a day and work up to more time each week. Or split up your activity for the day—try a brisk 10-minute walk after each meal.

Other ways to fit walking exercise into your day…

- Walk instead of drive whenever possible.
- Take the stairs instead of the elevator.
- Walk around while you talk on the phone.
- Work in the garden, rake leaves, or wash the car.
- Play with the kids.
- Carry things upstairs in two trips instead of one.
- Park at the far end of the shopping center lot and walk to the store.

*What is my A1C?
The A-1-C check is the blood glucose check "with a memory." It tells you what your average blood glucose level has been for the past 2 to 3 months.

My last A-1-C was ____.

My target for my A-1-C is _____.

APPENDIX D: Intervention message – gain by numbers

WALK WITH DEWITT

The American Diabetes Association recommends walking as exercise. Walking exercise makes your heart and bones strong, relieves stress, helps your insulin work better, and improves blood circulation. In addition, it cuts your risk for heart disease by lowering your blood glucose, blood pressure, and cholesterol levels. Research shows that if you walk 30 minutes a day, at least 5 days a week you can reduce your HgA1C* by .66. This means that if your A1C today is 7.0, after eight weeks of walking exercise, you could potentially decrease your A1C to 6.34. Or if your A1C today is 10.0, after eight weeks of walking exercise, you could potentially decrease your A1C to 9.34.

If you haven't been very active recently, you can start out with 5 or 10 minutes a day and work up to more time each week. Or split up your activity for the day—try a brisk 10-minute walk after each meal.

Other ways to fit walking exercise into your day…

- Walk instead of drive whenever possible.
- Take the stairs instead of the elevator.
- Walk around while you talk on the phone.
- Work in the garden, rake leaves, or wash the car.
- Play with the kids.
- Carry things upstairs in two trips instead of one.
- Park at the far end of the shopping center lot and walk to the store.

*What is my A1C?
The A-1-C check is the blood glucose check "with a memory." It tells you what your average blood glucose level has been for the past 2 to 3 months.

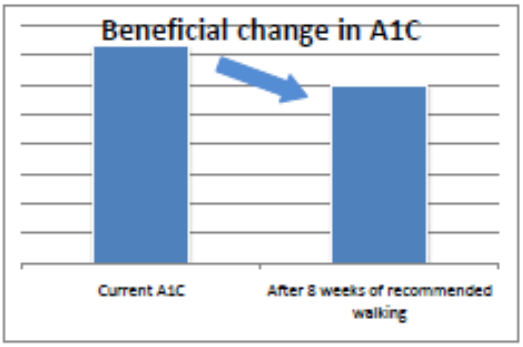
My last A-1-C was ____.

My target for my A-1-C is _____.

APPENDIX E: Intervention message – gain by images

WALK WITH DEWITT

The American Diabetes Association recommends walking as exercise. Walking exercise makes your heart and bones strong, relieves stress, helps your insulin work better, and improves blood circulation. In addition, it cuts your risk for heart disease by lowering your blood glucose, blood pressure, and cholesterol levels. Research shows that if you walk 30 minutes a day, at least 5 days a week you can reduce your HgA1C.*



If you haven't been very active recently, you can start out with 5 or 10 minutes a day and work up to more time each week. Or split up your activity for the day—try a brisk 10-minute walk after each meal.

Other ways to fit walking exercise into your day…

- Walk instead of drive whenever possible.
- Take the stairs instead of the elevator.
- Walk around while you talk on the phone.
- Work in the garden, rake leaves, or wash the car.
- Play with the kids.
- Carry things upstairs in two trips instead of one.
- Park at the far end of the shopping center lot and walk to the store.

*What is my A1C?
The A-1-C check is the blood glucose check "with a memory." It tells you what your average blood glucose level has been for the past 2 to 3 months.

My last A-1-C was ____.

My target for my A-1-C is _____.

APPENDIX F: Intervention message – loss by words

WALK WITH DEWITT

The American Diabetes Association recommends walking as exercise. Diabetics who don't walk for exercise lose the benefits of stronger heart and bones, stress relief, better insulin control, and improved blood circulation. In addition, not following the exercise recommendations prevents diabetics from experiencing the benefits of lower risk of heart disease that comes with lower blood glucose, blood pressure, and cholesterol levels. For most people, it's best to aim for a total of about 30 minutes a day, at least 5 days a week. When you don't follow this recommendation, you lose out on the potential to significantly reduce your HgA1C.*

If you haven't been very active recently, you can start out with 5 or 10 minutes a day and work up to more time each week. Or split up your activity for the day—try a brisk 10-minute walk after each meal.

Other ways to fit walking exercise into your day…

- Walk instead of drive whenever possible.
- Take the stairs instead of the elevator.
- Walk around while you talk on the phone.
- Work in the garden, rake leaves, or wash the car.
- Play with the kids.
- Carry things upstairs in two trips instead of one.
- Park at the far end of the shopping center lot and walk to the store.

*What is my A1C?
The A-1-C check is the blood glucose check "with a memory." It tells you what your average blood glucose level has been for the past 2 to 3 months.

My last A-1-C was ____.

My target for my A-1-C is _____.

APPENDIX G: Intervention message – loss by numbers

WALK WITH DEWITT

The American Diabetes Association recommends walking as exercise. Diabetics who don't walk for exercise lose the benefits of stronger heart and bones, stress relief, better insulin control, and improved blood circulation. In addition, not following the exercise recommendations prevents diabetics from experiencing the benefits of lower risk of heart disease that comes with lower blood glucose, blood pressure, and cholesterol levels. For most people, it's best to aim for a total of about 30 minutes a day, at least 5 days a week. When you don't follow this recommendation, you lose out on the potential to reduce your HgA1C* by .66. This means that if your A1C today is 7.0, choosing to not exercise, you lose the potential to decrease your A1C to 6.34. Or if your A1C today is 10.0, choosing to not exercise, you lose the potential to decrease your A1C to 9.34.

If you haven't been very active recently, you can start out with 5 or 10 minutes a day and work up to more time each week. Or split up your activity for the day—try a brisk 10-minute walk after each meal.

Other ways to fit walking exercise into your day…

- Walk instead of drive whenever possible.
- Take the stairs instead of the elevator.
- Walk around while you talk on the phone.
- Work in the garden, rake leaves, or wash the car.
- Play with the kids.
- Carry things upstairs in two trips instead of one.
- Park at the far end of the shopping center lot and walk to the store.

*What is my A1C?
The A-1-C check is the blood glucose check "with a memory." It tells you what your average blood glucose level has been for the past 2 to 3 months.

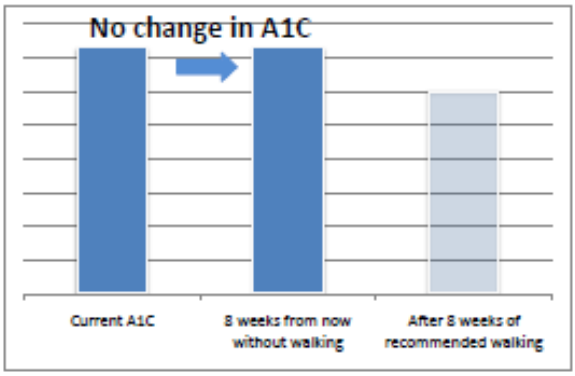
My last A-1-C was ____.

My target for my A-1-C is _____.

APPENDIX H: Intervention message – loss by images

WALK WITH DEWITT

The American Diabetes Association recommends walking as exercise. Diabetics who don't walk for exercise lose the benefits of stronger heart and bones, stress relief, better insulin control, and improved blood circulation. In addition, not following the exercise recommendations prevents diabetics from experiencing the benefits of lower risk of heart disease that comes with lower blood glucose, blood pressure, and cholesterol levels. For most people, it's best to aim for a total of about 30 minutes a day, at least 5 days a week. When you don't follow this recommendation, you lose out on the potential to reduce your HgA1C.*



If you haven't been very active recently, you can start out with 5 or 10 minutes a day and work up to more time each week. Or split up your activity for the day—try a brisk 10-minute walk after each meal.

Other ways to fit walking exercise into your day…

- Walk instead of drive whenever possible.
- Take the stairs instead of the elevator.
- Walk around while you talk on the phone.
- Work in the garden, rake leaves, or wash the car.
- Play with the kids.
- Carry things upstairs in two trips instead of one.
- Park at the far end of the shopping center lot and walk to the store.

*What is my A1C?
The A-1-C check is the blood glucose check "with a memory." It tells you what your average blood glucose level has been for the past 2 to 3 months.

My last A-1-C was ____.

My target for my A-1-C is _____.

APPENDIX I: Initial survey

Survey #1 ID# _____

WALK WITH DEWITT INITIAL SURVEY

Thank you for participating in the "Walk with DeWitt" program. In partnership with researchers at George Mason University, we are looking at how much patients diagnosed with type 2 diabetes walk daily and how that walking activity influences their diabetes management.

A little about yourself…
In what year, did you receive your type 2 diabetes diagnosis? _____
How old are you? _____
What is your gender? o Male o Female
How would you describe your ethnicity? oHispanic oWhite oBlack or African-American oAmerican Indian or Alaska native oAsian oNative Hawaiian or other Pacific Islander o Would not describe my ethnicity in any of these categories
What medication(s) are you taking for your diabetes? Oral medications: _____ Insulin: _____
Do you have other chronic medical concerns? o Yes o No If yes, please list: _____
What is the highest level of education you have completed? oHigh school diploma or GED oSome college oAssociate's degree o Bachelor's degree oSome graduate school oGraduate degree, e.g., M.A., M.S., M.B.A., etc. o Professional degree, e.g., M.D., J.D.

Please indicate your agreement with the following statements by circling the number in the appropriate box.

Talking to my doctor	Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree
I like to learn more about my diabetes using statistics and numbers.	1	2	3	4	5	6	7
I prefer to learn new ideas with pictures, graphs, and tables.	1	2	3	4	5	6	7
I make decisions based on the experiences and stories I've heard my friends and family tell.	1	2	3	4	5	6	7
Living with diabetes	**Strongly agree**	**Agree**	**Slightly agree**	**Neutral**	**Slightly disagree**	**Disagree**	**Strongly disagree**
Diabetes is a serious illness.	1	2	3	4	5	6	7
Diabetes interferes with my life.	1	2	3	4	5	6	7
Diabetes affects my life every day.	1	2	3	4	5	6	7
I worry about the possibility of developing future complications from my diabetes.	1	2	3	4	5	6	7
When all is said and done, I am the one who is responsible for managing my diabetes.	1	2	3	4	5	6	7
Taking an active role in my own health care is the most important factor in determining my health and my ability to function.	1	2	3	4	5	6	7
I know what each of my prescribed medications do.	1	2	3	4	5	6	7
I am confident that I can tell my health care provider concerns I have, even when he or she does not ask.	1	2	3	4	5	6	7
I am confident that I can tell when I need to get medical care and when I can handle a health problem myself.	1	2	3	4	5	6	7
I know the lifestyle changes, like diet and exercise, that are recommended for diabetics.	1	2	3	4	5	6	7
I am confident that I can follow through on medical treatments I need to do at home.	1	2	3	4	5	6	7

Survey #1 ID# _____

Living with diabetes	Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree
I am confident that I can take actions that will help prevent or minimize some symptoms or problems associated with my health condition.	1	2	3	4	5	6	7
I am confident that I can find trustworthy sources of information about my diabetes and my health choices.	1	2	3	4	5	6	7
I am confident that I can follow through on medical recommendations my health care provider makes, such as changing my diet or doing regular exercise.	1	2	3	4	5	6	7
I understand the nature and causes of my diabetes.	1	2	3	4	5	6	7
I know the different medical treatment options for my diabetes.	1	2	3	4	5	6	7
I have been able to maintain the lifestyle changes for my health that I have made.	1	2	3	4	5	6	7
I know how to prevent further problems with my diabetes.	1	2	3	4	5	6	7
I know about the self-treatments for my diabetes.	1	2	3	4	5	6	7
I have made the changes in my lifestyle, like diet and exercise that are recommended for my diabetes.	1	2	3	4	5	6	7
I am confident I can figure out solutions when new situations or problems arise with my health condition.	1	2	3	4	5	6	7
I am able to handle symptoms of my diabetes on my own at home.	1	2	3	4	5	6	7
I am confident that I can maintain lifestyle changes, like diet and exercise, even during times of stress.	1	2	3	4	5	6	7
I am able to handle problems of my diabetes on my own at home.	1	2	3	4	5	6	7
I am confident I can keep my health problems from interfering with the things I want to do.	1	2	3	4	5	6	7
Maintaining the lifestyle changes that are recommended for my diabetes is too hard to do on a daily basis.	1	2	3	4	5	6	7

In your own words, please define A1C (hemoglobin A1c). If you don't recognize this term, please indicate so.

	Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree
It is important for me to know my A1C.	1	2	3	4	5	6	7
I can take action to change my A1C.	1	2	3	4	5	6	7

Walking as exercise

Please record below how many minutes you walked for exercise each day in the past week.

Yesterday	Two days ago	Three days ago	Four days ago	Five days ago	Six days ago	Seven days ago

Walking as exercise	Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree
I think that walking will improve my management of my diabetes.	1	2	3	4	5	6	7
Walking makes my heart and bones strong.	1	2	3	4	5	6	7
Walking relieves stress.	1	2	3	4	5	6	7
Walking helps my insulin work better.	1	2	3	4	5	6	7
Walking improves my blood circulation.	1	2	3	4	5	6	7
I think that walking for my health will be pleasant.	1	2	3	4	5	6	7
I think that walking for my health will be beneficial.	1	2	3	4	5	6	7
I think that walking for my health will be good.	1	2	3	4	5	6	7
I think that walking for my health will be valuable.	1	2	3	4	5	6	7
I am confident I can participate in regular exercise when I am tired.	1	2	3	4	5	6	7

Survey #1 ID# _____

Walking as exercise	Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree
I am confident I can participate in regular exercise when I am in a bad mood.	1	2	3	4	5	6	7
I am confident I can participate in regular exercise when I feel I don't have the time.	1	2	3	4	5	6	7
I am confident I can participate in regular exercise when I am on vacation.	1	2	3	4	5	6	7
I am confident I can participate in regular exercise when it is raining or snowing.	1	2	3	4	5	6	7
More about you…	**Strongly agree**	**Agree**	**Slightly agree**	**Neutral**	**Slightly disagree**	**Disagree**	**Strongly disagree**
I am capable, sensible, and accomplished.	1	2	3	4	5	6	7
I like to keep the area around me tidy and well organized.	1	2	3	4	5	6	7
I adhere to a standard of conduct.	1	2	3	4	5	6	7
I am persistent and able to continue with a task despite boredom or other distractions.	1	2	3	4	5	6	7
When I make decisions, I am cautious and thoughtful in my planning.	1	2	3	4	5	6	7
In general, I am focused on preventing negative events in my life.	1	2	3	4	5	6	7
I am anxious that I will fall short of my responsibilities and obligations.	1	2	3	4	5	6	7
I frequently imagine how I will achieve my hopes and aspirations.	1	2	3	4	5	6	7
I often think about the person I am afraid I might become in the future.	1	2	3	4	5	6	7
I often think about the person I would ideally like to be in the future.	1	2	3	4	5	6	7
I typically focus on the success I hope to achieve in the future.	1	2	3	4	5	6	7

Survey #1 ID# _____

More about you…	Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree
I often worry that I will fail to accomplish my life goals.	1	2	3	4	5	6	7
I often think about how I will achieve success.	1	2	3	4	5	6	7
I often imagine myself experiencing bad things that I fear might happen to me.	1	2	3	4	5	6	7
I frequently think about how I can prevent failures in my life.	1	2	3	4	5	6	7
I am more oriented toward preventing losses than I am toward achieving gains.	1	2	3	4	5	6	7
I see myself as someone who is primarily striving to become the self I "ought" to be – to fulfill my duties, responsibilities, and obligations.	1	2	3	4	5	6	7
In general, I am focused on achieving positive outcomes in my life.	1	2	3	4	5	6	7
I often imagine myself experiencing good things that I hope will happen to me.	1	2	3	4	5	6	7
Overall, I am more oriented toward achieving success than preventing failure.	1	2	3	4	5	6	7

A little about your friends and family

Please circle the appropriate number between the pairs of words/phrases below. The closer the number is to a word/phrase, the more certain you are of your evaluation.

Most people who are important to me walk 30 minutes five days a week.								
Completely true	1	2	3	4	5	6	7	Completely false
The people in my life whose opinions I value … 30 minutes five days a week.								
Walk	1	2	3	4	5	6	7	Do not walk
Many people like me walk 30 minutes five days a week.								
Extremely likely	1	2	3	4	5	6	7	Extremely unlikely

APPENDIX J: Post-intervention survey

WALK WITH DEWITT APPOINTMENT SURVEY

Thank you for taking the time to talk to a doctor about the "Walk with DeWitt" program today.
The following number is your personal identification number. _____ This number will be written on each of your surveys.

Walking as exercise

Please record below how many minutes you walked for exercise each day in the past week.

Yesterday	Two days ago	Three days ago	Four days ago	Five days ago	Six days ago	Seven days ago

Before today, had you seen this doctor for a previous medical appointment?

o Yes o No

If yes, how many medical visits have you had with this doctor?

o 1 o 2-3 o 4-6 o 7-10 o 11 or more

Please indicate your impression of the doctor below by circling the appropriate number between the pairs of adjectives below. The closer the number is to an adjective, the more certain you are of your evaluation.

Intelligent	1	2	3	4	5	6	7	Unintelligent
Untrained	1	2	3	4	5	6	7	Trained
Inexpert	1	2	3	4	5	6	7	Expert
Informed	1	2	3	4	5	6	7	Uninformed
Incompetent	1	2	3	4	5	6	7	Competent
Bright	1	2	3	4	5	6	7	Stupid
Cares about me	1	2	3	4	5	6	7	Doesn't care about me
Has my interests at heart	1	2	3	4	5	6	7	Doesn't have my interests at heart
Self-centered	1	2	3	4	5	6	7	Not self-centered
Concerned with me	1	2	3	4	5	6	7	Unconcerned with me
Insensitive	1	2	3	4	5	6	7	Sensitive
Not understanding	1	2	3	4	5	6	7	Understanding
Honest	1	2	3	4	5	6	7	Dishonest
Untrustworthy	1	2	3	4	5	6	7	Trustworthy
Honorable	1	2	3	4	5	6	7	Dishonorable
Moral	1	2	3	4	5	6	7	Immoral
Unethical	1	2	3	4	5	6	7	Ethical
Phony	1	2	3	4	5	6	7	Genuine

Survey #2 ID# _____

Please indicate your agreement with the following statements by circling the number in the appropriate box.

Talking to my doctor	Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree
The doctor told me today about walking's influence on my diabetes.	1	2	3	4	5	6	7
The doctor told me today about the benefits of walking for exercise.	1	2	3	4	5	6	7
The doctor told me today about the consequences of not walking for exercise.	1	2	3	4	5	6	7
The doctor treated me with respect.	1	2	3	4	5	6	7
The doctor listened to me.	1	2	3	4	5	6	7
The doctor responded to my needs.	1	2	3	4	5	6	7
The doctor gave me enough time to ask questions.	1	2	3	4	5	6	7
The doctor clearly explained the benefits of walking.	1	2	3	4	5	6	7
I understood what my doctor told me today about the benefits of walking.	1	2	3	4	5	6	7
I will seek out more information about walking.	1	2	3	4	5	6	7
I still have questions about the benefits of walking.	1	2	3	4	5	6	7

If you still have questions, please list them here.

_____

_____

Please rate the recommendation your doctor gave you today by circling the appropriate number between the pairs of adjectives below. The closer the number is to an adjective, the more certain you are of your evaluation.

Effective	1	2	3	4	5	6	7	Ineffective
Not persuasive	1	2	3	4	5	6	7	Persuasive
Moving	1	2	3	4	5	6	7	Not moving
Challenging	1	2	3	4	5	6	7	Not challenging
Thought provoking	1	2	3	4	5	6	7	Not thought provoking
Unconvincing	1	2	3	4	5	6	7	Convincing
Influential	1	2	3	4	5	6	7	Not influential

Survey #2 ID# _____

Today your doctor gave you the advice to walk for exercise to help control your diabetes. Thinking about those reasons, please indicate your agreement with the following statements by circling the number in the appropriate box.							
	Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree
My doctor's reason for walking 30 minutes five days a week was believable.	1	2	3	4	5	6	7
My doctor's reason for walking 30 minutes five days a week was convincing.	1	2	3	4	5	6	7
My doctor's reason for walking 30 minutes five days a week is important to me.	1	2	3	4	5	6	7
My doctor's advice helped me feel confident about how best to walk 30 minutes five days a week.	1	2	3	4	5	6	7
My doctor's advice would help my friends walk 30 minutes five days a week.	1	2	3	4	5	6	7
My doctor's advice put thoughts in my mind about wanting to walk 30 minutes five days a week.	1	2	3	4	5	6	7
My doctor's advice put thoughts in my mind about not wanting to walk 30 minutes five days a week.	1	2	3	4	5	6	7

Overall how much did you agree or disagree with your doctor's advice?								
Agree	1	2	3	4	5	6	7	Disagree

Is the reason your doctor gave for walking 30 minutes five days a week a strong or weak reason?								
Strong	1	2	3	4	5	6	7	Weak

Diabetes	Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree
There is a lot that I can do to control my diabetes.	1	2	3	4	5	6	7
What I do can determine whether my diabetes gets better or worse.	1	2	3	4	5	6	7
Nothing I do will affect my diabetes.	1	2	3	4	5	6	7
I have power to influence my diabetes.	1	2	3	4	5	6	7

Survey #2 ID# _____

	Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree
The course of my diabetes depends on me.	1	2	3	4	5	6	7
My actions will have no effect on the outcome of my diabetes.	1	2	3	4	5	6	7
Diabetes is a serious illness.	1	2	3	4	5	6	7
My diabetes interferes with my life.	1	2	3	4	5	6	7
My diabetes affects my life every day.	1	2	3	4	5	6	7
I worry about the possibility of developing future complications from my diabetes.	1	2	3	4	5	6	7

In your own words, please define A1C (hemoglobin A1c). If you don't recognize this term, please indicate so.

_____

_____

	Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree
It is important for me to know my A1C.	1	2	3	4	5	6	7
I can take action to change my A1C.	1	2	3	4	5	6	7
I am confident I can participate in regular exercise when I am tired.	1	2	3	4	5	6	7
I am confident I can participate in regular exercise when I am in a bad mood.	1	2	3	4	5	6	7
I am confident I can participate in regular exercise when I feel I don't have the time.	1	2	3	4	5	6	7
I am confident I can participate in regular exercise when I am on vacation.	1	2	3	4	5	6	7
I am confident I can participate in regular exercise when it is raining or snowing.	1	2	3	4	5	6	7

	Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree
I think that walking will improve my management of my diabetes.	1	2	3	4	5	6	7
Walking makes my heart and bones strong.	1	2	3	4	5	6	7
Walking relieves stress.	1	2	3	4	5	6	7
Walking helps my insulin work better.	1	2	3	4	5	6	7
Walking improves my blood circulation.	1	2	3	4	5	6	7
I plan to wear my pedometer every day for the next month.	1	2	3	4	5	6	7
I plan to walk for 30 minutes 5 days a week for the next month.	1	2	3	4	5	6	7
I will wear my pedometer every day for the next month.	1	2	3	4	5	6	7
I will walk for 30 minutes 5 days a week for the next month.	1	2	3	4	5	6	7

Please indicate how you feel about walking 30 minutes 5 days a week in the next month by circling the appropriate number between the pairs of adjectives below.

Harmful	1	2	3	4	5	6	7	Beneficial
Pleasant	1	2	3	4	5	6	7	Unpleasant
Good	1	2	3	4	5	6	7	Bad
Worthless	1	2	3	4	5	6	7	Valuable
Enjoyable	1	2	3	4	5	6	7	Unenjoyable

A little about your friends and family

Please circle the appropriate number between the pairs of words/phrases below.

Most people who are important to me walk 30 minutes five days a week.

Completely true	1	2	3	4	5	6	7	Completely false

The people in my life whose opinions I value…30 minutes five days a week.

Walk	1	2	3	4	5	6	7	Do not walk

Many people like me walk 30 minutes five days a week.

Extremely likely	1	2	3	4	5	6	7	Extremely unlikely

APPENDIX K: Week one pedometer record

Survey #3 ID# _____

WALK WITH DEWITT: WEEK ONE EXERCISE RECORD

Thank you for taking the time to complete this record about the "Walk with DeWitt" program.

Please record your first week's pedometer readings.

The day after your pedometer appointment	Two days after	Three days after	Four days after	Five days after	Six days after	Seven days after

Did you have any trouble with your pedometer? o Yes o No
If yes, please describe it below.

_____

_____

Walking as exercise

Please record below how many minutes you walked for exercise each day in the first week.

The day after your pedometer appointment	Two days after	Three days after	Four days after	Five days after	Six days after	Seven days after

Please mail this record in the accompanying addressed envelope to our research team one week following your doctor's appointment.

APPENDIX L: Week four follow-up survey

Survey #4 ID# _____

WALK WITH DEWITT FOLLOW-UP SURVEY

Thank you for taking the time to complete this survey about the "Walk with DeWitt" program today.

Please record your last week's daily steps as recorded by your pedometer.

Yesterday	Two days ago	Three days ago	Four days ago	Five days ago	Six days ago	Seven days ago

Walking as exercise

Please record below how many minutes you walked for exercise each day in the past week. If you exercised in another way (swimming, bicycling, weight lifting, etc.), please also write those minutes and indicate what type of exercise it was.

Yesterday	Two days ago	Three days ago	Four days ago	Five days ago	Six days ago	Seven days ago

One week ago, we sent you a postcard about the Walk with DeWitt program. Do you remember receiving this card?

o Yes o No

If yes, please briefly describe what you remember the postcard said:

_____

_____

_____

Please rate the recommendation provided on the postcard you received by circling the appropriate number between the pairs of adjectives below. The closer the number is to an adjective, the more certain you are of your evaluation.

Effective	1	2	3	4	5	6	7	Ineffective
Not persuasive	1	2	3	4	5	6	7	Persuasive
Moving	1	2	3	4	5	6	7	Not moving
Challenging	1	2	3	4	5	6	7	Not challenging
Thought provoking	1	2	3	4	5	6	7	Not thought provoking
Unconvincing	1	2	3	4	5	6	7	Convincing
Influential	1	2	3	4	5	6	7	Not influential

Survey #4 ID# _____

Please indicate your agreement with the following statements by circling the number in the appropriate box.

Diabetes	Strongly agree	Agree	Slightly agree	Neutral	Slightly disagree	Disagree	Strongly disagree
There is a lot that I can do to control my diabetes.	1	2	3	4	5	6	7
What I do can determine whether my diabetes gets better or worse.	1	2	3	4	5	6	7
Nothing I do will affect my diabetes.	1	2	3	4	5	6	7
I have power to influence my diabetes.	1	2	3	4	5	6	7
The course of my diabetes depends on me.	1	2	3	4	5	6	7
My actions will have no effect on the outcome of my diabetes.	1	2	3	4	5	6	7
Diabetes is a serious illness.	1	2	3	4	5	6	7
My diabetes interferes with my life.	1	2	3	4	5	6	7
My diabetes affects my life every day.	1	2	3	4	5	6	7
I worry about the possibility of developing future complications from my diabetes.	1	2	3	4	5	6	7
My exercise							
I am confident I can participate in regular exercise when I am tired.	1	2	3	4	5	6	7
I am confident I can participate in regular exercise when I am in a bad mood.	1	2	3	4	5	6	7
I am confident I can participate in regular exercise when I feel I don't have the time.	1	2	3	4	5	6	7
I am confident I can participate in regular exercise when I am on vacation.	1	2	3	4	5	6	7
I am confident I can participate in regular exercise when it is raining or snowing.	1	2	3	4	5	6	7

I think that walking will improve my management of my diabetes.	1	2	3	4	5	6	7
Walking makes my heart and bones strong.	1	2	3	4	5	6	7
Walking relieves stress.	1	2	3	4	5	6	7
Walking helps my insulin work better.	1	2	3	4	5	6	7
Walking improves my blood circulation.	1	2	3	4	5	6	7
I plan to wear my pedometer every day for the next month.	1	2	3	4	5	6	7
I plan to walk for 30 minutes 5 days a week for the next month.	1	2	3	4	5	6	7
I will wear my pedometer every day for the next month.	1	2	3	4	5	6	7
I will walk for 30 minutes 5 days a week for the next month.	1	2	3	4	5	6	7

Please indicate how you feel about walking 30 minutes 5 days a week in the next month by circling the appropriate number between the pairs of adjectives below. The closer the number is to an adjective, the more certain you are of your evaluation.

Harmful	1	2	3	4	5	6	7	Beneficial
Pleasant	1	2	3	4	5	6	7	Unpleasant
Good	1	2	3	4	5	6	7	Bad
Worthless	1	2	3	4	5	6	7	Valuable
Enjoyable	1	2	3	4	5	6	7	Unenjoyable

A little about your friends and family

Please circle the appropriate number between the pairs of words/phrases below. The closer the number is to a word/phrase, the more certain you are of your evaluation.

Most people who are important to me walk 30 minutes five days a week.

Completely true	1	2	3	4	5	6	7	Completely false

The people in my life whose opinions I value…30 minutes five days a week.

Walk	1	2	3	4	5	6	7	Do not walk

Many people like me walk 30 minutes five days a week.

Extremely likely	1	2	3	4	5	6	7	Extremely unlikely

APPENDIX M: Patient activation measure licensing information

To use the Patient Activation Measure you must obtain a license. Craig Swanson at Insignia Health manages the licensing of the Patient Activation Measure. His contact information is: cswanson@insigniahealth.com, (612) 998-6216. For more information, see the Insignia Health website at www.insigniahealth.com.

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CURRICULUM VITAE

Christian (Christy) J.W. Ledford graduated from the College of Charleston, S.C., with her Bachelor of Arts in corporate communication in 1996. She received her Master of Science in technical communication from Colorado State University, Fort Collins, Colo., in 2000, where her thesis investigated source credibility and message design. As a military spouse, Christy also serves as a Red Cross volunteer at DeWitt Army Community Hospital, Fort Belvoir, Va.