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Social Comparison Theory in the Context of Chronic Illness: Predictors and Consequences of Target Selection among Individuals with Type 2 Diabetes

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Abstract

Individuals often compare themselves to others (i.e., *social comparisons*) in order to determine their status in a given domain. Social comparisons may be particularly important for patients with chronic illness; patients often experience uncertainty and anxiety about their health, which increase the likelihood and utility of social comparisons. Among patients, social comparisons can have both positive and negative health-related consequences (for affect, motivation to improve one's health care behaviors, etc.), depending upon several contextual features. Various steps in the social comparison process have been proposed, but not tested directly. The present study is an examination of the social comparison process among patients with Type 2 Diabetes Mellitus (T2DM) – a condition that is a growing public health concern for which psychosocial interventions can be beneficial. Patient participants used a web-mediated program to self-report individual difference characteristics prior to selecting from four comparison targets (descriptions of other patients with T2DM). Patients then rated their motivations for selection, read a description of their chosen patient, and reported on their response (e.g., current affect, motivation to improve self-care). Patients who endorsed greater symptom severity were more likely to choose sicker comparison targets, but choice was unrelated to personality characteristics. A model that incorporated several individual difference factors thought to be related to social comparison had moderate predictive value for comparison choice. The extent to which patients focused on differences and similarities between themselves and their chosen targets moderated affective and motivational response (respectively). These findings may contribute to the improvement of psychosocial interventions for patients with T2DM and other illnesses (e.g., components of cognitive intervention, educational materials that include patient testimonials, the composition of support groups).

Social Comparison Theory in the Context of Chronic Illness:
Predictors and Consequences of Target Selection among Individuals with Type 2 Diabetes

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DISSERTATION

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For Gina, whose place of Honor is permanent.

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Social Comparison Theory in the Context of Chronic Illness:

Predictors and Consequences of Target Selection among Individuals with Type 2 Diabetes

A state of good physical and emotional health allows individuals to freely engage in desired tasks, which in turn promote independence, well-being, and life satisfaction. The presence of health problems, in contrast, can limit both independent functioning and the range of goals achievable for the person who is ill. As health status contributes either positively or negatively to an individual's level of autonomy and success in everyday activities, health status is often an integral dimension of one's identity (Reitzes & Mutran, 2006) that generates great deal of self-focused attention.

Examining the ways in which individuals evaluate their health may reveal key processes that contribute to health-related decisions (e.g., engaging in self-care behaviors) and health status (i.e., severity of illness symptoms). One such process involves evaluation via comparisons against accepted standards. In his seminal theoretical outline of the comparison process, Festinger (1954) proposed that comparisons are most informative with reference to an "objective" standard. In the absence of objective standards, however, individuals can evaluate themselves relative to others in their environments. Such *social comparisons* result in perceptions of doing well or poorly, which can impact emotional state, motivation to improve one's standing, and behavior in various domains.

Empirical evidence illustrates that social comparisons are frequent in daily life, and often are made with respect to characteristics such as appearance (Leahey, Crowther, & Mikelson, 2006), income and achievement (Wheeler & Miyake, 1992), and health status (Bogart & Helgeson, 2000). The potential affective, motivational, and behavioral consequences of social comparisons have a range of implications for physical and psychological health. This is

particularly true among clinical populations, which may be more vulnerable to the effects of comparisons than the general population.

Social Comparisons and Health: The Impact of Threat

Social comparisons occur when individuals receive information about others' situations, which can result from multiple sources. The first is "live" contact with other individuals, including direct interaction and passive observation in public spaces. The second is learning about others through verbal, visual, or written descriptions. Such information is shared via conversations (about others not present), watching television programs or movies, and reading newspaper or magazine articles. In these situations, social comparisons can occur as automatic responses to unsolicited and encounters with social information (Wood, 1996), and the individual does not have the option to select a different person against whom to compare.

Many individuals also willfully seek out social comparisons (e.g., Somerset, Sharp, & Campbell, 2002), however. Comparisons that are self-selected from a range of options may serve several purposes, and have prompted theoretical and empirical interest in potential motivations for (specific) comparisons. Both Wills (1981) and Taylor and Lobel (1989) proposed that comparisons are motivated by the desire to alleviate negative emotions associated with threat. Wills (1981) suggested that comparisons serve a self-enhancing function. Threats to self-concept raise anxiety and negative affect, which individuals naturally want to resolve; comparisons toward less fortunate others allow for individuals to perceive themselves as "doing well," which reduces negative affect and restores confidence. Taylor and Lobel (1989) added that comparisons toward more fortunate others also are desirable, as they can provide concrete information about ways to improve one's own situation. These comparisons may replace negative affect (e.g., despair) with motivation and hope for improvement.

Social comparisons do not always result in positive outcomes, however; some comparisons actually serve to strengthen existing negative views of the self and the world (Van der Zee, Buunk, & Sanderman, 1998). Negative views may perpetuate debilitating conditions such as depression (Beck & Alford, 2009) and exacerbate physical health symptoms. It is possible that negative outcomes naturally result from certain *types of comparison*. It is equally possible that certain *individuals* make comparisons that result in negative outcomes (that then compromise health), or that specific *situations* are likely to produce comparisons with negative outcomes. Addressing this issue represents an area of research opportunity for improving the health and well-being of individuals who use comparisons in their everyday lives.

The Context of Chronic Illness

The influence of social comparisons may be especially powerful for individuals whose health is threatened, as in the case of chronic illness (Van der Zee, Buunk, & Sanderman, 1996). Illness may challenge an individual's resources, quality of life, and life expectancy (Bennenbroek, Buunk, Van der Zee, & Grol, 2002), often initiating psychological stress, anxiety, and uncertainty about one's future (Stiegelis et al., 2004). These psychological states increase the desire for information (Rodríguez-Marín et al., 2000) and should thereby increase the likelihood that social comparisons will be used to satisfy this desire (Festinger, 1954).

Although direct comparisons between patients and healthy controls are scarce, existing evidence suggests that patients report more frequent use of comparisons than do healthy individuals (Van der Zee, Buunk, DeRuiter, Templaar, VanSonderen, & Sanderman, 1996). The literature on social comparisons among patients with chronic illness identifies several potential factors that may influence comparison outcomes, including personality characteristics, mood state prior to the comparison, and patients' unique interpretations of a given comparison. At

present, however, this limited evidence does not adequately address comparison predictors or consequences that may impact patients' health.

These gaps in the literature suggest several important “next steps” toward improving our understanding of comparison process(es) and outcomes among patients with chronic illness. Self-selected comparisons represent a particular area of opportunity because very little work has captured this type of comparison among patients. Focusing on comparisons that are selected by patients will provide initial indication of: (1) types of social comparisons or specific situations (i.e., reasons for choosing certain comparisons) that can lead to positive (versus negative) consequences, and/or (2) patients who tend to use comparisons that result in positive (versus negative) consequences. This information eventually may inform the design of comparison-based psychosocial interventions for patients with chronic illness, who are at risk for experiencing significant psychological difficulties (e.g., depression) that exacerbate physical symptoms (Peveler, Carson, & Rodin, 2002).

Toward these ends, the following provides a brief overview of social comparison theory and reviews noteworthy empirical applications of the theory to patients with chronic illness. The method and results of a new study are then described. This study was conducted for the purpose of identifying: (1) predictors of comparison selection (e.g., personality characteristics, illness variables, reasons for target choice), and (2) response to selection (i.e., affective consequence, motivation to change self-care behaviors). Finally, the results of this study are discussed in the context of existing literature.

Relevant Components of Social Comparison Theory

Several aspects of social comparisons may contribute to their effects on emotional response and motivation to achieve a goal. First, the *dimension* of comparison refers to the specific attribute that is compared, such as musical ability or proficiency in a language.

Comparisons made on dimensions that are important to the individual are more likely to trigger cognitive, emotional, and behavioral responses than are comparisons on dimensions that are considered irrelevant. Second is the *direction* of a comparison. Comparison “targets,” or the individuals against whom comparisons are made, may be better off than the self (upward comparison), worse off than the self (downward comparison), or the same as the self (lateral comparison)¹ on a given dimension. Viewing the self as doing well or poorly on a given dimension, relative to another individual, can have distinct effects on mood and motivation for various behaviors.

Consider, for example, an individual who learns that his friend can run faster than he can. Because the target (friend) is doing better than the individual making the comparison, the individual makes an *upward* comparison. According to Festinger (1954), such a comparison should result in perception of the opportunity to improve, confidence in one’s ability to improve (as someone else has demonstrated accomplishment in the domain of evaluation), and motivation to work harder in order to improve. In contrast, an individual who learns that a friend runs slower than he does (i.e., *downward* comparison) should see himself as doing well, experience satisfaction with his own accomplishments, and see no reason to work toward improvement. If Festinger was correct about the evaluative consequences of comparisons, then each type of comparison should lead to a positive emotional state (i.e., optimism, satisfaction). Subsequent tests of Festinger’s predictions, however, revealed that additional steps in the process of social comparison may impact resulting (post-comparison) affect, expanding the range of potential comparison consequences.

The Relationship between Comparisons and Affect

Festinger himself did not focus on the emotional consequences of social comparisons. Subsequent researchers suggested that the self-appraisal inherent in comparisons (i.e., seeing

oneself as doing relatively well or poorly) may impact one's immediate affective state (e.g., Tesser, Millar, & Moore, 1988). As outlined above, Festinger's initial predictions seem to suggest that social comparisons may confer the benefit of positive affect through either favorable self-evaluations (via downward comparisons; Wills, 1981) or increased motivation for and confidence in improvement (via upward comparisons; Taylor & Lobel, 1989).

As indicated, however, the larger body of evidence presents a more complicated picture, showing that negative affect can result from both upward and downward comparisons (Buunk, Collins, Taylor, VanYperen & Dakoff, 1990, Study 2). Chronic negative affect (e.g., sadness, frustration) is associated with high risk for cardiovascular disease (Fogel, 2007), compromised immune function (Kiecolt-Glaser, McGuire, Robles, & Glaser, 2002), and a host of other physical conditions, making negative affect a frequent and appropriate target of intervention – particularly those whose health is already compromised. A small number of studies have shown that negative outlook and mood as a personality characteristic (i.e., neuroticism) may be linked to the repeated use of negative-outcome comparisons (Buunk, Van der Zee, & VanYperen, 2001). Yet these findings give little indication of the pathway from a given comparison to negative affect. In addition, the same individuals often report experiencing various combinations of comparison direction (upward versus downward) and consequence (positive versus negative emotion) (e.g., Fry & Debats, 2003; Gibbons & Buunk, 1999). The presence of upward and downward comparisons that result in both positive and negative emotions *for the same individual* suggests that there is another aspect of comparisons contributing to affective response, which may influence motivation to change behavior in a given domain.

Theoretical work on this topic has offered some clarification by approaching the range of affect-related findings from a cognitive framework. This framework suggests that an individual's interpretation of a given comparison will contribute to the affective consequence – specifically,

the individual's *perceived similarity* to a target. Buunk and Ybema (1997) proposed that when exposed to a comparison target, the individual focuses either on similarities or differences between the self and the target. Focusing on similarities leads the individual to identify with the target. Identification with an upward target tends to trigger optimism for improvement (and resulting positive affect), whereas identification with a downward target suggests that a worse-off condition is possible (if not probable), and inspires negative affect. Focusing on differences, however, allows the individual to contrast oneself against the target. Contrast against an upward target may lead to perceptions of inferiority (and resulting negative affect), whereas contrast against a downward target typically inspires reassurance that the individual is doing well (and triggers positive affect).

In sum, both isolated instances of social comparison and the consistent use of a comparison strategy have the potential to impact self-evaluations, motivations to improve in a given domain, and affect. Whether the effect of comparisons is generally positive or negative is dependent upon dimension, direction, and perceived similarity to the target. Comparisons are classified according to target direction: upward toward individuals who are "better off" and downward toward individuals who are "worse off" on a given dimension. Upward and downward comparisons result in distinct self-evaluations (the self as not doing well or doing well, respectively), but each has been associated with consequent positive and negative affect. The effects on emotional response and motivation to improve may be influenced by perceived similarity to the comparison target, which produces identification or contrast. Patients with chronic illness are particularly likely to use health-based social comparisons and respond to these comparisons in ways that influence their health. Applications of social comparison theory to patients with chronic illness will be considered next.

Social Comparisons by Patients with Chronic Illness

When evaluating their health status, patients often look to others with the same illness to determine how their symptoms compare to the symptoms of others (Affleck, Tennen, Urrows, Higgins, & Abeles, 2000; Bogart & Helgeson, 2000). Patients have frequent opportunities to determine how “well” they are relative to others through contact in treatment centers (Kulik, Mahler, & Moore, 1996), support groups (Carmack-Taylor, Kulik, Badr et al., 2007), stories told by friends, relatives, and media (Taylor et al., 1993, Study 1), and ordinary social encounters (Affleck et al., 2000).

For a patient with a chronic illness, learning that an acquaintance is surviving with the same illness may be a positive or negative experience, depending on the context. Information about an acquaintance who is doing well may trigger frustration and despair about one’s own (worse-off) condition, or may provide reassurance that one’s own symptoms are not immediately life-threatening. Conversely, information about an acquaintance who is doing poorly may trigger appreciation for one’s own (better-off) status, or signal that one’s own status is likely to become worse (Buunk et al., 1990, Study 1; Wills, 1981). Such distinctions are reflected in further classification of “positive outcome” or “negative outcome” directional comparisons. For example, a comparison to someone who is better off that leads to positive affect would be a “positive-outcome upward comparison” (see Figure 1). The outcome of a comparison is likely influenced by the specific health-relevant dimension of comparison and perceived similarity to the target patient, in addition to the direction of a comparison.

Social comparison among chronic illness patients has been examined in samples of individuals with cancer, rheumatoid arthritis, multiple sclerosis, Ménière’s disease, Human Immunodeficiency Virus [HIV], sickle cell disease, chronic pain and fibromyalgia, diabetes mellitus, cardiovascular disease and familial hypercholesterolaemia (premorbid heart disease),

and end stage renal failure (kidney disease). Investigations have used a variety of methods to assess features of comparisons and a wide range of health-related comparison effects, and each method provides different information about the process and outcomes of comparisons among patients. These differences, including the representation of specific illness populations, are discussed below.

Wood's (1996) taxonomy of social comparison research methods is a useful framework for describing the differences between approaches. *Narration methods* rely on self-reported occurrence of comparisons in daily life, including global judgments of comparison preference or style and recollections of specific comparison situations. *Reaction methods* use experimental and quasi-experimental designs to examine the effects of encountered comparisons, or those that are not self-motivated (i.e., occur in response to unsolicited presentation of social information and do not allow target choice). Finally, *selection methods* allow patients to choose from multiple comparison targets for the purpose of gathering further information about the chosen target. The application of these methods to patients with chronic illness will be considered in turn, with particular focus on selection methods.

Narration Methods: Self-Reported Comparisons among Patients with Chronic Illness

Narration methods have been used in multiple patient samples, but much of this work has been conducted with cancer patients. These studies have assessed various features of general comparison style and specific comparison types. For example, *need for comparison* is a rating of individuals' overall desire for social information, without differentiating the direction, dimension, or similarity of the comparison target. Retrospective self-report is used to assess the *frequency* of directional (i.e., upward versus downward) comparisons that have already occurred in daily life. Similarly, patients report the *frequency* and *intensity* of affective responses; frequency and intensity are thus past-oriented, resulting in global judgments of comparison

history. As noted, responses to comparisons may be influenced by several features of the comparison target or situation, including direction, specific health dimension, and perceived similarity to the target.

Comparison frequency and illness characteristics. Among cancer patients, high need for comparison is associated with impaired psychological and physical health. Patients with cancer who endorse high need for comparison report more (versus less) severe psychological distress (Van der Zee, Buunk, & Sanderman, 1996) and depressive and illness symptoms (Bennenbroek, Buunk, Van der Zee, & Grol, 2002). Patients with cancer who are higher in need also recall making downward comparisons more frequently than upward (Van der Zee, Buunk, DeRuiter et al., 1996; Van der Zee, Buunk, & Sanderman, 1996).

Findings from other patient groups also suggest the predominance of comparing downward. Patients with cancer and arthritis report preferences for downward comparisons (when offered the alternative of upward comparisons; Blalock, DeVellis, & DeVellis, 1989; DeVellis, Holt, Renner, & Blalock, 1990) and retrospectively report making downward comparisons more often than upward (when asked about both directions; Buunk et al., 1990; DeVellis et al., 1990; Heidrich, 1996; Van der Zee, Buunk, DeRuiter et al., 1996). Cardiac patients also record more downward comparisons in daily diaries (when asked about both upward and downward; Bogart & Helgeson, 2000). When asked to compare against “other individuals with the same illness” (rather than against an identifiable other), patients with cancer and rheumatoid arthritis report that they are doing better than most (i.e., downward relative evaluation; Helgeson & Taylor, 1993; Neugebauer, Katz, & Pasch, 2003; Taylor et al., 1993, Study 1; Van der Zee et al., 1996; Wood, Taylor, & Lichtman, 1985).

The association between need and illness symptoms suggests that comparisons may be particularly frequent, and possibly more influential, for patients who have greater physical and

psychological distress. This relationship may be the result of three pathways: (1) higher need for comparison (and consequent use of comparisons) leads to greater distress and more severe symptoms, (2) “sicker” patients tend to want more information about others than do patients who have less severe symptoms, or (3) both are true, in that sicker patients want more information about others and this information increases, rather than decreases, physical and emotional distress. There is thus a need for (quasi)experimental work to determine the nature of this relationship, which may assist in designing and targeting interventions that reduce the impact of comparisons that negatively effect health.

Downward comparisons may be more common for individuals who have high need for comparison because these patients tend to be more physically or psychologically compromised. In the case of (more) severe physical or mental health symptoms, the use of downward comparisons may serve a self-enhancing function (e.g., improving mood and reducing anxiety; Wills, 1981); these patients may selectively use, search for, or remember downward comparison opportunities (see Taylor et al., 1993, Study 1). It is possible that downward comparisons are more memorable due to their affective consequence, or that other features of comparisons that were not assessed (e.g., dimension, perceived similarity) affect the impact of comparisons that differ by direction.

Dimension of illness-related comparison. Existing evidence demonstrates that there are two dimensions of illness-related comparison: illness severity and emotional response/coping effectiveness. Schachter’s (1959) early work on affiliation showed that individuals who are under threat evaluate not only their circumstances, but also their attempts to cope with difficulty. Indeed, inquiries into the attributes on which cardiac rehabilitation patients compare themselves revealed that patients most often compare the physical characteristics of their illness (e.g., symptom severity, prognosis), but also compare their adjustment, coping, and attitudes toward

the illness (Buunk et al., 1990; Helgeson & Taylor, 1993). When asked about dimensions separately, cancer patients stated preferences for upward targets, rather than downward targets, on the dimension of coping (Bennenbroek et al., 2002; Van der Zee, Oldsma, Buunk, & Bos, 1998), and downward targets, rather than upward targets, on the dimension of illness severity (Bennenbroek et al., 2002). Although the dimension of health-related comparison thus may be an important predictor of comparison type or consequences, existing work has rarely differentiated comparison targets by dimension. To our knowledge, no prior study has assessed differences in affective response to targets that differ by dimension.

Affective consequences of comparisons among patients. Affective reactions to comparisons, or the accumulation thereof, may directly or indirectly impact health. Although immediate affective responses to comparisons often are transient, even temporary shifts to identifiable mood states (e.g., sadness) can influence medical and psychiatric illness features such as symptom detection, perceived efficacy for self-care, and treatment-seeking behavior (Salovey & Birnbaum, 1989). Across multiple illness samples, positive affect (i.e., a “positive outcome”) was more common than negative affect (i.e., a “negative outcome”) following comparisons (Affleck et al., 1988; Hemphill & Lehman, 1991; Huang, Gorawara-Bhat, & Chin, 2005; Lindqvist, Carlsson, & Sjoden, 2000; Senior, Smith, Michie, & Marteau, 2002; Somerset, Sharp, & Campbell, 2002; Stanton et al., 1999). This difference was more pronounced for downward comparisons than upward comparisons (Bogart & Helgeson, 2000), suggesting that downward comparisons are much more often associated with positive than negative affect.

Similarly, patients with breast cancer and osteoarthritis endorsed positive consequences (e.g., “feel good about myself”) of both upward and downward comparisons, and downward comparisons were rated as more positive than were upward comparisons (Heidrich, 1996). Among cancer patients, most common were positive-outcome downward comparisons (made by

82% of patients), followed closely by positive-outcome upward comparisons (made by 78%); negative-outcome comparisons were made by less than 60% of patients (Buunk et al., 1990).

Although such findings are consistent with the notion that patients make comparisons for the purpose of self-enhancement (Wills, 1981), the studies noted above do not consider important contextual features and do not differentiate comparisons that are self-selected from those that result from singular encounters in the environment. It is possible that many patients naturally confront opportunities for downward comparison more often than for upward comparison. As Wood, Taylor, and Lichtman (1985) note, however, not all patients can be doing better than most others. It therefore is unlikely that the majority of patients who participate in research are those who have few opportunities for upward comparison. This logic suggests that (some) patients purposely choose downward targets more often than upward, and that further investigation of self-selected comparisons is necessary to understand the affective (and related behavioral) consequences of naturally-occurring comparisons.

What determines whether patients experience positive versus negative comparison consequences? It seems clear that comparison direction is not the only determinant of post-comparison affect. Even in studies that demonstrate the high frequency of downward comparisons, there are substantial minority of stated preferences for upward targets (Kulik, Moore, & Mahler, 1993) and recalled upward comparisons (Buunk et al., 1990, Study 1; Helgeson & Taylor, 1993; Hemphill & Lehman, 1991) in a range of patient samples. Several studies demonstrate that although many instances of both upward and downward comparison result in positive outcomes, negative-outcome comparisons are common and may warrant increased attention (Dibb & Yardley, 2006, Study 1; Senior et al., 2002; Somerset et al., 2002; Wood et al., 1985). Two potentially related constructs have been offered to account for the

existence of both positive- and negative-outcome upward and downward comparisons: perceived similarity and neuroticism.

Perceived similarity. As noted, researchers have invoked “interpretation” frameworks such as the Identification/Contrast Model (Buunk & Ybema, 1997) to explain the existence of both positive- and negative-outcome comparisons (see Figure 1). This model suggests that identification with (or focusing on similarities to) an upward target can result in the realization that improvement is possible and a model for how to improve (Taylor & Lobel, 1983). In the case of chronic illness, improvement may be reflected in medication adherence or the adoption healthy self-care behaviors. Contrast against (or focusing on differences between the self and) a downward target emphasizes an individual’s superiority in the health domain, as the individual is not as sick as another patient (e.g., “My symptoms aren’t that bad”). Conversely, contrast against an upward target likely highlights an individual’s inferiority (e.g., “My health could be much better,” “I could do more to take care of myself”), and identification with a downward target shows that a situation could become worse (e.g., “I am likely to become as sick as that person”). Both upward contrast and downward identification typically result in negative affect (Buunk & Ybema, 1997).

Perceived similarity typically is inferred from outcome, rather than assessed as a unique variable, which does not lend empirical support to the Identification/Contrast Model. Only a small number of studies have assessed perceived similarity explicitly. In these studies, negative-outcome comparisons were related to lower adjustment (versus positive-outcome comparisons) — regardless of comparison direction. For example, negative-outcome comparisons were consistently associated with lower self-ratings of overall health, vitality, and social and emotional functioning among patients with Ménière’s disease; the frequency of positive-outcome

comparisons was unrelated to self-rated physical and psychological health (Dibb & Yardley, 2006, Study 2).

Among patients with cancer, positive-outcome comparisons were associated with “action-focused” coping mechanisms (i.e., changing the situation, seeking support, and focusing on personal growth), which typically are viewed as effective (Van der Zee et al., 2000). Negative-outcome comparisons were associated with more “emotion-focused” methods (i.e., expressing emotion, typically considered ineffective) in this study. In the same study, upward identification and downward contrast (i.e., “positive-outcome” comparisons) were strongly correlated, whereas correlation between downward identification and upward contrast (i.e., “negative-outcome” comparisons) was weak. The latter finding indicates that perceived similarity may be trait-like, in that some individuals are “self-enhancers” (and tend toward upward identification and downward contrast). Yet the lack of a compelling relationship between the possible comparison responses of “self-defeaters” (who might tend toward downward identification and upward contrast) also leaves open the possibility that perceived similarity is, to some extent, flexible and situationally-bound.

Neuroticism and negative-outcome comparisons. One stable personality trait that has been linked to comparison outcome is neuroticism. Studies have shown that cancer patients who score high in neuroticism pay more attention to social information than patients low in neuroticism (Van der Zee, Oldersma, Buunk, & Bos, 1998), and use comparisons in ways that support their negative views of the self and increase negative affect (Van der Zee, Buunk, & Sanderman, 1998; Van der Zee, Buunk, Sanderman, Botke, & van den Bergh, 2000). Indeed, patients who are high (versus low) in neuroticism explicitly endorse greater downward identification (Van der Zee et al., 1999). Existing evidence thus points to neuroticism as a

potential influence on the affective consequences of comparisons, but this finding requires replication in samples of patients with illnesses other than cancer.

Summary of narration methods. Overall, there is some evidence to suggest that patients with severe physical and psychological symptoms are more likely to want opportunities for comparison, relative to those with more mild symptoms. This may be due to high anxiety or uncertainty about one's future associated with severe symptoms, and thus "sicker" patients may use comparisons to alleviate negative affect. Findings in various patient samples demonstrate that downward comparisons are more common than upward (based on recall).

The affective consequence of a comparison appears dependent on the direction and dimension of the comparison, and on perceived similarity to the target. A patient's general comparison style, including direction and perceived similarity, may be associated with personality traits such as neuroticism. Despite awareness that each of these features is important with respect to consequences, no single study has incorporated all of them in order to examine processes that lead to positive- and negative-outcome comparisons. Without consistent assessment of contextual features, it is difficult to determine which patients are at risk for negative consequences and when positive (versus negative) affective consequences are likely to occur. It is important to note that all of these findings are based on patients' self-reports of current preference or prior comparisons; the following section considers comparisons that are induced (or elicited by researchers), rather than recalled. The lack of evidence related to (motivation for) illness self-care behavior also is an area of opportunity for future work.

Reaction Methods: Target Presentation to Patients with Chronic Illness

Experimental and quasi-experimental studies answer the question of "what happens when patients are confronted with social information, and are not allowed to choose their comparison targets?" Although studies that use reaction methods typically are conducted in research/

laboratory settings, the designs attempt to mimic situations that patients would encounter in their everyday lives (e.g., receiving a handout from a specialty clinic that includes information about other patients, observing or talking with another patient in a treatment center). The simplest designs have compared the opportunity to make a comparison (through the presentation of a patient target) against no opportunity to make a comparison. Somewhat more sophisticated designs have compared targets that differ by dimension (e.g., physical aspects of the illness, emotional response to illness) to one another, and to no target.

These studies have shown no differential effects of dimension, but demonstrate that opportunities for social comparison result in improved emotional and physical health outcomes (e.g., less anxiety, shorter inpatient hospital stays), relative to the presentation of health information alone (i.e., no target; Mahler & Kulik, 1998; Mahler, Kulik, & Hill, 1995). For example, a written psychoeducational booklet that included an upward comparison target led to the weakening of associations between perceived control/uncertainty and depression/anger (Steigelis et al., 2004). Moreover, cardiovascular surgery patients who viewed videotapes that included upward comparison targets experienced fewer post-operative complications and increased ambulation post-surgery (Mahler, Kulik, & Hill, 1995), and higher lung function and shorter intensive care and overall hospital stays (Mahler & Kulik, 1998), than patients who viewed tapes without comparison targets.

Based on such findings, it is possible that the opportunity for social comparison (versus no opportunity for comparison) has medical benefits for patients with chronic illness. As these studies included only upward comparison targets, however, they offer little help to clarify the broader process of comparison or identify the types of targets that should be used in interventions. More complex (quasi)experimental studies provide a bit more detail. For instance, cancer patients who listened to audiotapes of targets describing their coping efforts reported

higher self-efficacy for coping with cancer, relative to patients who heard targets describe negative emotional expression (Bennenbroek et al., 2003). Patients who heard (negative) emotional expression also reported higher negative affect (i.e., depression and anger) than patients who heard about coping or procedural information, suggesting that a target's emotional expression (as presented) may have short-term negative effects.

Manipulations of direction and dimension. Experimental manipulations that explore the effects of both direction (upward versus downward) and dimension (coping versus illness prognosis) have captured differences in affiliative response to a target. Breast cancer patients who listened to audiotaped interviews with upward coping targets expressed stronger desire for emotional support and information from the target, relative to patients who listened to downward coping targets; upward targets did not differ from targets whose coping was “unspecified” (Stanton et al., 1999). These results were partially replicated in patients with HIV (Derlega et al., 2008). In this study, patients who listened to upward prognosis targets reported greater desire for emotional support and information, relative to patients who listened to “unspecified” prognosis targets, but did not differ from patients who listened to downward prognosis targets. Patients who listened to downward coping targets showed *less* desire for emotional support and information from the target relative to patients who listened to upward and unspecified coping targets.

Both Stanton and colleagues (1999) and Derlega and colleagues (2008) demonstrate that patients prefer support and information from upward coping targets, relative to downward coping targets. These studies also suggest that patients may not want support or information from downward targets (on either dimension), but did not address the possibility that downward comparisons may be useful for reasons such as self-enhancement. In addition, neither study assessed affective or illness-related consequences; it is plausible that patients may want certain

targets for specific reasons (e.g., emotional support), but that “unwanted” targets are associated with additional positive outcomes that were not captured in these studies.

The issue of preference versus actual benefit is addressed in a series of studies by Kulik and colleagues (Kulik & Mahler, 1987; Kulik, Mahler, & Moore, 1996; Kulik, Moore, & Mahler, 1993). These studies employed quasi-experimental designs of hospital roommate assignment; roommate assignment was based on bed availability (determined by hospital staff), as it would be in real-world instances of hospitalization. In each of these studies, patients scheduled for cardiovascular surgery were assigned to pre-operative roommates (i.e., lateral or downward targets) or post-operative roommates (i.e., upward targets). Although most patients expressed preferences for (similarly) pre-operative patients prior to surgery, those whose roommates were post-operative reported less anxiety about surgery than did patients whose roommates were pre-operative. Likewise, patients whose roommates were post-operative showed faster return to ambulation and shorter hospital stays than patients whose roommates were pre-operative.

Summary of reaction methods. Manipulation of one or more features of a comparison target has shown that the opportunity for comparison may lead to positive health outcomes, relative to no opportunity for comparison. Less clear is the type of comparison most clearly associated with positive outcomes, based on direction and specific dimension. Although patients report preferences for upward coping and downward illness targets, they actually may receive greater health benefits from upward illness targets. A potential issue for external validity is that existing designs use separate upward and downward targets to illustrate coping and illness dimensions; in reality, patients who are used as targets exist on both dimensions simultaneously, and it is likely that patients who make comparisons will have information about both coping and illness (i.e., severity, prognosis). Targets who are described on both dimensions may more accurately reflect patients’ real-world comparison opportunities. Together with the assessment of

perceived similarity, future research that examines direction and dimension will provide more nuanced indications of the comparison contexts that result in benefit (e.g., comparison to upward coping targets when the focus is on identification).

Narration and Reaction Methods: Conclusions

Taken together, it appears that narration and reaction methods generate somewhat different conclusions. Discrepancies may be related to the inherent differences between asking patients to retrospectively aggregate across many instances of comparison (narration methods) and observing their responses to individual targets (reaction methods). Reaction methods present individual encounters with comparison information, in that patients cannot choose their targets. Findings from reaction studies suggest that upward targets are rated more highly on various dimensions of affiliation than are downward targets, and that patients may receive superior medical and psychological benefits from upward comparisons (relative to downward).

Narration methods rely on patient recall, and thus capture comparisons that are both encountered (i.e., only one available target) and self-selected (from a range of options). Although both situations occur in the real world, failure to differentiate them combines and confuses their effects. For example, narration methods show that when asked to recall their use of comparisons in daily life, patients report more downward comparisons (relative to upward) and report that downward comparisons are most often associated with positive affect. These findings stand in contrast to results from studies that use reaction methods, preventing a clear understanding of whom patients want as targets (i.e., preference for direction/dimension), why they want certain targets (i.e., motivation or reason for preference), and what happens when they make certain comparisons (i.e., interpretation of similarity, affective response, medical outcomes/motivation to change health behaviors).

Examining comparison consequences experimentally via reaction methods isolates the “individual target” situation, but ignores self-selected comparisons. The latter provides an opportunity to elucidate preference and reason for choosing a particular target, as the choice is deliberate, conscious, and recent. It is possible that patients regularly consider multiple available targets (or interpretations of the same target), and that they make target selections for predictable reasons (e.g., self-enhancement). If patients do consider multiple comparison options, an additional complication exists in the typical assessment of “preference.” Ratings of preference are entirely hypothetical, in that patients do not have the expectation that their stated preference will lead to an actual comparison opportunity. Without this expectation, it is not clear what “preference” actually captures, and whether it has any effect on patient outcomes.

In the absence of an expected comparison opportunity, patients may not carefully attend to the potential consequences of each comparison, or prioritize the likely immediate consequence in one domain (e.g., affect) over potential longer-term consequences (e.g., motivation to improve self-care behaviors). Such cursory consideration of options is less likely when a comparison opportunity is expected, and it remains possible that self-reported preferences are inconsistent with the actual motivated comparison activity that occurs in patients’ daily lives. In short, although we know the range of potential impact of comparisons on affect and motivation for healthy behaviors, the process that leads to each consequence is largely unknown.

Target Selection by Patients with Chronic Illness

A small number of studies have addressed the ambiguity of “preference” by providing patients with brief descriptions of multiple comparison targets and allowing them to select the target(s) about whom they would like to learn more. Preference in *selection* studies (Wood, 1996) is thus based on behaviorally-demonstrated indication of desire for comparison information. Targets in existing selection studies are patients with the same illnesses as patient

participants, and are described as doing well (upward targets) or poorly (downward targets) on the dimension of illness severity. Previous research has not assessed the effects of describing target coping, and has ignored many features of the comparison context (e.g., pre-existing affect, motivation for selection, perceived similarity to the target).

Only two available studies have used selection methods to assess preference. The first allowed participants with rheumatoid arthritis to select one of two folders; participants were asked to choose either a patient “doing better or doing worse than you” (DeVellis et al., 1990, p.6). Folders contained a description of a patient who had either “very mild” (upward target) or “very severe” (downward target) arthritis symptoms, based on the participant’s choice. In this study, patients chose downward targets more often than upward targets. Folder choice was not related to global negative affect.

A second study, conducted in a sample of patients with cancer, allowed participants to select from various electronic descriptions of other patients with cancer who were either doing well or poorly. Participants were allowed to choose as many descriptions as they liked, and time spent reading each choice was monitored by the computer system (Van der Zee et al., 1998). Participants in this study spent more time reading about upward targets, relative to reading about downward targets. Participants who chose more upward targets also reported higher positive affect after terminating the computer program. In contrast, patients who chose more downward targets reported higher negative affect after exposure to comparison targets.

This small set of studies suggests that patients with cancer typically prefer to read about upward targets, whereas patients with arthritis prefer to read about downward targets. This difference in choice may reflect divergence in the nature of cancer versus arthritis (see Heidrich, 1996). Cancer prognoses vary widely, but many patients with cancer can foresee potential improvement. The possibility of gathering information about how to improve may make upward

comparisons useful to these patients in a way that downward comparisons are not, or are less so. As arthritis is degenerative, however, patients typically cannot look forward to future improvement and may thus be more comforted by downward comparisons. Differences in target selection also may be due to a host of other illness- or personality-related aspects of the samples that were not the focus of either study, such as illness duration (Affleck, Tennen, Pfeiffer, & Fifield, 1988; Helgeson & Taylor, 1993; Wood, Taylor, & Lichtman, 1985).

Van der Zee et al. (1998) also showed that patients who chose to read about upward targets tend to experience consequent positive feelings more so than those who chose to read about downward targets. The negative impact of downward comparisons stands in contrast to predictions and self-reports that downward comparisons result in satisfaction with one's own standing (and thereby, positive affect), indicating that additional features of the comparison context may impact the outcome of targets that are deliberately selected. In particular, because there is no indication of pre- to post-selection change in affect, it is possible that preexisting mood contributed to target selection (cf. Wheeler & Miyake, 1992). In this case, selection may serve to maintain current mood, which could have positive or negative effects on health.

If choice is repeated over time, consistent engagement in comparison activity that triggers negative affect (for example) may have long-term psychological and physical health consequences. Alternatively, although the immediate consequences of certain comparisons may be negative, the cumulative effect of repeated comparisons may be positive (e.g., appreciation for one's own situation, increased motivation to improve self-care), and may have a positive effect on health. As such, results from studies that use selection methods underscore the potential impact of social comparisons on the health of patients with chronic illness and highlight the importance of gaining further insight into the process of selecting comparison targets. Because selection methods have been employed only in samples of cancer and rheumatoid arthritis

patients, however, expanding the range of patient samples would address the generalizability of existing evidence.

Summary and Overview of the Present Study

Applications of social comparison theory in patient samples indicate that comparisons can have meaningful affective consequences, and may influence motivation for self-care behaviors. The consequence of a given comparison is impacted by several factors, including: (1) individual difference characteristics (e.g., neuroticism), (2) target characteristics (i.e., direction and dimension), (3) specific reasons for or desired outcomes of a comparison (e.g., feeling better about one's own situation), (4) pre-comparison affect, and (5) comparison interpretation (i.e., perceived similarity). Increasing our knowledge of the process of social comparison among chronic illness patients eventually may contribute to the improvement of interventions for patients with chronic illness. Specifically, understanding what patients are likely to do on their own (e.g., talking to other patients, reading patient testimonials on the internet) and the effects of comparisons allows providers to consider optimal methods for using comparison information in interventions (Arigo, Suls, & Smyth, 2012). In contexts such as patient support groups and the presentation of educational materials, for example, patients may be trained to make comparisons that lead to positive mood and/or improved motivation for self-care.

Selection methods provide a unique opportunity to assess each comparison-relevant variable in turn, and to determine their unique and/or combined effects on comparison consequences. Selection methods are underutilized, however, and have been applied to only a limited range of illnesses. An important next step is to conduct selection studies that capture each process variable, and ideally, to do so in a way that incorporates new and potentially vulnerable patient populations. Type 2 Diabetes Mellitus (T2DM) is a chronic but preventable health condition that requires consistent maintenance through specific self-care behaviors. Because

prognosis for T2DM is highly variable, patients who are diagnosed with this condition likely experience high uncertainty about their health status, which may increase the desire for (and/or impact) of social comparisons. T2DM is thus an important and appropriate condition in which to examine the process and consequences of target selection.

Type 2 Diabetes Mellitus

T2DM is an acquired metabolic disorder characterized by the excessive buildup of glucose (sugar) in the blood stream. In healthy individuals, glucose is transported to cells to fuel maintenance and growth – a process that requires the assistance of the hormone insulin. T2DM results from insulin resistance: cells fail to respond to the release of insulin, and glucose builds up in the blood stream and is then eliminated through urine, rather than used by cells (National Institutes of Health, 2009). Over time, high levels of blood glucose can lead to a variety of symptoms, ranging from mild to severe. Initial, mild symptoms include thirst, dizziness, frequent urination, and blurred vision. More serious, longer-term symptoms include neuropathy, retinopathy (and often, blindness), and kidney failure, among others.

Diagnosis of T2DM typically occurs in adulthood (i.e., after the age of 20); the disorder is most common among individuals aged 60 or older, suggesting increased prevalence with advancing age. Although genetic predisposition (Jonsson et al., 2008) and pathogen exposure (Tong et al., 2009) have been implicated in the etiology of T2DM, unhealthy lifestyle choices (e.g., diets high in saturated fat, lack of exercise) significantly increase the probability of developing the disorder. A diagnosis of T2DM necessitates consistent attention to lifestyle choices, in order to prevent an unsafe rise in blood glucose and avoid debilitating symptoms. Major risk factors that contribute to both the onset of T2DM and to ongoing symptoms are thus (partially) within an individual's control. Despite increasing awareness of the lifestyle-based risks for T2DM, however, the prevalence of the disorder is steadily increasing; approximately 8

million Americans currently carry a diagnosis of T2DM, and another 1.6 million new cases are reported each year (Centers for Disease Control and Prevention, 2007). Recent estimates show that US children born in 2000 have at least a 33% chance of developing T2DM during their lifetimes; this risk is even higher among certain demographic groups (Narayan, Boyle, Thompson, Sorensen, & Williamson, 2003).

Individuals with T2DM also are at increased risk for comorbid conditions such as dyslipidemia (i.e., high cholesterol; Campbell, 2009), cardiovascular disease (Barrett-Connor, 2003), emotional distress (e.g., depression; Li et al., 2009), and early death (Florkowski, Scott, Coope, & Moir, 2001), which increases the health care burden of T2DM (Durden, Alemayehu, Bouchard, Chu, & Aagren, 2009). Although the deleterious effects of both T2DM and associated disorders can be curtailed through medical management and psychosocial interventions, maximally and widely effective interventions do not yet exist (DeCoster & Cummings, 2005). T2DM is thus a growing public health concern that requires improved techniques to treat a wide range of physical and psychological symptoms.

Social Comparison among Patients with Diabetes Mellitus

In the service of creating effective interventions for patients with T2DM, researchers have conducted qualitative interviews to capture the experiences and perceptions of patients who have been diagnosed with this illness. Such methods have identified social comparison as a self-initiated strategy that patients use to understand and cope with their illness (Gorawara-Bhat, Huang, & Chin, 2008; Huang, Gorawara-Bhat, & Chin, 2005). When asked about their goals, T2DM patients noted that downward comparisons toward other patients resulted in satisfaction with one's own health status and increased motivation to seek treatment. These reported consequences potentially reflect downward contrast and downward identification, respectively, with each leading to "benefit" in a different way. Downward contrast resulted in favorable self-

evaluations (and possibly reduced negative affect), whereas downward identification resulted in increased motivation to improve self care (despite the possibility of an immediate increase in negative affect). Upward comparisons were very rarely invoked; those upward comparisons generated by T2DM patients resembled upward contrast and resulted in frustration.

As revealed through semi-structured interviews, social comparisons are common and useful for T2DM patients. A drawback of the qualitative methods employed in existing studies is the lack of purposeful assessment of the comparison process, which limits the ability to draw conclusions regarding motivations and consequences. Relevant analyses of qualitative data also do not explicitly address differences in comparison target choices based on dimension. Only two other available studies have captured comparisons among patients with diabetes; these studies relied on experimental methods to determine the effects of forced exposure to specific targets.

Reaction studies among diabetes patients. Based on a previous investigation of patients with breast cancer (Stanton et al., 1999), Derlega and colleagues (Derlega et al., 2005) exposed patients with T2DM to comparison targets that differed by direction and dimension. Prognosis and coping were presented as good, poor, or unspecified. Ratings of desire to affiliate with the target did not differ based on prognosis, but did differ based on coping effectiveness. Patients exposed to “good” (i.e., upward) coping targets reported greater desire for affiliation and emotional support from such targets, and liked such targets better, than did patients exposed to “poor” coping targets.

In a separate study, patients with insulin-dependent diabetes (types 1 and 2) showed differences in motivation for self-care based on both personality characteristics and the comparison target provided (Schokker et al., 2010). For patients exposed to an upward target, those with a high promotion focus (i.e., desire to achieve desirable outcomes) were more motivated to engage in self-care than patients with a low promotion focus. For patients exposed

to a downward target, those with a high prevention focus (i.e., desire to avoid undesirable outcomes) were more motivated to engage in self-care than patients with a low prevention focus. Self-efficacy qualified this latter finding, as it only applied to patients with high self-efficacy.³

Derlega and colleagues (2005) and Schokker and colleagues (2010) thus demonstrated that there are differential affiliative and motivational responses to targets among patients with diabetes. As these studies used reaction methods, these authors captured responses to individual (unselected) comparisons only. These studies also did not assess perceived similarity or affective consequences of comparisons. Perhaps the most problematic concern regarding external validity is the separation of information about coping effectiveness and illness severity. Derlega and colleagues (2005) separated coping and illness dimensions between targets; Schokker and colleagues (2010) included both dimensions, but the effects of each dimension were not examined. In everyday life, patients are likely to encounter information about both aspects of targets. The importance and optimal sequential placement of dimensional information remains unclear, leaving room for further work to contribute to our understanding of patient comparisons. The proposed study represents an attempt to fill in these noticeable gaps in our knowledge of patients' comparison choices and responses, with the ultimate goal of improving patient care by addressing patients' use of comparisons in psychosocial interventions.

Outline of the Present Study

The present study utilized computer-mediated assessment and target presentation to capture individual differences (e.g., neuroticism, age, disease factors), reasons for target selection (e.g., self-enhancement), target choice, interpretation (i.e., perceived similarity), and affective and motivational responses to the selected target in a large sample of patients with T2DM. A small pilot study was conducted for the purpose of ensuring that case descriptions of targets (i.e., patient vignettes) were seen as clearly representing “upward” versus “downward”

targets among patients with T2DM. Patients in vignettes were described on both coping and illness severity dimensions in order to mimic real-world comparison opportunities. Patients for the large-scale study were recruited with the assistance of online media, including general and diabetes-specific websites, and were directed to an independent web-based study designed to capture each step in the process of target selection. Please refer to Figure 2 for a visual representation of the conceptual model.

A wide range of data were collected in several stages of the experiment, with each stage designed to provide unique information. Participating patients first responded to questions about their general affect, diabetes symptoms, illness duration, social comparison tendencies, and neuroticism (*individual difference predictors of target selection*). A second set of questions assessed participants' mood states immediately pre-selection, self-evaluations of coping and illness severity, and motivation for engaging in diabetes-specific self-care behaviors (*existing affect, self-evaluations, and motivation*). Patients then received one-sentence descriptions of their comparison target options and selected among them (*target selection*) before rating several possible reasons for their selection (*reason for selection*). Case description vignettes were then presented based on target selection, and patients were asked to read/study them. Subsequently, patients rated their perceived similarity (*interpretation*), post-selection affect, and motivation for engaging in self-care behaviors (*selection consequences*). A flowchart of study procedures can be found in Figure 3.

Research Questions and Hypotheses

Research questions for the present study derive from the existing findings of studies that used narration, reaction, and selection methods to assess comparisons among patients with chronic illness. Much of the existing literature speculates about the interconnections among various steps in the process without testing the entirety of these connections directly within

persons in a single experiment. Our overall research goal was to determine whether steps in the proposed model, which is based on theoretical and empirical work in the area of social comparison, operate as previous authors describe them. Specific research questions correspond to individual steps in the process of comparison selection for the purpose of associating each step with target selection, consequence, or both.

Research Question #1: *To what extent are diabetes-specific illness symptoms and concerns, as well as personality characteristics, associated with general social comparison tendencies?* Existing literature suggests that certain patients are more likely to engage in social comparison in daily life. These patients tend to score highly on measures of neuroticism/negative affect, and in some studies, these patients report greater illness severity. To our knowledge, neuroticism and general tendency toward social comparison (e.g., Social Comparison Orientation [SCO]; Gibbons & Buunk, 1999) has been examined only among patients with cancer. Based on these findings, we expected that SCO is positively correlated with neuroticism, negative affect, and illness severity (as captured by symptom report, concern about diabetes, Hb_{A1c} level, body mass index [BMI]) (*Hypothesis 1a*).

Less clear is the relationship between SCO and length of time since T2DM diagnosis, positive affect, and self-rating of coping difficulty; we predicted that SCO would be related to these factors, but we did not have specific expectations for direction (*Hypothesis 1b*). Similarly, overall tendencies toward upward and downward comparison (versus extent of comparison overall) have not been investigated, and prior findings show that both upward and downward comparison can be beneficial for well-being. We predicted that upward and downward SCO would be associated with the aforementioned illness-related experiences and personality characteristics, but we did not have specific expectations for direction (*Hypothesis 1c*).

Research Question #2: *What is the frequency distribution of target selection among patients with type 2 diabetes?* Previous literature has shown variety in comparison preferences (reported and demonstrated), but selection has not been demonstrated among patients with T2DM. We predicted that patients would select downward illness/upward coping targets most often, as these targets should provide both satisfaction with one's health status and information about how to cope with their illness (*Hypothesis 2*).

Research Question #3: *Are individual difference characteristics – particularly those that are associated with social comparison orientation – related to behaviorally-demonstrated target selection?* Existing evidence suggests that “sicker” patients may be motivated to alleviate their anxiety or uncertainty through the use of downward comparisons. We intended to test whether specific physical and psychological experiences are associated with target choice, including illness symptoms and neuroticism. We predicted that patients who reported more severe (versus less severe) illness symptoms would choose downward illness/downward coping targets most often (*Hypothesis 3a*), and that patients who reported more neuroticism (versus less neuroticism) would choose downward illness/upward coping targets most often (*Hypothesis 3b*). We also were interested in whether reported tendency toward social comparison (general, upward, and downward SCO) was associated with target selection. We expected that SCO would predict target selection (*Hypothesis 3c*), but we did not have specific predictions about the direction of this relationship.

Research Question #4: *Do differences in arousal and mood valence prior to target selection lead to different choices?* There is some existing evidence to suggest that comparisons differ based on an individual's pre-existing mood (Wheeler & Miyake, 1992). To our knowledge, pre-comparison mood has not yet been examined among chronic illness patients. Because patients may use comparisons to either modify or maintain their moods, we did not have specific

predictions about the direction of this relationship, nor about the domain(s) of affect that might show the effect. We expected to find that affect immediately prior to selection predicts target choice, in the domains of stress (*Hypotheses 4a*), mood valence (*Hypotheses 4b*), activation (*Hypotheses 4c*), and excitement (*Hypotheses 4d*).

Research Question #5: *Does a model that includes multiple variables proposed to influence comparisons accurately predict target choice?* Previous work has identified illness severity, negative outlook, pre-existing affect, and tendency toward comparison as associated with target selection, but the predictive power of these factors has not been tested. We expected that the combination of illness severity (Hb_{A1c}, self-rated symptom severity), negative outlook (neuroticism, diabetes concerns, negative mood over the past month), affect immediately prior to selection, and social comparison orientation (general, upward, and downward) to predict target selection with accuracy that is better than chance (*Hypothesis 5*).

Research Question #6: *Are target selections differentially associated with reported reasons for target choice?* Several authors, such as Wills (1981), Taylor and Lobel (1989), and Buunk and colleagues (1990), have proposed reasons for specific target selections. These reasons include improving affect and gaining information about how to improve one's standing. In previous work, differences in reasons for choosing or focusing on specific comparisons referred to direction only; the present study allowed for exploration of patients' reasons based on both direction and dimension of comparison. We predicted that the choice of downward illness/upward coping targets would be associated with desires for both information (*Hypothesis 6a*) and improved mood (*Hypothesis 6b*). We expected that the choice of upward illness/downward coping targets would be associated with the desire for information (*Hypothesis 6c*). We also predicted that the choice of downward illness/downward coping targets would be associated with the desire for improved mood (*Hypothesis 6d*).

Research Question #7: *Do different target selections result in distinct affective consequences?* Existing evidence suggests that certain comparisons are associated with greater improvements in mood than are other comparisons and suggest that affective consequence may be more powerful for downward targets. Because it is unclear whether a specific combined (coping/illness severity) target results in greater affective response, we tested the differences in affective response (pre- to post-selection) based on each target selection. We expected that the choice of downward illness/upward coping targets would result in improved mood (i.e., *Hypothesis 7a*), whereas the choice of upward illness/downward coping targets would result in worsened mood (*Hypothesis 7b*). We predicted that both upward coping/upward illness targets (*Hypothesis 7c*) and downward illness/upward coping targets (*Hypothesis 7d*) would result in improved mood. Given that upward coping and downward illness targets are separately associated with positive affect, we predicted that the choice of downward illness/upward coping targets would result in greater increases in positive affect than would any other coping target (*Hypothesis 7e*).

Research Question #8: *Do different target selections result in distinct effects on motivation for self-care?* Tests of social comparison effects on self-care motivation among patients with chronic illness are scarce, but existing evidence suggests that effects differ based on comparison target. We predicted that the choice of downward illness/upward coping targets would result in higher motivation to improve self-care behavior than any of the other available targets (*Hypothesis 8*).

Research Question #9: *What is the relationship between target selection and perceived similarity?* We intended to investigate whether identification and contrast are associated with target selection or consequence in the ways that they have been theoretically implicated. We expected patients who selected upward illness/upward coping targets to state that they focused

more on similarities between themselves and the target (*Hypothesis 9a*), and less on differences between themselves and the target (*Hypothesis 9b*), than patients who selected any other target. Conversely, we expected patients who selected downward illness targets/downward coping targets to state that they focused more on differences between themselves and the target (*Hypothesis 9c*), and less on similarities between themselves and the target (*Hypothesis 9d*), than patients who selected any other target.

Research Question #10: *Does perceived similarity moderate the effect of target selection on affective consequences or motivation for self-care?* If theoretical work is correct, target selection alone may not show a direct impact on affect or motivation. Rather, the interaction between target selection and perceived similarity to the target should have greater predictive power for reported outcomes. We expected to find a significant interaction effect for target selection and perceived similarity on affect (*Hypothesis 10a*) and motivation for self-care (*Hypothesis 10b*). Specifically, that motivation would be higher with greater identification with upward targets and for greater contrast against downward targets.

Method: Pilot Study

Participants

All study procedures were approved by Syracuse University's Institutional Review Board (IRB). A prior study recruited patients with medically-verified T2DM via print and online advertisement through the Stress, Health, and Daily Experiences [SHADE] laboratory at Syracuse University from 2005 to 2009. Patients who gave their consent to be notified about future research projects were contacted via telephone to determine their interest in the present pilot study. Patients also were recruited through printed advertisements distributed in the community (e.g., public bulletin boards, diabetes supply stores). Patients who expressed interest in the study served as pilot participants for the purpose of evaluating study materials (e.g., patient

vignettes). Pilot participants (N=22) completed an initial screening and were scheduled for a 1-hour appointment at the SHADE research center.

Most participants in the pilot study were Caucasian (71%), married (or living with someone as if married; 43%), and earning less than \$20,000 per year. Mean age of the sample was 54.10 years ($SD=9.68$). Mean body mass index [BMI] was 34.65 ($SD=6.89$); this score falls in the “obese” category of the World Health Organization’s international classification system (WHO, 2000). Mean reported glycated hemoglobin (Hb_{A1c}) level (based on last physician visit/assessment) was 8.1% ($SD=2.01$), indicating higher-than-recommended average blood glucose over the past 3-6 months. The American Diabetes Association recommends an Hb_{A1c} level lower than 7% as optimal for minimizing neuropathic and microvascular complications from diabetes (American Diabetes Association, 2010).

Materials and Measures (located in Appendices A and B)

Demographics. This form included personal information such as age, gender, household income, ethnicity, relationship status, self-reported height and weight (for calculation of body mass index), and duration of T2DM.

Self-rating of illness severity and coping effectiveness. Due to a lack of validated, brief measures for illness severity and coping effectiveness, short scales were created for the present study. Four items were used to assess participants’ perceptions of their own illness severity. These items were based on the dimensions captured in existing measures such as the Short-Form Health Survey (Ware & Sherbourne, 1992), the Diabetes Symptom Checklist (Grootenhius, Snoek, Heine, & Bouter, 1993), and the Problem Areas in Diabetes scale (Polonsky, Anderson, Lohrer, Welch, Jacobson, Aponte, & Schwartz, 1995). Items assessed symptom number, frequency, intensity, and extent of interference with daily activities. Each item was rated from 1 (“few”/“very mild”) to 5 (“many”/“very severe”) and items were summed to create a total

score. The resulting measure had good internal consistency (Cronbach's $\alpha=.87$) and showed a strong correlation with the Problem Areas in Diabetes scale ($r=.60, p=.003$).

An initial set of items corresponding to coping (i.e., management of negative emotional response to illness) assessed number of effective strategies, frequency of deliberate coping, extent of difficulty managing emotional response, and extent to which emotional response interferes with daily activities. These items were based on the dimensions captured in existing measures such as the Short-Form Health Survey (Ware & Sherbourne, 1992). Each item was rated from 1 ("many"/"no difficulty") to 5 ("none"/"immense difficulty") and items were intended to be summed to create a total score. This total had poor internal consistency (Cronbach's $\alpha=.32$), and only one item showed significant correlation with the total score ("how much difficulty have you had managing your emotional response to diabetes?" $r=.35, p=.02$).

In addition, participants expressed confusion about these items and gave feedback that they should be simplified and/or consolidated. Participants identified "how much difficulty have you had managing your emotional response to diabetes?" as the item that most directly tapped coping effectiveness. Alone, this item strongly correlated with affect over the past four weeks (positive affect: $r=-.64, p=.002$; negative affect: $r=.62, p=.003$), whereas the total score for all coping items did not ($r=.11, p=.35$). As a result, the three low-performing items were dropped from the study, and self-rated coping effectiveness was operationalized as participants' ratings of how much difficulty they experience with diabetes-related emotion management. Although a one-item scale is not ideal, this item appeared to capture the experience in question. The broader health perceptions literature includes empirical evidence to show that single items used capture global perceptions perform as well as multiple-item measures (e.g., subjective well-being; Gardner, Cummings, Dunham & Pierce, 1998) and predict important outcomes (e.g., all cause mortality; DeSalvo, Bloser, Reynolds, He, & Muntner, 2006). Eliminating extraneous items also

reduced the total number of questions included in the study – a change that many participants requested.

Target rating scales. Two items were used to assess participants' perceptions of patient illness severity: one item assessed the number of symptoms (from "very few" to "very many") and one item assessed the severity of symptoms ("very mild" to "extremely severe"). Item scores for severity were averaged. One item assessed participants' perceptions of patient coping ("very poorly" to "very well"). Two items assessed relative evaluation with respect to illness severity and coping: participants were asked to rate their own illness symptoms and coping relative to the patient described (from "doing much worse than the patient" to "doing much better than the patient"). Finally, patients were asked to report their affective response(s) and thoughts about each patient. In addition to quantitative data (analyzed according to the following procedure), affective responses and thoughts provided qualitative information to guide vignette revisions.

Patient descriptions. Vignettes were developed by the investigators and were based on patient descriptions used as comparison targets in previous studies (e.g., Derlega et al., 2005). Descriptions in these studies consistently use first-person point of view, and typically are limited to one paragraph. For coping targets, these paragraphs begin with "my doctor referred me to a diabetes specialist. After my diagnosis, I was depressed, and since then" (my emotions have stayed the same/been better, indicating present coping). For illness targets, descriptions include physical symptoms (mild for upward targets, severe for downward targets) and self-care behaviors (diet and exercise self-management for upward targets, medication/insulin shots for downward targets).

In the present study, vignettes used the same general approach as those presented above, but each vignette described a patient with T2DM with respect to both illness symptoms and coping strategies. Vignettes used first-person language to eliminate any potential influence of

target demographics (e.g., gender, ethnicity, age) on selection or outcomes. Descriptions began with reference to initial diagnosis and emotional response, followed by details about symptoms and self-care. The vignettes were designed to illustrate upward or downward comparison targets on each dimension: One patient had few, mild illness symptoms and is coping well (upward illness/upward coping); one had many, severe symptoms but is coping well (downward illness/upward coping); one had few, mild symptoms but is coping poorly (upward illness/downward coping); one had many, severe symptoms and is coping poorly (downward illness/downward coping). The final version of the vignettes used in this study appear in Appendix B.

Procedure

Participants were seated in private rooms in front of desktop computers that allowed them to control the pace of presented material by clicking mouse buttons. They were asked to complete electronic questionnaires related to their demographic information, illness symptoms, and social comparison tendencies, and to view electronic descriptions of four different patients with T2DM. (At two points during data collection, the order of target presentation was changed to minimize order effects.) Subsequent to viewing each patient description, participants provided numerical ratings of each patient's illness severity and ability to cope with symptoms, based on descriptions in the vignettes. Participants were also asked to respond to open-ended prompts to capture their cognitive and affective responses to each patient description. Participation ended with a debriefing session and the invitation for participants to ask questions about the study. Participants were paid \$15 for their time.

Results: Pilot Study

Evaluation of Test Materials

Vignettes were evaluated using both absolute and relative standards. The *a priori* absolute cutoff for determining the suitability of each vignette was an average rating of 1 point above or below the midpoint of each scale (e.g., cutoff for downward illness severity target was set at 4, with a scale midpoint of 3). Average ratings were evaluated after each group of 8 participants completed the study. Ratings of the initial vignettes failed to meet this cutoff after the first two groups completed the study, and the vignettes were adjusted based on participant feedback until they met the absolute cutoff. Vignettes also were evaluated using relative standards; upward and downward targets were subjected to paired t-tests to establish significant differences between target ratings (p set at .05). For the overall sample, ratings of illness severity ($t[21]=8.00, p<.0001, d=.42$) and coping ($t[21]=10.19, p<.0001, d=.59$) indicated that participants saw upward targets as significantly better than downward targets on both dimensions. Study vignettes were considered effective and ready for use in the larger study protocol once they met both absolute and relative criteria.

Method

Recruitment

Community participants with self-reported physician-diagnosed T2DM were recruited via the use of online advertisement, including postings on T2DM support network websites (e.g., diabetesdaily.com), craigslist.org, and social networking websites (Twitter.com). Sites such as Diabetes Daily and Twitter are (inter)national and thus tapped a wide range of geographic locations. Craigslist uses separate sites for each major city and surrounding area; recruitment cities in the present study included New York City, Atlanta, Boston, Chicago, Detroit, Los

Angeles, Philadelphia, and Dallas. These cities were chosen to maximize geographic and ethnic diversity and the chances of reaching large numbers of individuals with diabetes.

Individuals with T2DM who met the following criteria were invited to participate; advertisements noted that participants would receive \$5 to amazon.com and would be entered to win a \$100 gift certificate to amazone.com. Inclusion criteria required that participants were not currently pregnant, that they could read and write comfortably in English, and that they were aged 25 or older. T2DM is most often diagnosed in adulthood and the prevalence of T2DM increases with advancing age. As such, a minimum age requirement of 25 reduced the likelihood of capturing individuals with other types of metabolic disorders (e.g., type 1 diabetes, which is often congenital). Participants who did not meet these criteria based on their self-report were excluded from analyses.

Participants

A total of 282 individuals with T2DM initiated the study. A number of participants ($n=82$) did not complete the study (some of whom stated that it required too much time to finish), leaving a sample of 200 completers. Those who completed the study did not differ from non-completers in age, years since diagnosis of T2DM, self-rated illness severity, reported Hb_{A1c} level, or general tendency toward social comparison (Wilks's $\lambda=.93$, $F[8,163]=1.55$, $p=.15$; individual T-test $ps>.05$). Most participants who completed the study were Caucasian (87%), married (74%), and affluent (51% indicated an annual income greater than \$80,000). Just over half of the sample of completers was male (55%). The average participant who completed was 49 years old ($SD=10.47$), with a BMI of 33.46 ($SD=6.63$) and an Hb_{A1c} level of 7.59% ($SD=1.75$); average time since diabetes diagnosis was 6.24 years ($SD=6.82$). Please refer to Table 1 for further information about participant demographics. Illness and personality characteristics for the overall sample can be found in Table 2.

Materials and Measures

Demographics. This form captured reported personal information such as age, gender, household income, ethnicity, relationship status, height and weight (for calculation of body mass index), and duration of T2DM.

Self-rating of illness severity and coping. Four items were used to assess participants' perceptions of their own coping and illness severity. Items corresponding to illness severity assessed symptom number, frequency, intensity, and extent of interference with daily activities. Each item was rated from 1 (few/very mild) to 5 (many/very severe), and items were summed to create a total score. The resulting measure had good internal consistency ($\alpha=.88$), and showed positive associations with reported medical status ($r=.35$; $p<.0001$) and concerns about diabetes ($r=.52$; $p<.0001$). One item corresponding to coping assessed the extent of participants' distress related to managing their diabetes. This item was rated from 1 (very well – no distress) to 5 (not well at all – very high distress). Higher ratings on this item (more distress in managing diabetes) corresponded to greater depressive symptoms ($r=.56$; $p<.0001$), greater negative affect over the past month ($r=.43$; $p<.0001$), and less positive affect over the past month ($r=-.52$; $p<.0001$).

Problem Areas in Diabetes [PAID]. The PAID is a widely used 20-item inventory that asks participants to endorse specific domains of concern related to their diabetes (Polonsky, Anderson, Lohrer, Welch, Jacobson, Aponte, & Schwartz, 1995). Each item is rated on a scale of 0 (“not a problem”) to 4 (“serious problem”); the measure generates a total score between 0 and 20, with higher scores representing greater difficulty with symptom management. Because this measure has a substantial “emotional adjustment” component, it is included in the present study to provide information about patients' coping that was not captured with the single-item coping rating. The PAID has previously demonstrated high internal consistency (Cronbach's $\alpha = .90$)

and adequate test-retest reliability over a span of two months (Polonsky et al., 1995). In the present study, Cronbach's alpha was equal to .95.

Iowa-Netherlands Comparison Information Measure [IN-COM]. This 23-item questionnaire assesses the degree to which individuals report engaging in social comparison activity, with separate subscales for upward and downward comparisons (Gibbons & Buunk, 1999). Items are rated on a scale ranging from “strongly disagree” to 5 “strongly agree.” Cronbach's alphas for this measure's total score have been reported at .78 and .85 across two samples, indicating good internal consistency; alphas for subscales have not been reported. Alphas for the present sample were .80 (general), .93 (upward), and .92 (downward).

Eysenck Personality Questionnaire-Brief version [EPQ]. Items corresponding to specific personality characteristics (e.g., “Would you call yourself tense or high-strung?” “Do you ever feel miserable for no reason?”) are rated from 1 (not at all) to 5 (extremely). The full 24-item measure (Sato, 2005) captures extraversion and neuroticism; in the present study, only the 12-item “neuroticism” subscale was used. This measure has shown good internal consistency in previous samples of patients with chronic illness (Cronbach's $\alpha = .85$; Van der Zee, Buunk, & Sanderman, 1996; 1998). In the present study, Cronbach's alpha was .93.

Positive and Negative Affect Schedule [PANAS]. The PANAS was included to assess affect over the past week (Watson, Clark, & Tellegen, 1988). The PANAS includes a total of 20 words. Ten of these words represent positive affect (PA; e.g., excited, proud, strong) and another ten represent negative affect (NA; e.g., distressed, guilty, scared). Participants respond on a scale of 1 (very slightly/not at all) to 5 (extremely) as indicative of the degree of the specific affect. Total scores range from 10 to 50, with higher scores indicating more intense affect. Internal consistency is reportedly .86 to .90 for PA, and .84 to .87 for NA, in previous studies. Alphas for the present sample were .94 for PA and .93 for NA.

Immediate Affect. The time frame of the PANAS can be changed to capture current affect, and often is used as a pre-/post- manipulation affect measure. We chose not to use the same measure for state and trait affect, however. Administering the same scale on three occasions (i.e., over the past week, “right now” prior to selection, and “right now” subsequent to selection) in a short amount of time may not accurately capture distinctions in affect, and would likely confuse participants. We thus opted to use the circumplex model (Russell, 1980) to assess state affect. Participants were asked to rate four aspects of their current affect both before and after target selection. Arousal was rated from sleepy (1) to highly active (5), and valence was rated from very unpleasant (1) to very pleasant (5). Affect was further delineated on continua from relaxed (1) stressed (5) and from depressed (1) to excited (5). In statistical tests, these dimensional items were used independently.

Procedure

Online advertisements recruited individuals aged 25 or older who were previously diagnosed with T2DM. Advertisements referred interested patients to the study’s website (diabetes.syr.edu). After providing electronic informed consent, participants were asked to complete questionnaires assessing current affect, social comparison tendencies, general and diabetes-specific physical functioning, and self-evaluations of their illness severity and ability to cope with T2DM. Comparison target options were then presented in a list. Participants read brief descriptions of their options (e.g., “Patient X is struggling with severe symptoms of diabetes”) and selected one target using the computer mouse. Participants were asked to electronically rate potential motivations for selecting their comparison targets. Please refer to Figure 2 for an overview of study procedures.

Upon completion of the motivation rating form, participants had the opportunity to read a patient vignette corresponding to their target choice (please refer to Appendix B). Participants

were then asked to rate (1) their current affect, (2) the degree to which they focused on various aspects of the comparison target (e.g., similarities to the self), and (3) their current level of motivation for various self-care behaviors. Finally, participants were invited to email su.diabetes@gmail.com to submit their contact information (for the \$5 amazon.com gift certificate) and to enter the \$100 amazon.com gift certificate lottery.

Results

Data Security and Cleaning

Data were collected through a web-based survey system that provides encryption of all data files and daily security scans via multiple independent companies. Access to data files requires login by the account administrator (investigator); files are password-protected and were only accessed by the administrator. Data files were saved to a designated Syracuse University computer that is also password-protected to prevent access from unauthorized users.

As disease status was not confirmed by a physician, we employed a conservative approach to inclusion in data analysis. In addition to requiring that respondents reported a physician diagnosis of T2DM, those who did not report glycated hemoglobin (Hb_{A1c}) levels and those who reported levels out of a plausible range (i.e., below 2% and above 20%) were not included in analyses. Hb_{A1c} readings reflect the average level of blood glucose over a period of 2-4 months. Patients with diabetes who are engaged in treatment are likely to know (or have access to) their most recent readings, as Hb_{A1c} is the most commonly-used marker of glucose regulation (and thereby, illness severity). We reasoned that respondents who do not know their most recent Hb_{A1c} levels likely fall into two categories: individuals who have not been diagnosed with T2DM by a physician, or individuals with a diagnosis who are not informed about diabetes management. The former category includes individuals who do not meet eligibility criteria; individuals in the latter category may be unfamiliar with the symptoms and self-care behaviors

described in this study, and therefore may see diabetes comparison targets as irrelevant. These individuals (n=20) were outside of our target population and were thus removed from the data set prior to hypothesis testing.

Power Analysis

Features of the existing relevant literature precluded confident estimation effect sizes for the outcomes of interest in this study. First, there is a paucity of extant data using similar selection methods of assessment. As the few studies that allowed for participant selection did not attempt to predict selection, no available data can inform effect size estimation for this outcome. One study provides evidence that could inform an effect size for target choice, but choice was based solely on difference in direction; in the present study, the target options varied by direction and dimension. With respect to affective response, a crude judgment of effect size can be generated from findings associated with multiple methods of assessment. Such findings result from analysis of group differences, rather than changes in pre- to post-comparison affect.

Taken together, extant findings suggest that the effects of individual differences on target selection, and of target selection on affect, are likely to be small to moderate (i.e., Cohen's d of 0.2 to 0.4; Cohen, 1988). In the case of a small effect size (with up to three predictor variables), a sample size of 100 patients would result in adequate power to detect the effect of tests proposed for this study (e.g., ANOVA). As multiple tests were performed and multiple predictors were used, however, data collection for the present study remained open for 1.5 years in order to maximize sample size. Based on a the SAS PROC POWER calculation, the resulting sample size (N=180 included in analyses) allowed for enough power to detect a small effect (i.e., $d=0.2$, power>.80).

Missing Data

As noted, individuals who did not complete the study were eliminated from analyses. Responses for those who completed the study were examined to determine the extent and nature of missing data. We assumed that data would be missing due to participants randomly overlooking items or technical errors (e.g., mouse click did not highlight item response). Overall, less than 5% of data were missing, and there was no discernible pattern to missing data. There were no participants whose individual set of responses were missing more than 5% of data points. As a result, no participants were excluded due to missing data, and missing data was considered random.

Data Analytic Approach

All analyses were conducted using SAS statistical software (SAS Institute, 2003). Descriptive statistics and bivariate correlations (between pairs of scores for social comparison, well-being, and illness experiences) are presented prior to the results of inferential hypothesis tests. Existing literature on social comparisons among patients with chronic illness allows for specific predictions about each of the performance of several (but not all) of the variables included in the present study. Given that much of the previous literature is theoretical, rather than empirical, however, the present study includes novel methods for operationalizing these variables and testing their effects. The particular research design used in this study also has not been applied to a diabetes population. Consequently, we chose to include multiple approaches to answer our research questions, when appropriate. For example, Research Questions 5 includes both between-group and within-group analytic approaches to explore related (though distinct) hypotheses. Differences between hypotheses and statistical tests are described, with their results.

The following section presents several pieces of information related to each research question. Under each question, we review the method for capturing relevant variables and

present descriptive information about these variables. We then outline hypotheses related to the research question, the corresponding analytic technique for each hypothesis, and the results of each test. Cutoff P -values for statistical significance was set to .05 for all tests. Each section concludes with a summary of findings for the associated research question.

Research Question #1: *To what extent are diabetes-specific illness symptoms and concerns, as well as personality characteristics, associated with general social comparison tendencies?*

Associations between social comparison orientation and illness/personality characteristics were tested with bivariate correlations (Pearson's r) on total scores for measures of each construct. Please refer to Table 2 for baseline descriptive statistics on the overall sample; correlations (r -values) and individual significance levels for bivariate correlations can be found in Table 3.

Hypothesis 1a: At baseline, self-rated illness severity, reported Hb_{A1c}, diabetes concerns, neuroticism, negative affect, and body mass index will be positively correlated with general social comparison orientation (SCO).

This hypothesis was partially supported. Diabetes concerns, neuroticism, and negative affect showed significant positive correlations with general SCO ($ps < .05$), indicating that those patients who endorsed high levels of diabetes concerns, neuroticism, and negative affect also endorsed strong tendencies toward social comparison. Self-rated illness severity, reported Hb_{A1c}, and BMI were not related to general SCO ($ps > .05$).

Hypothesis 1b: Self-rated coping difficulty, time since diagnosis, and positive affect will be correlated with general SCO.

This hypothesis was supported. Self-rated coping difficulty was positively correlated with general SCO ($p < .0001$), whereas time since diagnosis and positive affect were negatively correlated with SCO ($ps < .0001$). Those patients who reported fewer years since their diagnosis,

less positive affect, and more difficulty coping with their diabetes also reported strong tendencies toward social comparison.

Hypothesis 1c: Both upward and downward comparison orientation will be related to diabetes experiences and personality characteristics.

Upward comparison was positively correlated with self-rated illness severity, reported Hb_{A1c}, difficulty coping with diabetes, diabetes concerns, neuroticism, and negative affect, and was negatively correlated with years since diagnosis, BMI, and positive affect ($ps < .03$). These correlations indicate that patients who reported severe physical and emotional diabetes-related problems and lower well-being, those who were recently diagnosed, and those with low BMIs endorsed strong tendencies toward upward comparison.

Similarly, downward comparison was positively correlated with self-rated illness severity, reported Hb_{A1c}, difficulty coping with diabetes, and was negatively correlated with years since diagnosis, BMI, and positive affect ($ps < .01$). Patients who reported severe physical diabetes symptoms and difficulty coping with diabetes, those who were recently diagnosed, and those with low BMIs endorsed strong tendencies toward downward comparison. Downward comparison was unrelated to diabetes concerns, neuroticism, and negative affect.

Summary of findings for Research Question #1. Reports of general tendency toward social comparison are associated with endorsements of greater emotional distress (please refer to Table 3). Tendency toward upward comparison (specifically) is associated with both physical and emotional distress across multiple domains, including illness severity markers and positive and negative affect. Tendency toward downward comparison (specifically) is associated only with illness severity markers and (less) positive affect. Patients who were diagnosed in the recent (versus distant) past and those who have low (versus high) BMIs appear to have stronger tendencies toward social comparison.

Research Question #2: *What is the frequency distribution of target selection among patients with type 2 diabetes?* Subsequent to completing baseline measures, participants were provided with brief descriptions of the four available target patients and were asked to choose which patient to read about. For example, participants read the description “a patient who has severe symptoms and is coping well” as a representation of the downward illness/upward coping target choice.

Hypothesis 2: A greater proportion of patients will choose upward coping/downward illness targets, relative to other targets.

Individual differences in target selection were evaluated by a Chi-square test of frequency, which showed significant differences in target selection across the sample ($\chi^2=65.80$, $p<.001$). The target selected most often was not the expected target (downward illness/upward coping), however. The greatest number of participants selected upward illness/upward coping targets (44% of the sample). The downward illness/upward coping target was selected by 34% of the sample; upward illness/downward coping and downward illness/downward coping targets received 13% and 9% of selections, respectively.

Summary of findings for Research Question #2. Patients demonstrate significant differences in target preference. In the present sample, the largest subset of patients chose to read about upward illness/upward coping targets. Our specific hypothesis related to the frequency of target selection was not supported.

Research Question #3: *Are individual difference characteristics – particularly those that are associated with social comparison orientation – related to behaviorally-demonstrated target selection?* This question relates to whether different “kinds” of people (indicated by individual difference variables) reliably tend toward making particular selections. For example, do patients who are sicker (versus less sick) or more (versus less) neurotic make different target choices? In

addition, do patients who endorse strong (versus weak) tendencies toward social comparison make different target choices? As noted, participants were asked to choose from one of four brief descriptions of patients (e.g., “a patient who has severe symptoms and is coping well”).

Differences in reported illness severity and personality by target selection were examined using a generalized logit model (using SAS PROC GENMOD) for each unique predictor. Our specific predictions concerned individuals who chose downward illness/downward coping targets. As outlined below, these patients were predicted to be worse off than those who chose other targets. As the largest number of patients in our sample chose upward illness/upward coping targets (and, theoretically, these patients might be the best off in the sample), the upward illness/upward coping target group was used as a referent for logistic regression models. Mean values for each variable by target selection group can be found in Table 4. A summary of regression coefficients, Wald Chi-square tests, and corresponding 95% confidence intervals can be found in Table 5.

Hypothesis 3a: Patients who report more severe (versus less severe) illness symptoms will choose downward coping/downward illness targets most often.

Illness severity was captured in self-reported severity of symptoms, reported Hb_{A1c}, and BMI. A generalized logit model revealed that reported severity ($\chi^2=9.23, p=.02$) and reported Hb_{A1c} ($\chi^2=10.24, p=.005$) significantly predicted target choice, whereas BMI did not ($\chi^2=.25, p=.62$). Coefficients for both severity of symptoms and reported Hb_{A1c} were positive, suggesting that these illness markers were higher (i.e., more severe) among patients who did not choose upward illness/upward coping targets. Mean scores for target selection groups show that symptom severity and Hb_{A1c} were highest among patients who chose downward illness/downward coping targets.

Hypothesis 3b: Patients who report more (versus less) neuroticism will choose downward coping/downward illness targets most often.

Level of neuroticism did not predict target selection ($\chi^2=.03, p=.87$), in contrast to predictions.

Hypothesis 3b: Patients who report stronger social comparison orientation (SCO) will choose different targets than patients with weaker reported SCO.

None of the three domains of SCO was related to target selection (general, upward, and downward; $ps>.05$).

Summary of findings for Research Question #3. Our hypothesis was only partially supported: reported symptom severity and aggregated blood glucose significantly predicted target selection, in that individuals who reported greater (versus less) symptom severity and higher (versus lower) Hb_{A1c} levels chose downward illness/downward coping targets. Body mass index, level of neuroticism, and social comparison orientation did not predict target selection (see Tables 4 and 5).

Research Question #4: *Do differences in arousal and mood valence prior to target selection lead to different choices?* This question addresses whether individuals who were in “better” (e.g., more pleasant, less anxious) moods just before target selection made different choices than individuals who were in “worse” (e.g., less pleasant, more anxious) moods. As above, differences in affect by target selection were examined using a generalized logit model (using SAS PROC GENMOD) for each affect domain, and the upward illness/upward coping target group was used as the referent. We did not have specific predictions about the relationship between the degree of each affect domain (e.g., higher versus lower stress) and target choice. A summary of regression coefficients, Wald Chi-square tests, and corresponding 95% confidence

intervals can be found in Table 5. Mean values for each variable by target selection group can be found in Table 6.

Hypothesis 4a (exploratory). Patients who report higher stress prior to selection will choose different targets than patients who report less stress.

Pre-selection stress level was marginally associated with target choice ($\chi^2=3.02, p=.08$). The coefficient for pre-selection stress was positive, suggesting that stress was somewhat higher among patients who did not choose upward illness/upward coping targets. Mean scores for target selection groups show that patients who were more stressed were more likely to select downward illness/downward coping targets.

Hypothesis 4b (exploratory). Patients who report higher (better) mood valence prior to selection will choose different targets than patients who report lower (worse) mood valence.

Pre-selection mood valence was not associated with target choice ($\chi^2=2.19, p=.14$).

Hypothesis 4c (exploratory). Patients who report greater activation prior to selection will choose different targets than patients who report lower activation.

Pre-selection activation was not associated with target choice ($\chi^2=.49, p=.48$).

Hypothesis 4d (exploratory). Patients who report greater excitement prior to selection will choose different targets than patients who report less excitement.

Pre-selection excitement was not associated with target choice ($\chi^2=.01, p=.93$).

Summary of findings for Research Question #4: Contrary to hypotheses, pre-selection affect did not reliably differ between target selection groups (see Table 4). A weak exception to this was that differences in pre-selection stress level showed a trend toward significance, such that patients who reported higher stress prior to selection were those who chose downward targets (on either dimension).

Research Question #5: *Does a model that includes multiple variables proposed to influence comparisons accurately predict target choice?* In Research Questions 3 and 4, we examined the predictive power of specific variables that often have been associated with social comparisons (via retrospective recall or target selection) in existing literature. Tests of specific variables describe baseline differences between target selection groups. We also wanted to test the predictive power and accuracy of a model that includes multiple variables thought to impact comparisons. The proposed model included illness severity (Hb_{A1c}, self-rated symptom severity), negative outlook (neuroticism, diabetes concerns, negative mood over the past week), affect immediately prior to selection, and social comparison orientation (general, upward, and downward).

This model was tested using a discriminant function analysis (DFA). DFA produces three sets of information that relate to the predictive power of a model. First, it determines how many distinct (discriminant) combinations of predictors are associated with a categorical outcome. In this way, it is akin to factor analysis in that it groups items (in this case, predictor variables) that “hang together,” and provides an estimate of each group’s predictive ability. Second, it gives an estimate of the effect size for the model (i.e., amount of variance accounted for; R^2). Third, it shows the accuracy of the model for predicting membership in each outcome group. We will examine each of these aspects of our proposed model, in turn. We did not have expectations about the number of discriminant functions or effect size. Our specific concern was the accuracy of the model, as outlined below.

Number of discriminant functions and effect size (exploratory). DFA showed that three discriminant functions were calculated, with a combined $F(24,484)=1.81$ ($p=.01$). After removal of the first function, the association between groups and predictors was no longer significant ($F[16,334]=.90$, $p=.56$ and $F[7,168]=.79$, $p=.58$). These functions did not include information

useful for predicting target selection. The first function accounted for 16% of the total relationship between predictors and groups, and 59% of the variability between target selection groups.

Hypothesis 5: The proposed model will predict target selection with accuracy that is better than chance.

The identified discriminant function accurately classified 56% of cases in the sample (100 correctly classified cases out of 179), compared to 26% (47 correctly classified) due to chance alone. Please refer to Table 7 for the number of cases accurately classified by the model.

Summary of findings for Research Question #5: A model that includes illness severity (Hb_{A1c} , self-rated symptom severity), negative outlook (neuroticism, diabetes concerns, negative mood over the past month), affect immediately prior to selection, and social comparison orientation (general, upward, and downward) showed adequate model fit and 56% accuracy for predicting target selection (from amongst the four possible targets). Accuracy was much greater than chance, and the model accounted for a substantial proportion of the variability between groups.

Research Question #6: *Are target selections differentially associated with reported reasons for target choice?* Immediately after making a target selection, participants were asked to rate five separate reasons for making their choice. Reasons were derived from theoretically proposed motivations for social comparisons (e.g., Wills, 1981). These included: (1) gaining information about how to improve one's situation, (2) feeling better about one's own situation, (3) learning that others have similar situations to one's own, (4) boosting confidence in one's ability to improve, and (5) confirming that one's situation is bad. Reasons were rated prior to reading about the chosen target in order to prevent conflation between response to the target and pre-comparison motivations for selection. Table 8 presents descriptive statistics for reason ratings by

target selection group; these ratings are graphically depicted in Figure 4. *F*- and *p*-values for individual contrasts can be found in Table 9.

Differences in reasons for selection were explored in two ways. First, within-person analyses examined the differences in ratings for all reasons within each selection group (within-group ANOVA). This approach answers the question “do ratings for individual reasons differ among individuals who selected a particular target?” Second, between-person analyses allowed for tests of differences across selection groups in ratings for individual reasons (between-groups ANOVA). This approach answers the question “do ratings for specific reasons differ between target selection groups?”

Hypothesis 6a.1 (within-group): The choice of downward illness/upward coping targets will be positively associated with desire for information about how to improve one’s situation, (versus other reasons for target selection).

The desire for information about how to improve as a reason for choosing a target was endorsed more strongly than the desires to: (1) confirm that one’s situation is bad, and (2) feel better about one’s own situation ($p < .01$). Difference in ratings for the desire for information about how to improve and learning that another patient’s situation is similar to one’s own was marginal ($p = .05$). The desires for information about how to improve and to boosting confidence in one’s ability to improve were not significantly different ($p = .29$).

Hypothesis 6a.2 (between-group): The choice of downward illness/upward coping targets will be positively associated with desire for information about how to improve one’s situation, (versus other target selections).

Ratings of the desire for information about how to improve were not higher for patients who chose downward illness/upward coping targets, relative to other targets ($F[1]=1.05, p = .30$).

Summary of findings for Hypothesis 6a: Patients who chose downward illness/upward coping targets reported making this choice to gain information about how to improve, rather than for affective or affiliative reasons. Gaining confidence in one's ability to improve also was rated highly. Gaining information about how to improve was not more strongly endorsed by patients who chose downward illness/upward coping targets, relative to ratings by patients who chose other targets.

Hypothesis 6b.1: The choice of downward illness/upward coping targets will be positively associated with desire to improve mood (versus other reasons for target selection).

In line with predictions, desire to feel better about one's own situation was endorsed more strongly than the desire to confirm that one's situation is bad ($p < .001$). In contrast to predictions, however, the desire to feel better about one's own situation was endorsed *less* strongly than the desires to: (1) boost confidence in one's ability to improve, (2) gain information about how to improve, and (3) learn that another patient's situation is similar to one's own ($p_s < .01$).

Hypothesis 6b.2: The choice of downward illness/upward coping targets (versus other targets) will be positively associated with desire to improve mood.

A planned contrast showed that feeling better about one's own situation was not more strongly endorsed by participants who chose downward illness/upward coping targets, relative to other targets ($F[1]=1.16, p=.28$).

Summary of findings for Hypothesis 6b. Patients who chose downward illness/upward coping targets reported making this choice to feel better about their own situations, rather than to confirm that their situations are bad (see Tables 8 and 9 and Figure 4). Unexpectedly, boosting confidence in their ability to improve, learning that another patient's situation is similar to their

own, and gaining information about how to do so were patients' top reasons for choosing downward illness/upward coping targets.

Hypothesis 6c.1: The choice of downward illness/downward coping targets will be associated with the desire to improve mood (versus other reasons for target selection).

Contrary to predictions, the desire to feel better about one's own situation was not endorsed more strongly than other reasons for target choice ($p > .10$).

Hypothesis 6c.2: The choice of downward illness/downward coping targets will be associated with the desire to improve mood (versus other selections).

There was no observed difference in ratings for desire to improve mood between patients who chose downward illness/downward coping targets and other targets ($p = .38$).

Summary of findings for Hypothesis 6c: Patients who chose downward illness/downward coping targets did not show significant distinctions between reasons for target choice. Their ratings for reasons also did not differ from those of other target selection groups.

Summary of findings for Research Question #6. This hypothesis was partially supported. Patients who chose downward illness/upward coping targets endorsed gaining information about how to improve, boosting confidence in their ability to improve, and learning that others have similar situations as the primary reasons for their choice. Neither confirming that their situations are bad nor feeling better about their own situations were rated as important reasons for this choice. Patients who chose downward illness/downward coping targets did not endorse specific reasons more strongly than other reasons.

Research Question #7: *Do different target selections result in distinct affective consequences?*

Just before and just after reading about their chosen targets, participants were asked to rate their mood on four separate dimensions: arousal, valence (pleasantness), stress, and excitement.

Affect change on each of these dimensions was calculated by subtracting pre-comparison affect

ratings from post-comparison affect ratings, indicating that affect improved or worsened from pre- to post-comparison. Descriptive statistics for affect change by target selection group can be found in Table 6.

We again examined the impact of comparisons in two ways. Within-group analyses examined affect change among participants who chose a particular target (dependent groups *t*-tests on post-pre-comparison affect). These tests answer the question, “did reading about target X lead to meaningful affect change from pre- to post-comparison?” (as in Hypotheses 7a-7d) Between-group analyses allowed for tests of differences in the amount of affect change across selection groups (ANOVA). These tests answer the question, “did the amount of affect change differ between groups who chose different targets?” (as in Hypothesis 7e). Although we had specific directional predictions, we were unsure which dimensions of affect might reflect the expected changes. Please refer to Figure 5 for graphical depiction of affect change.

Hypothesis 7a: The choice of downward illness/upward coping targets will result in improved mood from pre- to post-comparison.

Dependent groups (paired) *t*-tests showed that changes in stress, mood valence, activation, and excitement were not significant ($p > .05$).

Hypothesis 7b: The choice of upward illness/downward coping targets will result in worsened mood.

Contrary to predictions, patients who chose upward illness/downward coping targets showed no significant change in stress, mood, activation, or excitement from pre-comparison to post-comparison ($p > .05$).

Hypothesis 7c: The choice of upward coping/upward illness targets will result in improved mood.

Patients who chose upward illness/upward coping targets reported more pleasant mood from pre- to post-comparison. ($t[79]=2.12, p=.037$). Changes in excitement, stress, and activation were not significant ($ps>.05$).

Hypothesis 7d: The choice of downward illness/downward coping targets will result in improved mood.

Contrary to predictions, patients who chose downward illness/downward coping targets showed no significant change in stress, mood, activation, or excitement from pre-comparison to post-comparison ($ps>.05$).

Hypothesis 7e: The choice of downward illness/upward coping targets will result in greater increases in mood ratings than any other target.

Changes in mood were not greater for patients who chose downward illness/upward coping targets, relative to patients who chose other targets ($F[1]=.44, p=.51$).

Hypothesis 7f (post-hoc): The pattern of ratings for mood change showed that all target selections resulted in improved mood except downward illness/downward coping targets; choosing a downward illness/downward coping target resulted in worsened mood. We examined whether this difference in mood ratings was significant (downward illness/downward coping targets versus all other targets). This difference was significant ($F[1]=4.32, p=.039$).

Summary of findings for Research Question #7: Selection of upward illness/upward coping targets led to improvement in mood valence (pleasantness). The selection of other targets did not result in significant affect changes. Change in valence for participants who chose downward illness/downward coping targets was distinct from the improvements observed for other targets.

Research Question #8: *Do different target selections result in distinct effects on motivation for self-care?* Before and after reading about their selected targets, participants were asked to rate

their motivation for four diabetes-related self-care behaviors: following recommended diet plans, exercising, testing glucose, and taking medications. These behaviors were considered separately and aggregated to form a total motivation score. Change in motivation was calculated by subtracting pre-comparison ratings from post-comparison ratings, indicating that motivation increased or decreased from pre- to post-comparison.

For descriptive purposes, we present the amount of change in motivation for each self-care behavior and total motivation for each target selection group (see Table 6). Only between-groups analyses were appropriate for our hypotheses. Between-groups analyses allowed for tests of differences in the amount of motivation change across selection groups (ANOVA). These tests answer the question, “did the amount of motivation change differ between groups who chose different targets?” Please refer to Figure 6 for graphical depiction of motivation change.

Hypothesis 8(a): The choice of downward illness/upward coping targets will result in greater improvement in motivation for self-care behavior than any other target.

Neither change in motivation for specific behaviors ($ps > .10$) nor overall change in motivation for self-care (total score; $F[1]=.01, p=.92$) differed between patients who chose downward illness/upward coping targets and those who chose other targets.

Hypothesis 8b (post-hoc): The pattern of ratings for motivation change showed that the selection of downward illness/downward coping targets resulted in noticeably large improvement. The difference in motivation change between patients who chose upward illness/downward coping targets and those who chose other targets was not significant ($F[1]=.98, p=.32$), however.

Hypothesis 8c (post-hoc): The pattern of ratings for motivation change showed that the selection of upward illness/downward coping targets resulted in almost no improvement. The

difference in motivation change between patients who chose upward illness/downward coping targets and those who chose other targets was not significant ($F[1]=1.56, p=.21$), however.

Summary of findings for Research Question #8: Patients who chose upward illness/upward coping targets and downward illness/upward coping targets reported significant improvement in their overall motivation for self-care. Those who chose downward illness/downward coping targets and upward illness/downward coping targets reported no change. Change scores between pre- and post-selection ratings of motivation (both individually and aggregated) did not differ between selection groups.

Research Question #9: *What is the relationship between target selection and perceived similarity?* After reading about their selected targets and rating affect and motivation, participants rated their perceived similarity. Participants were asked to reflect on the extent to which they focused on similarities between themselves and the target (i.e., identification) and the extent to which they focused on differences between themselves and the target (i.e., contrast). Ratings were separate to allow for the possibility that participants focused on neither, both, or one more so than the other. Only specific between-groups contrasts were appropriate for our hypotheses; descriptive statistics for identification and contrast between groups can be found in Table 10. Please refer to Figure 7 for graphical depiction of ratings for identification and contrast.

Hypothesis 9a: The choice of upward illness/upward coping targets will correspond to higher ratings of identification than any other target.

Patients who chose upward illness/upward coping targets did not endorse greater focus on similarities than patients who chose other targets ($F[1]=.2.27, p=.13$).

Hypothesis 9b: The choice of upward illness/upward coping targets will correspond to lower ratings of contrast than any other target.

Patients who chose upward illness/upward coping targets endorsed less focus on differences than patients who chose other targets ($F[1]=5.25, p=.023$).

Hypothesis 9c: The choice of downward illness/downward coping targets will correspond to lower ratings of identification than any other target.

Patients who chose downward illness/downward coping targets did not report less focus on similarities than patients who chose other targets ($F[1]=.29, p=.59$).

Hypothesis 9d: The choice of downward illness/downward coping targets will correspond to higher ratings of contrast than any other target.

Patients who chose downward illness/downward coping targets did not report greater focus on differences than patients who chose other targets ($F[1]=.08, p=.77$).

Summary of findings for Research Question #9: Patients who chose upward illness/upward coping targets focused less on differences (i.e., contrast) than other selection groups, but did not focus more on similarities (i.e., identification) than other groups. Patients who chose downward illness/downward coping targets did not report less identification or greater contrast than other selection groups.

Research Question #10: *Does perceived similarity moderate the effect of target selection on affective consequences or motivation for self-care?* As noted, participants rated their affect and motivation for self-care both before and after reading about their chosen targets. Both affect and motivation were rated on multiple dimensions. Affect included stress, activation, valence (pleasantness), and excitement; self-care behaviors included following the recommended diet plan, exercising, testing blood glucose, and taking medications, as well as a total motivation for self-care score. After completing their post-comparison (reading) ratings of affect and motivation, participants reported the extent to which they focused on similarities (i.e., identification) and differences (i.e., contrast) between themselves and the target.

We did not have specific predictions about effects on individual dimensions of affect or motivation for self-care. In order to test the effects on every dimension without running individual tests (which increases the likelihood of Type I error), we used multivariate analyses (MANOVA; Wilks's λ). Results for dimensions of affect (together in one test) and motivation as dependent variables (together in one test) are presented in turn. Because there is limited evidence to suggest the correct measurement of perceived similarity, we tested the effects of identification (focus on similarities) and contrast (focus on differences) separately.

Hypothesis 10a – Affect: Across groups, the interaction between target selection and identification was not significant when stress, mood, activation, and excitement were considered separately but simultaneously (Wilks's $\lambda=.94$, $F[12,434]=.81$, $p=.64$). The interaction between target selection and contrast was significant, however (Wilks's $\lambda=.87$, $F[12,436]=2.04$, $p=.019$). The interaction did not show a significant effect for mood or activation ($ps>.05$); the effect on stress was marginally significant ($F[7,168]=2.49$, $p=.06$), and the effect on excitement was significant ($F[7,168]=3.37$, $p=.02$).

Specifically, we predicted that affect would be higher with greater identification with upward targets and for greater contrast against downward targets. The effect of identification was not significant; the effect of contrast, however, appears to follow the expected pattern. As shown in Figure 8, excitement *decreases* with greater contrast for patients who chose upward targets (on either dimension), whereas excitement *increases* with greater contrast for patients who chose the downward (only) target.

Hypothesis 10b – Motivation. The interaction between target selection and contrast was not significant when diet, exercise, glucose testing, and medication adherence were considered simultaneously (Wilks's $\lambda=.97$, $F[12,431]=.49$, $p=.92$). The interaction between target selection and identification was significant, however (Wilks's $\lambda=.86$, $F[12,428]=2.07$, $p=.017$). The

interaction did not show a significant effect for diet or medication adherence ($ps > .05$); the effects on glucose testing ($I[7,165]=2.94, p=.03$) and exercise ($I[7,165]=4.97, p=.003$) were significant.

Specifically, we predicted that affect would be higher with greater identification with upward targets and for greater contrast against downward targets. The effect of contrast was not significant; the effect of identification, however, appears to follow the expected pattern. As shown in Figure 8, motivation *decreases* with greater identification for patients who chose upward targets (on either dimension), whereas motivation *increases* with greater identification for patients who chose the downward (only) target.

Summary of findings for Research Question #10: The extent to which patients focused on similarities between themselves and the target did not influence the effect of comparison selection on affect. The extent to which they focused on differences did influence this effect, in that patients who chose upward targets (illness and/or coping) experienced less excitement and greater stress the more they focused on differences; patients who chose downward (only) targets experienced greater excitement and less stress the more they focused on differences.

This moderating effect was reversed for self-care motivation. The extent to which patients focused on differences between themselves and the target did not influence the effect of comparison selection on motivation. The extent to which they focused on similarities did influence this effect, in that patients who chose upward targets (illness and/or coping) experienced higher motivation for exercise and glucose testing the more they focused on similarities; patients who chose downward (only) targets lower motivation for exercise and glucose testing the more they focused on similarities.

Discussion

Social comparison is a common way to learn about one's standing in a given domain. When used to one's advantage, this information can reduce uncertainty and anxiety, provide information about how to improve in the chosen domain, and motivate improvement-focused behavior. Comparisons also can increase anxiety about possible negative future states and lower motivation for behavior, if used in certain ways. At present, it is not clear why some comparisons lead to positive mood states or behaviors and others have negative effects on these outcomes. Previous literature suggests that features of the comparison process, context, and the individual making the comparison may contribute to differences in outcome (Arigo, Suls, & Smyth, 2012).

Social comparisons may be especially important in the domain of health, as they may influence motivation for the behaviors that prevent illness and promote wellness. Individuals who have been diagnosed with chronic illnesses experience symptoms that threaten their long-term health and create uncertainty about the future, which may provide extra incentive to gain health-relevant information from social comparisons. Comparisons may impact health directly (via physiological response) and/or indirectly (by motivating illness-specific self-care behaviors).

Some understanding of the potential power of social comparisons is evident in the use of comparison targets in educational materials and interventions for patients with chronic illnesses (e.g., American Diabetes Association, 2011). Yet previous studies of social comparisons among patients show both positive and negative responses to comparisons, which demonstrates that some patients under some circumstances are worse off after making a comparison (e.g., Buunk et al., 1990). Although the effects of an isolated comparison may be temporary, the consequences of repeated use of "negative outcome comparisons" are not yet known.

Gaining a better understanding of the process, contextual, and individual difference factors that impact response to comparisons would improve intervention design and decisions

about implementation (e.g., for whom or when comparison-based interventions are most effective). The present study represents an initial step toward this goal. Two hundred patients who reported physician-verified diagnosis of type 2 diabetes mellitus completed a web-based study of personality characteristics, immediate affect, and response to a social comparison opportunity. Patients were asked to select one of four potential comparison targets (which differed by direction and specific health-relevant dimension) and read a short vignette about their chosen target. Response to the chosen comparison was captured in ratings of mood and motivation for self-care behaviors.

This study thus address four main aspects of the comparison process: (1) relationships between trait-level comparison tendencies, other aspects of personality (e.g., neuroticism), and illness characteristics, (2) differences in personality, illness characteristics, and pre-comparison mood that are associated with target choice, (3) affective and motivational response to a selected comparison target, and (4) perceived similarity to the selected target. Findings related to each of these aspects of the comparison process will be discussed in the context of existing theoretical and empirical literature, and the clinical implications of this work will be considered.

Between-Person Associations between Social Comparison Orientation and Personality/ Illness Indicators

Our results show that at baseline, general tendency toward social comparison (social comparison orientation; SCO) varies between patients. This finding is consistent with previous demonstrations of social comparison as a trait-level construct in community, student, and chronic illness samples (Gibbons & Buunk, 1999). In the present sample of patients with type 2 diabetes, general SCO was unrelated to physical markers of illness, but was associated with a range of indicators of emotional well-being. For example, individuals with endorsed stronger (versus weaker) SCO reported greater neuroticism, negative affect, diabetes concerns, and coping

difficulty. These associations also align with those found in previous studies (Gibbons & Buunk, 1999; Van der Zee, Buunk, DeRuiter, Tempelaar, & Sanderman, 1996; Van der Zee, Buunk, & Sanderman, 1996).

Patients who endorsed stronger SCO also tended to have fewer years since their diagnosis, suggesting that they have had less time to adjust to their illness and its required self-management. This relationship is consistent with findings from previous work. For example, cancer patients were more likely to report the use of comparisons (in daily diaries) at the beginning of an 8-week treatment program, relative to the end of treatment (Bogart & Helgeson, 2000). It is possible that for patients who have been diagnosed more recently – who are likely to experience more uncertainty and have more concerns and more anxiety about their illness – social comparisons are particularly useful. In contrast, patients who were diagnosed in the distant past may have learned other methods for managing diabetes-related distress (e.g., objective methods such as testing blood sugar and adjusting intake accordingly; Garcia et al., 2001). Patients who were diagnosed recently also may be at greatest risk for mental health concerns such as depression. If these individuals rely on social comparisons, it will be especially important to understand the role of comparisons in adjustment and coping to a chronic illness diagnosis. These associations underscore the utility of gaining a better understanding of the how comparisons alleviate (versus perpetuate) distress and motivate positive health behaviors.

Some preliminary clarification can be found in associations between patients' tendencies toward upward and downward comparison. Although general SCO was not related to physical aspects of diabetes, upward and downward tendencies showed substantial association. In this sample, “sicker” patients (i.e., those with greater reported symptom severity, higher Hb_{A1c} levels, and higher BMIs) endorsed upward and downward SCO more so than patients who were less

sick. Upward comparison SCO was strongly associated with diabetes concerns, neuroticism, and negative affect, whereas downward comparison SCO was not related to these experiences.

Patients who were diagnosed in the recent past also reported greater upward *and* downward SCO than patients who were diagnosed at earlier dates. In previous work, downward comparisons were more common right after cancer surgery, relative to later in time, but time since surgery was not associated with upward comparison use (Wood, Taylor, & Lichtman, 1985). Because our findings suggest that diabetes patients use both upward and downward comparisons sooner (versus later) after diagnosis, it is necessary to determine how each of these types of comparisons impact relevant outcomes (e.g., affect and motivation for self-care).

Overall, it appears that patients who are more (versus less) physically and emotionally symptomatic tend to use comparisons more often, and are particularly prone to upward comparisons. If these patients repeatedly use upward contrast (i.e., focus on differences between themselves and an upward target), it is possible that consequent short-term negative affect serves to maintain long-term worry about one's illness. Further, if this worry does not motivate positive health behaviors (i.e., there is no long-term positive health effect), it seems that patients may benefit from brief cognitive intervention to reframe comparisons in ways that are more favorable for health.

The present study demonstrates that downward comparisons also are associated with poor physical and emotional health. This finding stands in contrast to previous work, which has shown that increased use of downward comparisons is associated with *better* health. For example, cancer patients who rated themselves as better-off than other patients (i.e., downward comparison) reported less physical and psychological distress and higher subjective well-being (concurrently; Van der Zee et al., 1996), as well as better quality of life (over time; Hagedoorn, Sneeuw, & Aaronson, 2002).

Such contradictory findings may reflect differences in the nature of cancer versus diabetes. Although both illnesses can be life-threatening, good self-care often can prevent serious symptoms of diabetes (e.g., neuropathy). Diabetes patients who use downward comparisons may experience increased positive affect (and/or decreased negative affect) from seeing themselves as “doing well.” The perception of doing well may do little to motivate self-care, and thus negatively impact actual health status (as symptoms get worse in the absence of positive health behaviors). Attention to health behaviors may not prevent the spreading of cancer cells (and consequent organ damage, etc.), however. Cancer patients who use downward comparisons also may experience improved affect and the perception of “doing well,” but the consequent effects on self-care may have less impact on actual health status. This explanation is admittedly speculative and requires further examination. Yet the divergence between present and existing findings highlights the need for experimental and behavioral methods to supplement (and potentially, to clarify) conclusions from correlational studies.

How Well Do Individual Difference Characteristics Predict Target Choice?

Previous research has demonstrated the relationship between “social comparisons” and a variety of indicators of illness severity, personality, and immediate subjective experience (e.g., mood). Because these findings were generated by studies that use narration methods (and thus, largely retrospective self-report), the extent to which illness severity, personality, and mood characteristics contribute to an individual instance of comparison is unclear. To address this issue, we tested the predictive power of: (1) individual characteristics, and (2) a model that included aspects of the aforementioned constructs.

Illness status. As predicted, sicker patients made different target choices than did patients who were less sick. In fact, the more physically ill the patient (as indicated by reported symptom severity and Hb_{A1c}), the more physically and emotionally compromised the chosen

target. Thus, sick patients seemed to seek out information about someone who was “doing worse” (than the self). This finding appears to support Schachter’s (1959) assertion that “misery loves (miserable) company,” in that patients preferred targets whose symptoms were similar to or worse than their own – perhaps because downward comparisons can alleviate anxiety about one’s own status (Wills, 1981).

This finding also reintroduces the question of whether (and when) patients actually “benefit” from downward comparisons, as it appears that downward comparisons in some way contribute to poorer health. (Or, at least, do little to improve it.) As noted, seeing oneself as “doing well” actually may lower motivation for self-care and thus negatively impact health. This appears to occur only in certain patients, however (which will be discussed further below). Determining benefit, both in terms of affective consequence and motivation for self-care, thus requires more fine-grained assessment than retrospective self-report can provide. The physiological consequences and symptoms of diabetes – and possibly, other chronic illnesses – that directly affect cognition (e.g., confusion or concentration difficulties related to hypoglycemia) also may influence the process of target selection, such that patients who experience certain symptoms at the time of target selection choose differently than those who experience other (or no) symptoms. Including an assessment of immediate physical state in future work may provide useful information about the process of target selection.

Neuroticism and Social Comparison Orientation. General tendencies toward neuroticism and social comparisons have shown strong associations in the past (Van der Zee et al., 1998) and were strongly correlated in the present sample. As a result, it is somewhat surprising that neither set of traits was related to target selection. It is possible that patients’ actual comparisons (represented in behaviorally-demonstrated target selection) are different from those they self-report, indicating that their perceptions of past activity may be inaccurate.

Another explanation is that perceptions are accurate, but the behavior captured in the present study is not entirely representative of patients' everyday comparisons.

A third (and highly likely) possibility is that perceived similarity drives the trait-level relationship between neuroticism and social comparison orientation (c.f. Van der Zee, Buunk, & Sanderman, 1998; Van der Zee, Buunk, Sanderman, Botke, & van den Bergh, 2000). Patients with stronger (versus weaker) negative outlooks and higher (versus lower) negative affect are more motivated to use comparisons, but these also are patients who are apt to interpret comparisons negatively (i.e., downward identification and upward contrast). Although not tested in the present study, a reasonable approach to addressing this issue is to examine the relationships between neuroticism, social comparison orientation, and type of comparison (i.e., target choice-similarity combination, rather than target choice alone). Thus, neuroticism and social comparison orientation may not predict the type of target selected (in terms of direction and dimension), but may well predict negative-outcome comparisons to a range of targets. This proposition warrants further testing with a variety of research methods; greater clarification may help to appropriately identify patients who are likely to use negative-outcome comparisons.

A model for predicting target selection. A larger prediction model included subjective illness severity, reported Hb_{A1c}, BMI, social comparison orientation (general, upward, and downward), neuroticism, and pre-selection mood. This model predicted target choice with 56% accuracy. Although the model performed much better than chance alone, it accounted for only 16% of the variance in selection. Given the number of predictors, this (rather small) effect size suggests that there are additional factors that are important to the process of target selection. For example, perceived control over one's circumstances may be particularly important among chronic illness patients. In earlier work, patients high in perceived control of their illness (versus low control) reported less frequent negative-outcome downward comparisons, both cross-

sectionally (Bogart & Helgeson, 2000; Buunk et al., 1990) and over time (Bogart & Helgeson, 2000). As noted, Schokker and colleagues (2010) recently demonstrated the moderating effect of regulatory focus on motivation for self-care. Although it would be impossible for any one study to capture all of the constructs that account for variance in a dynamic, situationally-bound behavior, this body of literature would benefit from further exploration of patient characteristics such as perceived control and regulatory focus.

Behaviorally-Demonstrated Target Selection

The primary aim of this study was to build upon retrospective self-report of comparison tendencies (i.e., *narration* methods) by capturing comparison and response as they occur. Both reaction and selection methods can accomplish this goal. Existing studies that use *reaction* methods to assess patient response to a given target have the advantage of experimental control, as participants are randomized to a target. Because reaction methods present only one target to each participant, however, these studies do not address patients' preferences or reasons for choosing certain targets when options are presented (Wood, 1996). Selection methods, which can address questions about (reasons for) preference, rarely have been used in patient samples. Patients have opportunities to choose from multiple comparison targets in many real-world situations. For example, many patients visit medical centers and encounter various other patients (e.g., in the waiting room), participate in support or educational groups, and read posts in online illness-related forums. Consequently, examining the process of target choice (via *selection* methods) and potential range of outcomes is an important step toward understanding the impact of ubiquitous social information on patients with chronic illness.

In the present study, diabetes patients were asked to choose from four distinct targets. Differences between targets were based on key aspects of comparisons known to influence preference and affective response. Targets differed by direction (upward versus downward) and

dimension (illness severity and coping effectiveness), creating four options: (1) upward illness/upward coping (a patient with mild symptoms who is coping well), (2) downward illness/upward coping (a patients with severe symptoms who is coping well), (3) upward illness/downward coping (a patient with mild symptoms who is not coping well), and (4) downward illness/downward coping (a patient with severe symptoms who is not coping well). Previous theoretical and empirical work suggests that the selection of each of these targets is associated with specific reasons (e.g., the desire to gain information about how to improve; Festinger, 1954) and consequences (e.g., increased negative affect; Hemphill & Lehman, 1993).

We first examined the distribution of target selection, which showed that not all comparison targets are created equal. Across the sample, 44% of patients showed a preference for targets who were “doing well” in terms of both physical symptoms and emotional response (coping). Similarly, 34% of the sample showed a preference for targets who were staying positive (coping) despite severe physical symptoms. Thus, 78% of the sample chose a target who was coping well, regardless of illness severity. Targets who were struggling with their emotional responses to mild or severe symptoms were appealing to only 22% of the sample (13% and 9%, respectively).

These behaviorally-demonstrated preferences are somewhat inconsistent with retrospective reports of comparison activity, which suggest that patients use downward comparisons more often than upward (Buunk et al., 1990; DeVellis et al., 1990; Hemphill & Lehman, 1991; Heidrich, 1996; Van der Zee et al., 1996). These reports do not often differentiate between illness severity and coping dimensions, however. Patients in one existing study that did use separate dimensions showed similar reported preferences (i.e., Likert ratings), in that patients were partial to upward targets for coping information and downward targets for illness severity information (Bennenbroek et al., 2002).

Target selection in the present study does align with affiliative desires expressed in previous work that used reaction methods. In these earlier studies, patients who read about an upward (versus downward) coping target endorsed stronger desires for support and information from the target (Stanton et al., 1999; Derlega et al., 2005; 2009). It is possible that patients view targets with coping difficulties as particularly anxiety-provoking, and thus opt for less threatening targets (i.e., those who were coping well). The relationships between target selection and reason for choice, affective consequence, and resulting motivation for self-care behavior are examined below.

Comparison Responses of Each Selection Group

Upward illness/upward coping targets: Multiple short-term benefits. Patients who chose upward illness/upward coping targets reported less severe symptoms, lower Hb_{A1c} levels, and somewhat lower stress levels (just before selection) than patients who chose other targets. Those who chose upward illness/upward coping targets did not differ from other patients with respect to neuroticism, social comparison orientation, mood valence, or arousal. These patients also focused somewhat more on similarities between themselves and the target, relative to differences, and focused on differences somewhat less than patients who chose other targets. Patients reported choosing the upward illness/upward coping target to gain information about how to improve their situations, boost their confidence in their ability to improve, and learn that others have similar experiences. These patients reported a significant increase in their motivation for self-care from pre- to post-comparison. This increase was highest among patients who identified with, rather than contrasted against, their selected target.

Although feeling better about their situations was not strongly endorsed as a reason for this choice, patients who chose the upward illness/upward coping target also showed a trend toward improved mood from pre- to post-comparison. Thus at an explicit level, the choice of an

upward illness/upward coping target appears motivated by the desires for affiliation (i.e., knowing that others share their circumstances; Schachter, 1959), functional or procedural information (i.e., ways to improve; Festinger, 1954), and increased self-efficacy for healthy behaviors (i.e., increased confidence in one's ability to manage a chronic illness; e.g., Bandura, 1982). The choice of an upward illness/upward coping target also seems to serve Taylor and Lobel's (1989) proposed desire for hope of improvement, however; patients did not report making this choice to improve their mood, but their ratings indicate that they felt more pleasant after (versus before) reading about an upward illness/upward coping target.

It is possible that improved mood is an unanticipated bonus of comparisons to upward illness/upward coping targets. It also is possible that this outcome is foreseeable but the desire for it is outside of conscious awareness, or that it is foreseeable and conscious but not perceived as a "good" reason for making a choice. In other words, patients may have viewed presenting oneself as the type of person who values improvement and self-management (rather than feeling good) as socially desirable.

Overall, it appears that patients who report better illness status choose upward targets in order to improve their health. These patients tend to identify (versus contrast against) their chosen target, feel good after making the comparison, and experience increased motivation for self-care. The choice of an upward illness/upward coping target thus seems associated with, and may help maintain, better physical health and more positive affect. These findings are consistent with those of previous studies that demonstrate the potential benefits of upward comparisons (e.g., Dibb, 2009; Heidrich, 1996; Kulik, Mahler, & Moore, 1996), and builds upon this earlier work by illustrating the appeal of targets that are "doing well" on two health-relevant dimensions.

Downward illness/upward coping targets: Potential for improvement in motivation for self-care. Based on existing findings that suggest the positive effects of downward illness and upward coping targets (presented separately; Bennenbroek et al., 2002), we predicted that a combined downward illness/upward coping target would both appeal to our sample and result in desirable consequences (e.g., improved mood, increased motivation for self-care). A downward illness/downward coping target did not perform quite as expected, however. This target was selected by 34% of the sample; patients who chose downward illness/upward coping targets were somewhat sicker (in terms of reported Hb_{A1c} and symptom severity), relative to an upward illness/upward coping target.

Similar to patients who chose upward illness/upward coping targets, patients who chose downward illness/upward coping targets rated gaining information about how to improve and boosting confidence in their ability to improve as top reasons for their choice. Low ratings of the desire for mood improvement in this group may be related to social desirability. Unlike those who chose upward illness/upward coping targets, however, patients who chose downward illness/upward coping targets did not report improved mood from pre- to post-comparison, but did experience increased motivation for self-care. This effect was particularly strong for motivation to take medication. It is possible that the affective and motivational effects of comparisons are not directly related, such that improved mood is not a pathway to increased motivation (or vice versa). To our knowledge, this is the first study to test the impact of comparisons on both affect and motivation for self-care. On average, who chose downward illness/upward coping targets focused approximately equally on identification and contrast; increased motivation was associated with greater identification with the target.

Upward illness/downward coping Targets: The enigmatic choice. Our a priori ideas about patients who choose upward illness/downward coping targets were speculative and

generated no specific hypotheses, as there is little data to indicate how this combination might impact patients. The one existing study that addresses direction-by-dimension preferences demonstrates that patients express preferences for downward (versus upward) illness targets and upward (versus downward) coping targets (Bennenbroek et al., 2002). As a result, our upward illness/downward coping target likely combined two kinds of undesirable information.

Common sense suggests that an upward illness/downward coping target might confuse patients; whereas individuals who are emotionally well despite severe physical symptoms may be inspiring, individuals who are distressed about mild symptoms may be perceived as weak, dramatic, or irrational. Indeed, few patients in our sample were keen on this target, as only 13% selected it. Sicker patients were more likely to choose an upward illness/downward coping target (relative to an upward illness/upward coping target), but it is not clear what may be gained from this choice.

Patients who choose the upward illness/downward coping target endorsed gaining information about how to improve and learning that others share their circumstances most strongly, although even these ratings were barely greater than moderate. These patients experienced only slight (nonsignificant) improvements in mood; overall change in motivation for self-care was negligible, and motivation for medication adherence showed a (nonsignificant) reduction. Patients who chose the upward illness/downward coping target also contrasted somewhat more than they identified, but overall motivation appeared to improve with increased identification.

The upward illness/downward coping target thus remains the most obscure of the targets available in the present study. It is not clear what makes patients choose this target (with respect to individual difference characteristics and reported reasons for choice), nor is there indication that this choice benefitted patients in any way. In fact, this choice seemed to work against

patients in terms of motivation, which could have negative long-term outcomes (Shigaki et al., 2010). This target may be inappropriate for use in patient care until we better understand who responds well to this target combination and under what circumstances positive outcome(s) can be expected.

Downward illness/downward coping targets: Both negative and positive

consequences. Previous findings show that downward comparisons are associated with better physical and emotional health among patients with chronic illness (e.g., Hagedoorn, Sneeuw, & Aaronson, 2002). It would be logical to expect that patients who are in better health have more frequent opportunities for downward comparison, which in turn protect against health declines. Our data suggest the opposite, however. Sicker patients chose downward (only) targets; patients with higher reported symptom severity and Hb_{A1c} were more likely to choose a downward illness/downward coping target (relative to an upward illness/upward coping target).

Understanding the use of social information among the sickest patients is particularly important for patient care, as these individuals are at the highest risk for comorbid mental health conditions (Peveler, Carson, & Rodin, 2002) and poor self-care (e.g., medication nonadherence; DiMatteo, Haskard, & Williams, 2007).

Unlike other target selection groups, patients who chose downward illness/downward coping targets showed almost no variation across ratings for reason choices. Given that only 9% of our sample chose this target, however, a lack of within-group differences may be due to low power (for such “subgroup” analyses) rather than a true equality in weight across reasons. These patients also contrasted slightly more than they identified with their chosen target (nonsignificant) and the largest improvements in motivation were associated with less identification. Patients who chose downward illness/downward coping targets were the only participants to show benefit from less, rather than more, identification.

This finding is consistent with theoretical work that suggests the potential disadvantages of downward identification (e.g., Buunk & Ybema, 1997), and builds upon existing work in an important way. Previous studies have examined the potential impact of upward and downward identification (versus contrast), but have not differentiated illness and coping dimensions. In fact, several studies do not clearly identify the dimension; targets are described as having “more (or less) difficulty” than the patient participant (e.g., Van der Zee et al., 1999), which could mean physical difficulty, emotional difficulty, or both. The present study demonstrates that downward identification may be problematic if the target is *both* physically and emotionally compromised, but not if the target is “doing poorly” on only one of these dimensions.

Although mood change did not reach significance (also likely due to low power), it is noteworthy that those who chose downward illness/downward coping targets were the only patients to report worsened mood valence from pre- to post-comparison. Despite a potential worsening in mood, however, patients who chose downward illness/downward coping targets reported consistent improvement in their motivation across individual self-care behaviors and showed the greatest overall improvement in motivation for self-care. Here, it appears that (reported) affective consequences are not congruent with motivation, in that mood worsens while motivation improves.

Evidence from other domains of psychology provides some context for this finding. For example, negative affect has been shown to induce greater motivation for and demonstration of a desirable behavior (e.g., voting; Panagopoulis, 2010), relative to positive affect. As noted, it is possible that short-term negative affect consequent to comparisons results in long(er)-term behavioral benefit. The duration of this benefit and the impact of comparisons on actual patient behavior require empirical investigation.

In sum, it appears that an objective measure of illness severity is associated with target choice; the sicker the patient, the more likely he or she is to choose a target who is not doing well. The choice of upward illness/upward coping targets leads to immediate improvements in mood and motivation for self-care, particularly among those who identify with the chosen target. Downward illness/upward coping targets and downward illness/downward coping targets have parallel effects on motivation without the benefit of improved mood; downward illness/downward coping targets actually may worsen mood while increasing motivation. Upward illness/downward coping targets did not lead to significant changes in affect or motivation.

The Role of Perceived Similarity

Perceived similarity is difficult to operationalize and measure, for several reasons. Most problematic is that there are multiple theoretical approaches to this idea (e.g., assimilation versus contrast, attainment likelihood) that are not often assessed in empirical studies. Authors who have attempted to capture perceived similarity have done so using implicit measurement of reaction time (e.g., Stapel & Suls, 2004) or Likert-style rating scales (e.g., Van der Zee et al., 1999). Using the latter assumes that participants can accurately reflect on the extent of their identification and/or contrast, which may occur rapidly and without conscious processing. Given the resource-intensive nature of implicit measurement, however, there is value in attempting to empirically establish the utility of this construct to determine whether investment in other methods is warranted.

In the present study, we asked participants to what degree they focused on similarities (identification) and differences (contrast) between themselves and their chosen targets. It is possible that identification and contrast are at opposite ends of the same continuum, but it also is possible that they are orthogonal. Measuring aspects of perceived similarity as separate dimensions of focus is the more inclusive method; this approach allows for the calculation of a

difference score (e.g., identification – contrast), which may capture between-person variability in relative focus. For example, some individuals may focus on similarities and differences to the same degree (high or low for both), or may focus on one much more so than the other. Indeed, our findings show some variability in identification, contrast, and the difference between identification and contrast in each target selection group. As previous work has not fully addressed the appropriate measurement of perceived similarity (e.g., Dibb & Yardley, 2006, Study 2; Van der Zee et al., 1999), the present study provides a novel approach and preliminary evidence to indicate that identification and contrast should be measured separately.

Our findings also suggest several important features of perceived similarity. First, patients in all groups did some identification and some contrast, which suggests that they likely represent distinct constructs. Second, only patients who chose upward illness/upward coping targets did more identification than contrast; patients who chose downward targets (on either dimension) contrasted slightly more than they identified. Third, the ratio of contrast to identification does not appear to be related to affective or motivational consequences of comparisons. Although this lack of effect may be an artifact of too little difference between identification and contrast (possibly due to low power in some target selection groups), the unique effects of identification and contrast are noteworthy and have not yet been examined.

Among patients who chose upward targets (on either dimension), greater contrast is associated with worse mood. This effect is reversed among patients who chose downward illness/downward coping targets, such that greater contrast is associated with better mood. Identification appears to have the opposite effect on motivation; among patients who chose upward targets (on either dimension), greater identification is associated with higher motivation. For patients who chose downward illness/downward coping targets, greater identification is associated with lower motivation. These findings provide quantitative support for qualitative

descriptions of comparisons among diabetes patients (Gorawara-Bhat, Huang, & Chin, 2008; Huang, Gorawara-Bhat, & Chin, 2005), which suggests that contrast is associated with reported affect and identification is associated with motivation to engage in self-care.

At present, it is unclear why contrast impacts mood while identification does not, and why identification impacts motivation while contrast does not. Developments in social comparison theory shed some light on this finding; for example, Mussweiler (2003) emphasizes that contrast adds psychological distance between the self from the target. With increased distance, contrast may reduce or eliminate the self-relevance of a target's illness behaviors, and thereby fail to impact a patient's behavioral intention. In other words, a patient who focuses on differences between the self and the target may not see the information gained from the target as useful for informing his or her behavior. Identification, which reduces the psychological distance between the self and the target, may increase the self-relevance of social information and thus have a greater impact on motivation for healthy behavior. This impact is either positive or negative, depending on the type of comparison target. This idea does not adequately explain the effect of contrast, however. It is possible that identification and contrast occur at distinct points in the comparison process, which increases the salience of behavioral and affective information at different times (respectively). This proposition requires direct testing and integration with the broader social comparison literature.

Differences in Target Selection and Response: Implications for Social Comparison Theory

Findings from the present study address several aspects of social comparison theory that previously lacked empirical support. Related to the process of social comparison, the present study demonstrated that several factors thought to be relevant to may not differentiate types of comparers. For example, although patients who are highly neurotic differ from those who are less neurotic in terms of their overall social comparison tendencies (general and upward SCO;

c.f. Van der Zee et al., 1996; 1999), neuroticism was unrelated to a live instance of target selection.

It is possible that this particular instance of target selection simply was not representative of the typical social comparison process. Also noteworthy is that the method used in the present study captured aspects of the process that have not been assessed in prior work. Previous studies typically have not provided target options that differ by both direction and dimension, for example. In the present study, patients had a greater number of opportunities to engage in negative-outcome comparisons (i.e., upward contrast and/or downward identification; Buunk & Ybema, 1997; Hemphill & Lehman, 1993), and may have done so irrespective of their chosen targets. The current findings thus offer further evidence to support the notion that the type of target may be less influential than a patient's cognitive approach (i.e., perceived similarity). It would be useful to examine the relationships between baseline neuroticism and affective response (rather than target choice), which was not included in the present study.

Results from the present study also provide additional empirical evidence to support the Identification/Contrast Model (Buunk & Ybema, 1997). Existing evidence relies on retrospective self-report, which may not accurately reflect the comparison process or outcomes; the present study adds a live, behavioral demonstration of target selection that captures perceived similarity immediately after it is thought to occur. In previous work, perceived similarity was measured as one continuum, with identification at one end and contrast at the other (e.g., Dibb, 2009). Findings from the present study show that identification and contrast likely are two separate constructs. Moreover, the distinction between these constructs is important for comparison outcome: contrast moderates affective response to a target, whereas identification moderates consequent motivation for self-care. Further work is necessary to replicate this finding and to explain the differential impact on affect and motivation for self-care.

Finally, the present study is (to our knowledge) the first to assess patients' conscious reasons for selecting one target over another. The reasons included in this study were derived from theoretical work in this area (e.g., Wills, 1981, Taylor & Lobel, 1989). Although these authors provide compelling rationale for the expectation that comparisons serve to regulate mood (e.g., reduce distress), patients do not strongly endorse "feeling better" as a reason for their selections. As noted, it is possible that this motivation is outside of conscious awareness or simply not seen as a socially acceptable reason for target choice.

Regardless of target choice, patients highly endorse Festinger's (1954) proposed global motivation for social comparison: to gain information about how to improve status. Perhaps Festinger was correct, and it is interest in improvement that drives social comparisons. Some skepticism is warranted, however. Patients who participated in this study (i.e., those who have been diagnosed with T2DM by a physician) are likely to have some level of engagement with the healthcare system. Healthcare providers (and possibly loved ones) offer behavioral recommendations, encouragement to adopt healthy behaviors, and often, admonishment when patients do not adhere to recommendations. Because this atmosphere reinforces efforts to improve, patients may be motivated to present themselves as interested in improvement. This possibility, which is intrinsic to self-report methods, highlights the potential utility of implicit measures of motivation (as well as other constructs relevant to social comparison).

Implications for Clinical Intervention and Patient Care

Social comparisons represent an important source of information about one's status in a variety of domains. The present study builds upon existing literature that demonstrates both positive and negative consequences of comparisons, and underscores the broader associations between poor health and increased use of comparisons. Individuals whose physical and/or

emotional health is compromised may have increased desire for social information (Taylor et al., 1989), but greater reliance on this information does not appear to have a protective effect.

The present study shows that certain individuals may be prone to use comparisons in ways that further compromise their health (e.g., by negatively impacting mood and/or motivation for self-care). Similar findings have shown that negative-outcome social comparisons play a role in body dissatisfaction and disordered eating (e.g., Corning, Krum, & Smitham, 2006) and depression (e.g., Gibbons, 1986). As a result, addressing comparisons in clinical care may be a beneficial supplement to cognitive-behavioral treatment (CBT). For example, a core component of CBT is teaching patients to challenge their cognitive distortions and negative expectations (e.g., catastrophizing; Beck, Rush, Shaw, & Emery, 1979).

Explicitly including negative-outcome social comparisons in the list of cognitive distortions would allow clinicians to combat an additional factor that may serve to maintain patients' pathology. Interventions that include the opportunity to consider and/or challenge social information have shown promise for improving health behavior among college students (e.g., negative consequences of alcohol consumption: Turner, Perkins, & Bauerle, 2008; problematic dieting: Lew et al., 2006), and may be appropriate for other populations. In settings where brief interventions are preferable (e.g., primary care), providing a set of "instructions" to focus on similarities or differences between the self and a target could be beneficial (Arigo, Behnke, & Smyth, 2012).

Chronic illness care. Opportunities for social comparison are ubiquitous for many patients with chronic illnesses. These individuals often are encouraged to engage in interventions that are inherently social. Most obvious is the availability of support groups (live or web-based). Although these interventions may include psychoeducation about illness self-care, a key component is the sharing of health-relevant information. Even without explicit description of

one's symptoms, health status may be obvious through behavioral presentation (e.g., walking speed, expressions of pain or dizziness). Potential comparison targets also are presented in educational materials and discussions with health care providers.

The body of literature on patients' comparisons supports the notion that comparisons may be helpful, but provides a word of caution in the demonstration that not all patients respond well to all types of comparisons (see Arigo, Suls, & Smyth, 2012). Findings from the present study clarify this conclusion by moving toward identifying patients who might be vulnerable to negative-outcome comparisons. Sicker patients show behavioral preference for patients who have severe symptoms and/or are not coping well. In this subset, patients who focus more on similarities between themselves and the target experience decreased motivation for self-care behaviors, and those who focus more on differences experience improved mood. Conversely, patients who focus less on similarities with the target experience increased motivation, and those who focus less on differences experience worsened mood. The effects are reversed among less sick patients, who prefer targets who are doing well; these patients experience higher motivation for self-care with greater focus on similarities and better mood with less focus on differences.

These findings suggest potential treatment recommendations that are tailored to an individual's illness severity. Sicker patients might do best if offered a downward comparison target and encouraged to focus on differences between themselves and the target; less sick patients might do best if offered an upward comparison target and encouraged to focus on similarities between themselves and the target. The efficacy of tailoring interventions to patient characteristics has long been recognized, but rarely implemented (Forthofer & Bryant, 2000). The present findings leave open several important questions about *how* to tailor social comparison opportunities, however. For example, how would a provider determine whether a patient is sick enough to benefit from a downward target? Should the target be doing poorly with

both illness symptoms and coping, or just one of these dimensions (and which one)? Strong recommendations for changes to patient care will depend on the outcome of future research, which will be necessary to replicate the present findings and address remaining questions about matching comparison opportunities to patient characteristics.

Strengths and Limitations of the Present Study

The present study contributes to the literature on social comparisons among patients with chronic illness in several ways. First, this study incorporated two distinct methods for capturing social comparison. Narration methods rely on retrospective report of comparison activity and address questions about trait-level aspects of personality and illness. Selection methods present a range of comparison opportunities and capture comparison choices and responses as they occur (Wood, 1996). Given that selection methods are rarely used in chronic illness samples, the present study offers a unique opportunity to examine behaviorally-demonstrated preference among patients. In addition, using both methods allowed for direct evaluation of congruence between sets of findings. To our knowledge, this is one of the only existing studies that blends narration and selection methods.

Second, the format of target selection in the present study has the advantage of high external validity. In an era of increasingly sophisticated and ubiquitous technology, many patients with chronic illness use online media as sources of information about their conditions (Millard & Fintak, 2002). Although “objective” sources exist (e.g., reputable websites that provide education and expert advice), the popularity of online discussion forums for various illnesses speaks to the desire for information from others who share similar circumstances. For example, the site diabetesdaily.com has over 73,000 forum members who engage in discussion threads and comment on blog posts. The process of interacting with some patients over others

involves multiple decision points – all of which offer opportunities for selected social comparisons.

A web-based data collection method also broadened the potential reach of this study, presenting many more opportunities to administer the procedure than would in-person appointments. Furthermore, computerized data collection reduces the probability of human error. Given the sizable number of questionnaires and stimulus materials used in this study, which require presentation in a specific sequence, the probability for mistakes would be high if research staff had manually administered the proposed procedure. Online methods are thus wide-reaching, cost-effective, and less prone to individual instances of human error than are other methods. Online data collection also represented a unique opportunity to generate a large sample for the present study.

Online recruitment and data collection are not without challenges, however. For example, medical status cannot be objectively verified using online methods, leaving open the possibility that some participants did not meet criteria for a T2DM diagnosis. We attempted to limit this problem by requiring that participants provide their most recent Hb_{A1c} level, as knowledge of this information might discriminate between patients and non-patients. Perhaps more problematic is that online recruitment and data collection limit participation to patients who use the internet. This allows for self-selection bias and reduced generalizability to the larger population of T2DM patients. Indeed, the present sample is not widely representative of the general T2DM population with respect to ethnicity or socioeconomic status (Centers for Disease Control, 2011). The characteristics of our sample thus require that we do not generalize beyond the subset of T2DM patients who use the internet.

An additional drawback of basic online data collection is its restriction to self-reported information. As noted, objective assessment of medical status, including height and weight (for

BMI calculation), was not possible online. Although we were able to devise a behavioral measure of target preference, our software was not sophisticated enough for non-explicit measures of perceived similarity, reasons for target choice, or affective response to the selected target. Objective verification of the present findings and expansion to implicit measures of relevant constructs are thus areas of opportunity for future work.

Conclusions

Social comparisons are a key source of self-relevant information for patients with chronic illness, but can lead to either positive or negative consequences for health. Examining comparison targets who are self-selected provides the unique opportunity to capture information about various steps in the process of social comparison. The present study provides several new insights into this process. Relevant to social comparison theory, the present findings suggest that identification with and contrast against a target can occur simultaneously and have distinct effects on affect and motivation for behavior. Additional work is necessary to replicate and further elucidate this distinction, which will contribute to our basic understanding of the impact of a common social-cognitive process. Relevant to patient care, findings show that individual differences in social comparison selection are associated with physical symptom severity, and that affective and motivational responses to the selected target depend on the patient's perceived similarity to the target. Social comparisons naturally occur in clinical care settings, but also are provided to patients as aspects of various interventions. The present findings demonstrate the potential clinical benefit of improving our understanding of patients' comparison use in daily life, which may inform revisions to comparison opportunities provided in formal interventions.

1. Although lateral comparisons are common (e.g., Bennenbroek et al., 2002; Bogart & Helgeson, 2000), they often are left out of empirical investigation. This may be because they are not thought to introduce threat, which was the original point of interest for applied social comparison work (e.g., Wills, 1981). The most problematic practical concern is that it would be difficult to design a comparison target that is at the “same” level as a given participant. It would be exponentially more difficult, if not impossible, to design “same-level” targets for an entire sample, which will include between-person variability on multiple relevant dimensions.
2. Ratings of preference are present-oriented, measuring what patients want at the moment they are asked. Preference also is hypothetical, in that stated preferences typically do not result in the presentation of information about the preferred target.
3. Schokker et al. (2010) was published several months after the present study was initiated. As a result, the present study does not include assessment of the potential moderating variables identified by Schokker et al. (2010).
4. Correlations were calculated for the Center for Epidemiologic Studies–Depression Scale (Radloff, 1977) and the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988). These measures were included in the questionnaire battery but were not examined in the present study.

Table 1. *Participant characteristics.*

	<u>M</u>	<u>SD</u>
Age	49.07	11.10
Body Mass Index (BMI)	33.46	6.63
Years since diagnosis	6.24	6.82
Hb _{A1c}	7.59	1.75
	<u>Frequency</u>	<u>Percent of Sample</u>
<i>Sex</i>		
Male	110	55%
Female	90	45%
<i>Race</i>		
Caucasian	215	87%
African American	7	3%
Hispanic/Latino	9	4%
Native American	5	2%
Asian	8	3%
Multiracial	4	1%
<i>Marital Status</i>		
Married	184	74%
Widowed	9	4%
Divorced/Annulled	20	8%
Separated	4	2%
Never married	30	12%
<i>Children</i>		
Yes	183	75%
No	60	25%
<i>Annual Household Income</i>		
Less than \$20,000	24	10%
\$20,000-\$40,000	22	9%
\$40,000-60,000	30	12%
\$60,000-\$80,000	43	18%
\$80,000-\$100,000	34	14%
More than \$100,000	91	37%

Table 2. Descriptive statistics for predictor and outcome variables at baseline (full sample).

	Possible Range	M	SD
Reported Severity	1 (very mild) to 5 (very severe)	2.45	0.74
Reported A1c	4 (good control) to 20 (poor control)	8.07	1.69
Years Since Diagnosis	Any	5.15	5.26
Body Mass Index	16 (underweight) to 40+ (obese)	28.48	8.61
Diabetes Concerns	0 (no concerns) to 40 (many concerns)	22.47	14.99
Self-Rated Coping	1 (no distress) to 5 (intense distress)	2.67	0.80
Comparison Orientation (General)	11 (weak tendency) to 55 (strong tendency)	35.29	6.09
Upward Orientation	6 (weak tendency) to 30 (strong tendency)	18.29	5.42
Downward Orientation	6 (weak tendency) to 55 (strong tendency)	17.39	5.32
Positive Affect (PA)	10 (no PA) to 40 (high PA)	25.07	8.37
Negative Affect (NA)	10 (no NA) to 40 (high NA)	19.80	7.32
Neuroticism	12 (low neuroticism) to 60 (high neuroticism)	28.66	9.79
Affect			
Stress	1 (no stress) to 5 (highly stressed)	2.69	0.92
Mood	1 (very unpleasant) to 5 (very pleasant)	3.21	0.87
Activation	1 (sleepy) to 5 (highly active)	3.02	0.70
Excitement	1 (depressed) to 5 (excited)	2.91	0.59
Motivation			
Diet	1 (not motivated at all) to 5 (highly motivated)	3.63	0.98
Exercise	1 (not motivated at all) to 5 (highly motivated)	3.37	1.04
Testing	1 (not motivated at all) to 5 (highly motivated)	3.71	0.97
Medications	1 (not motivated at all) to 5 (highly motivated)	3.70	1.23

Table 3. *Correlations of Social Comparison Orientation with diabetes-specific experiences and personality characteristics.*

	<u>Overall Orientation</u>	<u>Upward Orientation</u>	<u>Downward Orientation</u>
Reported Severity	0.004	0.16*	0.21**
Reported A1c	0.09	0.25**	0.25**
Years Since Diagnosis	-0.43***	-0.41***	-0.35***
Body Mass Index	-0.11	-0.17*	-0.33***
Self-Rated Coping	0.32***	0.38***	0.35***
Diabetes Concerns	0.15*	0.19**	0.05
Neuroticism	0.21**	0.31***	0.11
Positive Affect	-0.23**	-0.40***	-0.31***
Negative Affect	0.23**	0.34***	0.10

Note: * $p < .05$; ** $p < .01$; *** $p < .001$

Table 4. Descriptive statistics for each predictor and outcome variable by target selection group.

	<u>UIUC</u>		<u>DIUC</u>		<u>UI/DC</u>		<u>DI/DC</u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Reported Severity	2.26	0.67	2.61	0.81	2.51	0.53	2.78	0.76
Reported A1c	7.62	1.60	8.39	1.60	7.76	1.54	9.34	1.77
Years Since Diagnosis	4.32	3.49	5.26	6.50	5.52	3.92	8.13	7.52
Body Mass Index	28.27	8.75	27.67	7.16	30.36	11.75	28.69	6.57
Self-Rated Coping	2.52	0.71	2.77	0.82	2.77	0.87	2.81	0.91
Comparison Orientation (General)	35.65	5.61	35.45	5.49	33.45	7.03	35.31	8.99
Upward Comparison Orientation	17.80	4.96	18.92	5.17	17.55	6.06	18.63	7.01
Downward Comparison Orientation	16.84	5.32	18.69	4.23	15.95	5.85	17.75	7.01
Neuroticism	28.29	8.69	28.71	10.65	28.86	10.26	28.06	8.68
Diabetes Concerns	19.34	12.70	23.79	16.19	25.36	13.24	25.63	16.80

Note: UI/UC = upward illness/upward coping; DI/DC = downward illness/downward coping; UI/DC = upward illness/downward coping; DI/DC = downward illness/downward coping.

Table 5. *Multinomial logistic regression analysis of target selection as a function of illness severity, personality characteristics, and immediate affect.*

<u>Variables</u>	<i>B</i>	Wald χ^2 -test	<i>p</i> -value	95% Confidence Interval	
				<i>Lower</i>	<i>Upper</i>
Reported Severity	0.58	<i>9.23</i>	<i>0.0024</i>	0.21	0.95
Reported A1c	0.28	<i>10.24</i>	<i>0.0014</i>	0.12	0.46
BMI	0.008	0.25	0.62	-0.02	0.04
Neuroticism	0.002	0.03	0.87	-0.03	0.03
Comparison Orientation (General)	-0.02	0.98	0.32	-0.07	0.02
Upward Comparison	0.01	0.41	0.52	-0.04	0.07
Downward Comparison	0.02	0.53	0.47	-0.03	0.08
Affect					
Stress	0.27	<i>3.02</i>	<i>0.08</i>	-0.03	0.58
Mood valence (pleasantness)	0.24	2.19	0.14	-0.08	0.57
Activation	-0.14	0.49	0.48	-0.05	0.25
Excitement	0.02	0.01	0.93	-0.44	0.48

Note: Reference group = upward illness/upward coping; χ^2 and *p*-values for (marginally) significant predictors are italicized.

Table 6. Descriptive statistics for affect dimensions and motivation (pre, post, and change).

Affect	UIUC						DIUC						
	Pre		Post		Change		Pre		Post		Change		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Stress	1 (no stress) to 5 (highly stressed)	2.57	0.87	2.47	0.81	-0.10	0.63	2.70	0.92	2.65	0.87	-0.03	0.64
Mood	1 (very unpleasant) to 5 (very pleasant)	3.15	0.84	3.37	0.79	0.22	0.90	3.19	0.85	3.32	0.74	0.13	0.88
Activation	1 (sleepy) to 5 (highly active)	3.08	0.67	3.04	0.71	-0.04	0.54	2.96	0.72	3.10	0.65	0.11	0.55
Excitement	1 (depressed) to 5 (excited)	2.92	0.55	2.99	0.67	0.06	0.58	2.90	0.62	3.02	0.69	0.11	0.41
Motivation (Total)	5 (not at all) to 25 (highly motivated)	14.58	3.11	15.19	2.91	0.65	1.95	14.73	2.69	15.11	3.15	0.66	1.76
Diet	1 (not at all) to 5 (highly motivated)	3.74	0.92	3.94	0.85	0.18	0.85	3.61	0.99	3.76	0.97	0.13	0.43
Exercise	1 (not at all) to 5 (highly motivated)	3.43	0.96	3.53	1.00	0.10	0.67	3.31	1.13	3.55	0.99	0.23	0.64
Testing	1 (not at all) to 5 (highly motivated)	3.78	0.97	3.94	0.91	0.02	0.64	3.77	0.85	3.90	0.89	0.19	0.66
Medications	1 (not at all) to 5 (highly motivated)	3.62	1.39	3.78	1.36	0.19	0.51	3.87	1.04	3.9	1.13	0.09	0.40

Note: Italicized change scores indicate significant change from pre- to post-comparison ($p < .05$); UI/UC = upward illness/upward coping; DI/DC = downward illness/downward coping; UI/DC = upward illness/downward coping; DI/UC = downward illness/upward coping.

Table 6. (continued).

	UIDC				DIDC								
	Pre		Post		Pre		Post						
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>					
Affect													
Stress	1 (no stress) to 5 (highly stressed)	2.77	0.92	2.86	0.89	0.09	0.53	3.00	0.97	2.88	0.89	-0.13	0.81
Mood	1 (very unpleasant) to 5 (very pleasant)	3.38	0.92	3.55	0.74	0.19	0.60	3.50	0.82	3.19	1.05	-0.31	1.14
Activation	1 (sleepy) to 5 (highly active)	2.95	0.84	3.05	0.84	0.09	0.53	3.06	0.57	2.81	0.75	-0.25	0.58
Excitement	1 (depressed) to 5 (excited)	2.95	0.65	2.95	0.76	0.00	0.62	2.94	0.44	2.88	0.72	-0.06	0.68
Motivation (Total)	5 (not at all) to 25 (highly motivated)	14.50	2.89	14.73	2.57	0.23	1.41	13.50	3.63	14.50	3.65	1.00	2.19
Diet	1 (not at all) to 5 (highly motivated)	3.38	1.14	3.86	0.89	0.22	0.69	3.25	0.93	3.50	0.97	0.25	0.58
Exercise	1 (not at all) to 5 (highly motivated)	3.55	1.01	3.59	1.05	0.05	0.58	3.25	1.00	3.44	0.96	0.19	0.91
Testing	1 (not at all) to 5 (highly motivated)	3.50	1.01	3.50	1.01	0.00	3.44	3.56	1.15	3.75	1.06	0.19	1.05
Medications	1 (not at all) to 5 (highly motivated)	3.82	1.18	3.77	1.15	-0.05	0.58	3.44	1.03	3.81	1.05	0.38	0.62

Note: Italicized change scores indicate significant change from pre- to post-comparison ($p < .05$); UI/UC = upward illness/upward coping; DI/DC = downward illness/downward coping; UI/DC = upward illness/downward coping; DI/UC = downward illness/upward coping.

Table 7. Accuracy of discriminant function analysis (DFA) classifications by target selection group.

<u>Predicted</u> <u>Classification</u>	<u>Actual Selection Group</u>				Total
	UI/UC	DI/UC	UI/DC	DI/DC	
UI/UC	39 49%	15 19%	13 16%	12 15%	79 100%
DI/UC	6 7%	34 55%	10 16%	12 19%	62 100%
UI/DC	3 14%	3 14%	12 58%	3 14%	21 100%
DI/DC	0 0%	1 6%	0 0%	15 94%	16 100%
Total	49 27%	53 30%	35 20%	42 23%	178 100%

Note: UI/UC = upward illness/upward coping; DI/DC = downward illness/downward coping; UI/DC = upward illness/downward coping; DI/DC = downward illness/downward coping.

Table 8. *Descriptive statistics for reasons for target selection by selection group.*

	<u>UIUC</u>		<u>DIUC</u>		<u>UIDC</u>		<u>DIDC</u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Gain information	3.62	0.88	3.53	0.97	3.41	1.14	3.07	0.73
Boost confidence	3.23	1.02	3.34	0.85	3.00	0.98	3.27	1.03
Feel better	2.72	1.04	2.97	0.97	2.77	1.02	3.07	1.10
Others with same situation	3.46	0.75	3.19	0.97	3.18	1.14	3.19	0.91
Confirm gravity of situation	2.11	1.05	2.39	1.09	2.36	1.00	2.93	1.10

Note: UI/UC = upward illness/upward coping; DI/DC = downward illness/downward coping; UI/DC = upward illness/downward coping; DI/DC = downward illness/downward coping.

Table 10. *Perceived similarity by target selection group.*

	<u>UIUC</u>		<u>DIUC</u>		<u>UIDC</u>		<u>DIDC</u>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Similarities (Identification)	3.14	0.76	2.97	0.94	2.90	1.04	2.88	0.96
Differences (Contrast)	2.94	0.83	3.09	0.74	3.36	0.73	3.19	0.75
Differences-Similarities	-0.20	1.06	0.13	1.44	0.38	132	0.31	1.20

Note: Italicized difference scores indicate marginally significant difference between identification and contrast ($p < .10$); UI/UC = upward illness/upward coping; DI/DC = downward illness/downward coping; UI/DC = downward illness/downward coping; DI/DC = downward illness/downward coping.

Figure 1. Potential outcomes of comparison by target and perceived similarity.

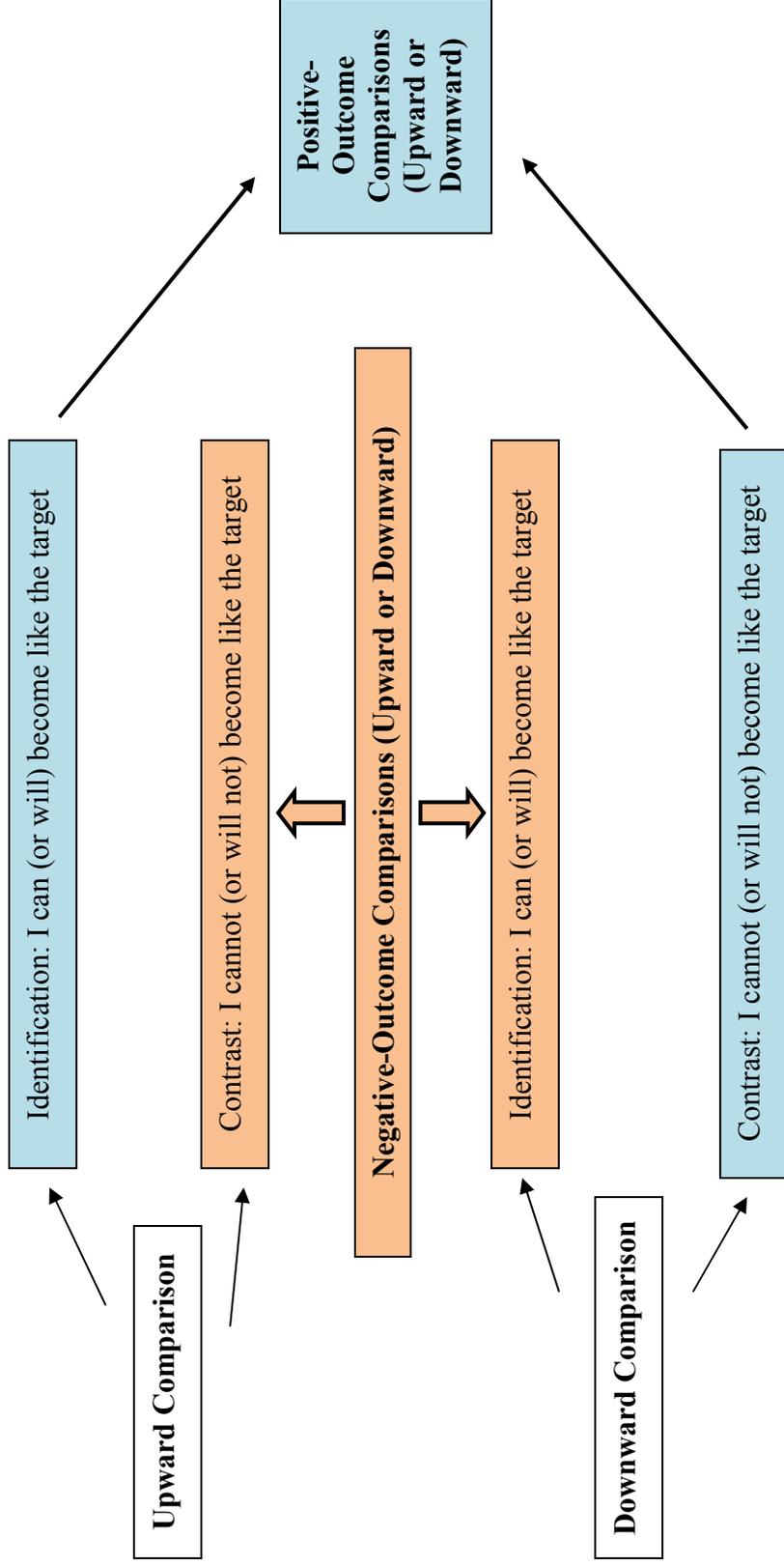


Figure 2. Conceptual Model for Target Selection and Consequences among T2DM Patients

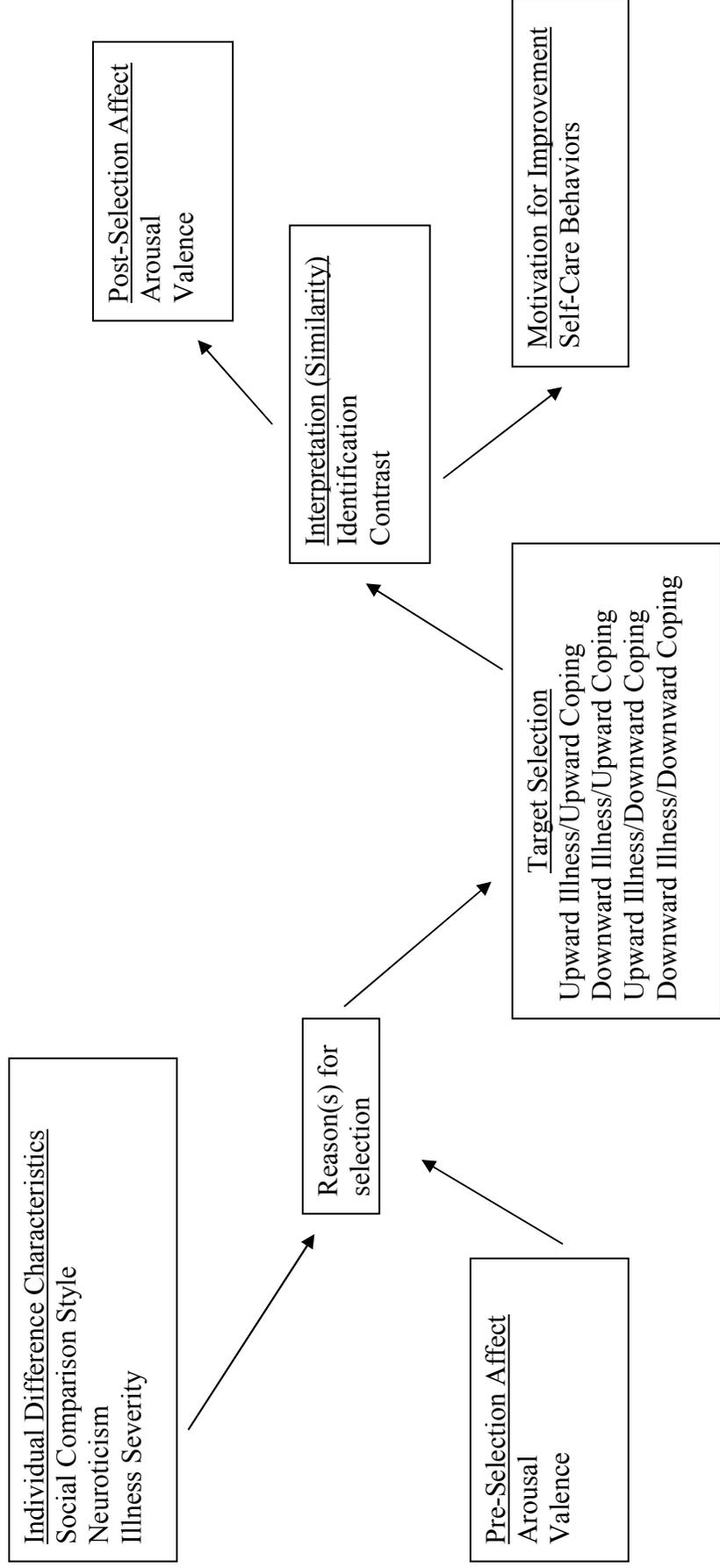


Figure 3. Study Procedures

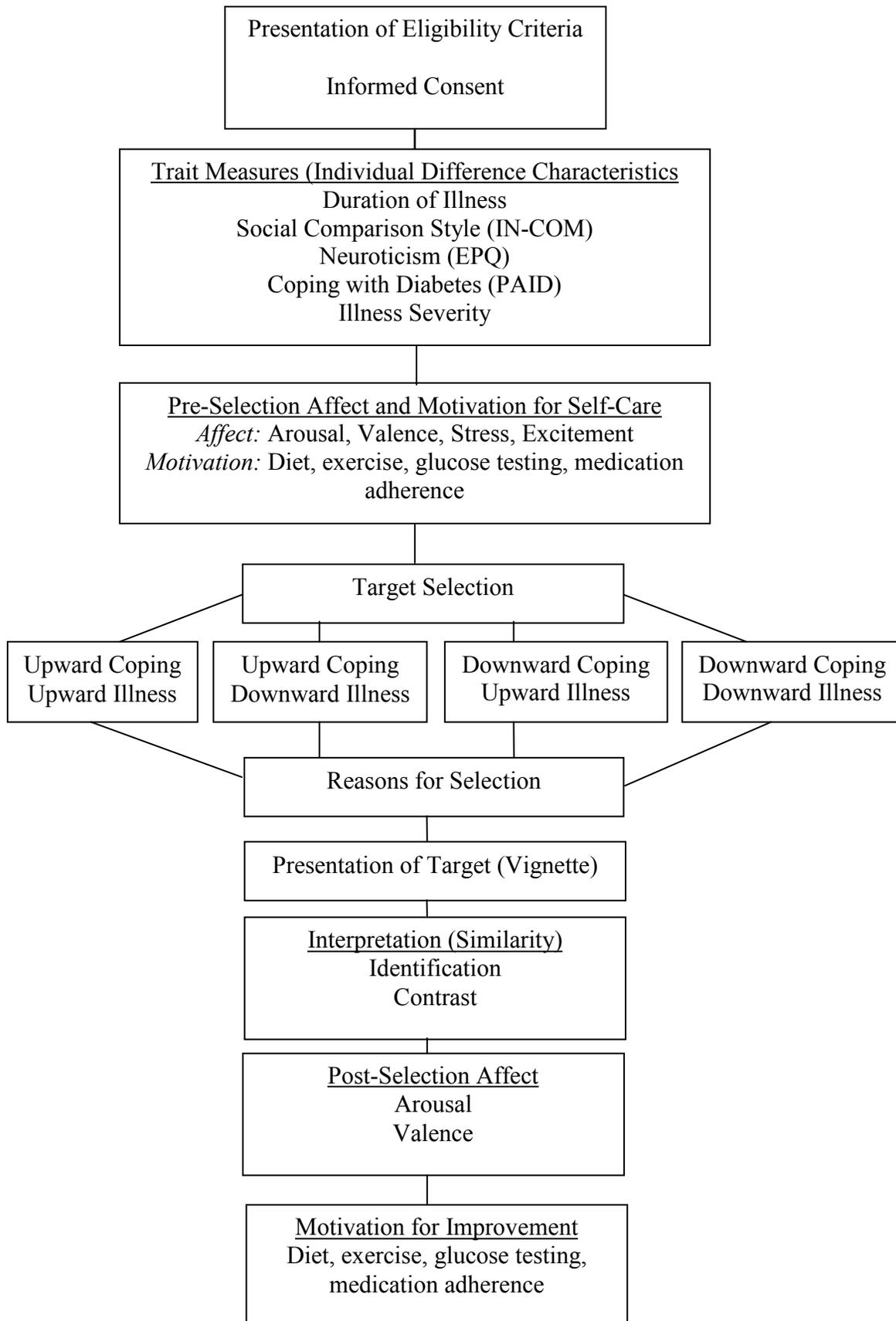
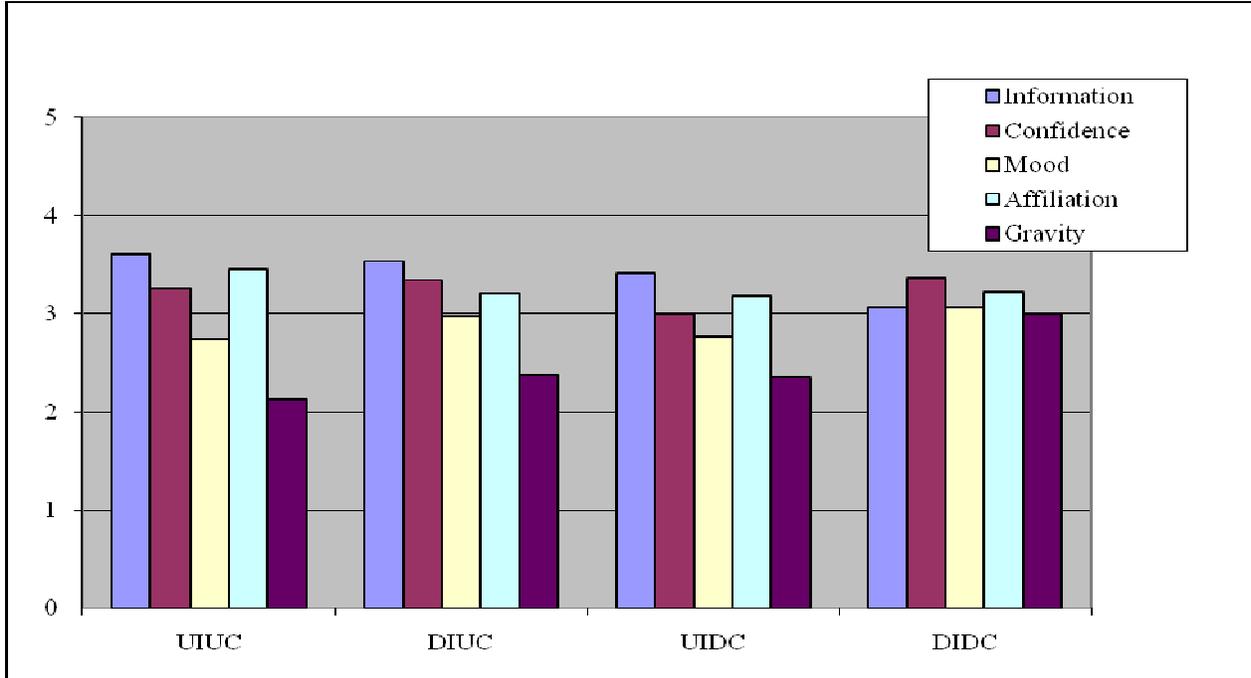


Figure 4. *Reasons for target choice by target selection.*

Between-groups



Within groups

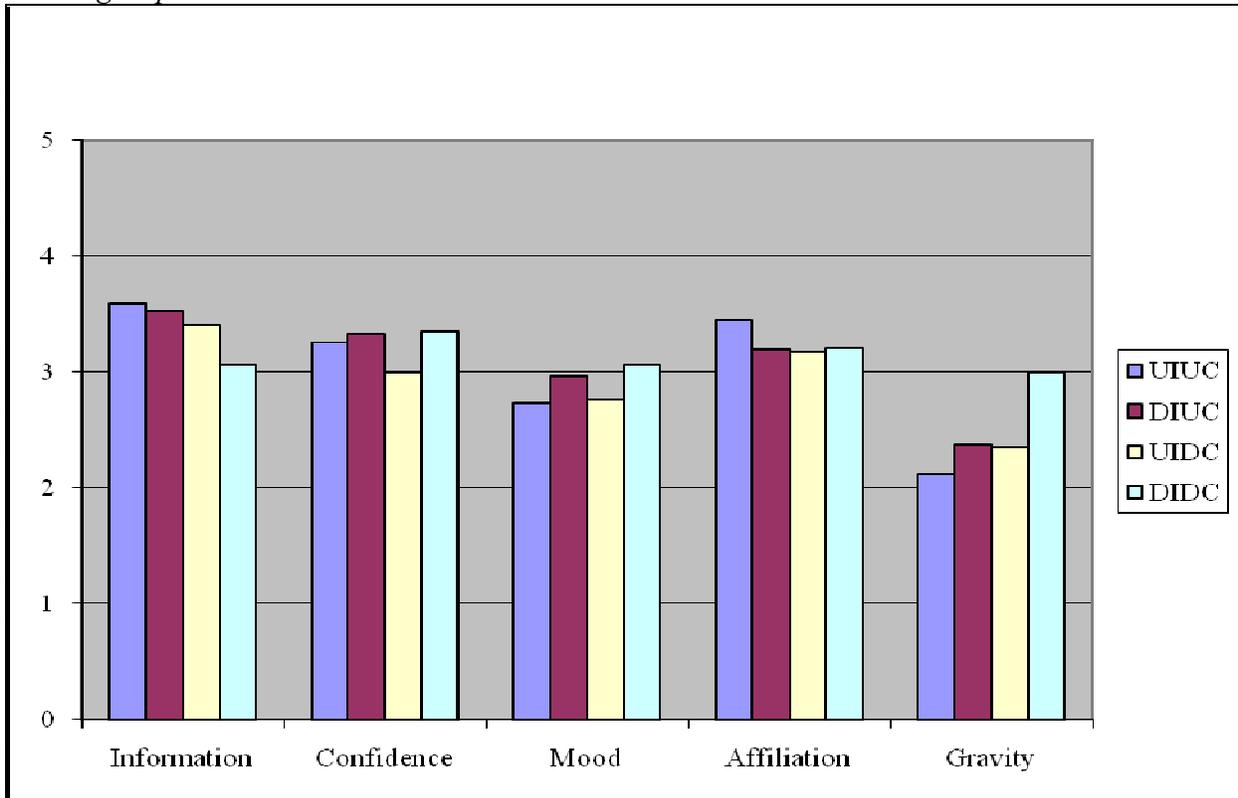


Figure 5. Change in affect dimensions from pre- to post-comparison by target selection group.

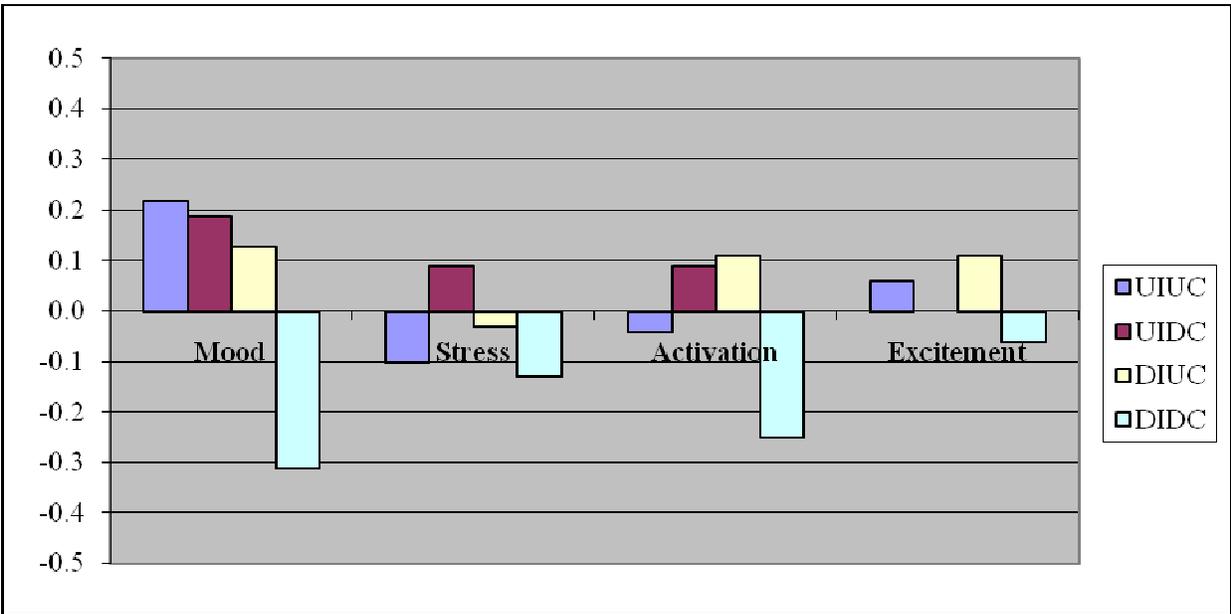


Figure 6. Change in motivation for self-care behaviors from pre- to post-comparison by target selection group.

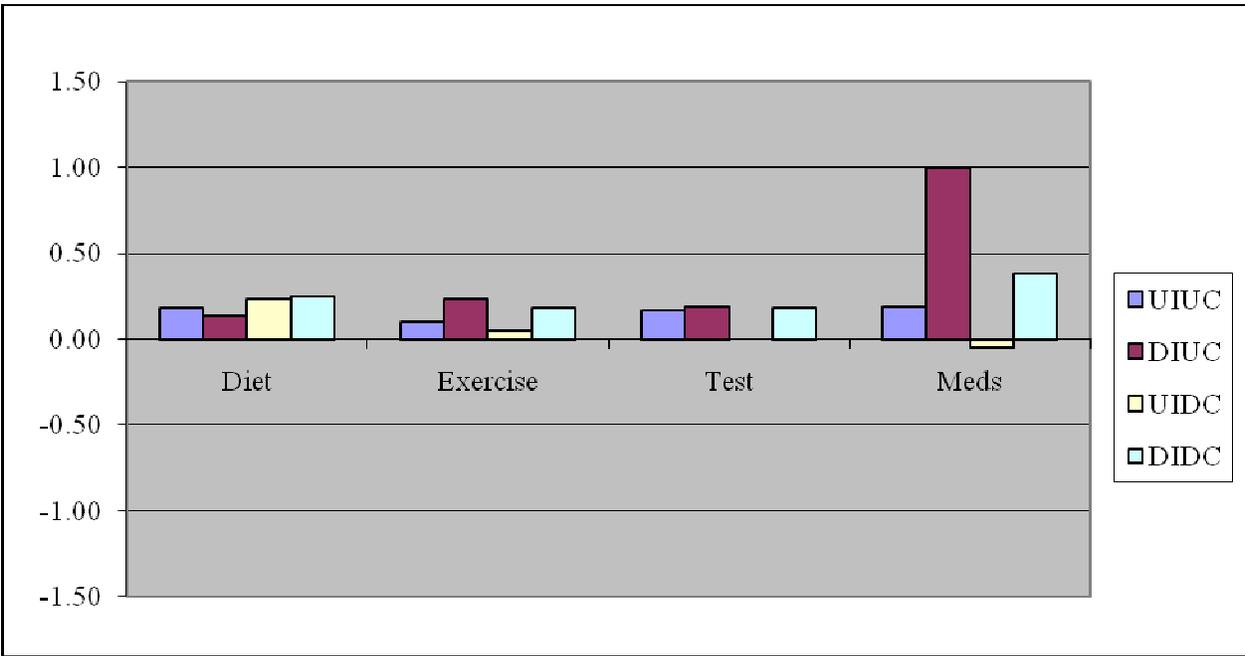


Figure 7. *Perceived similarity by target selection.*

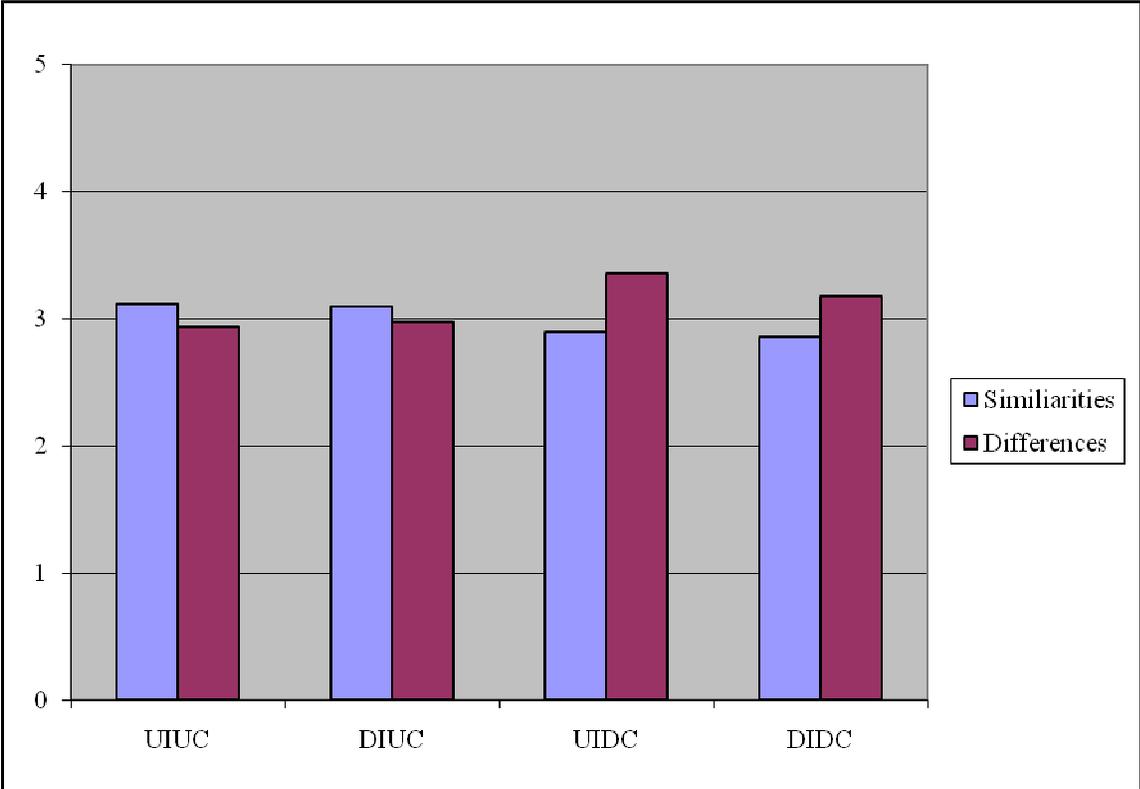
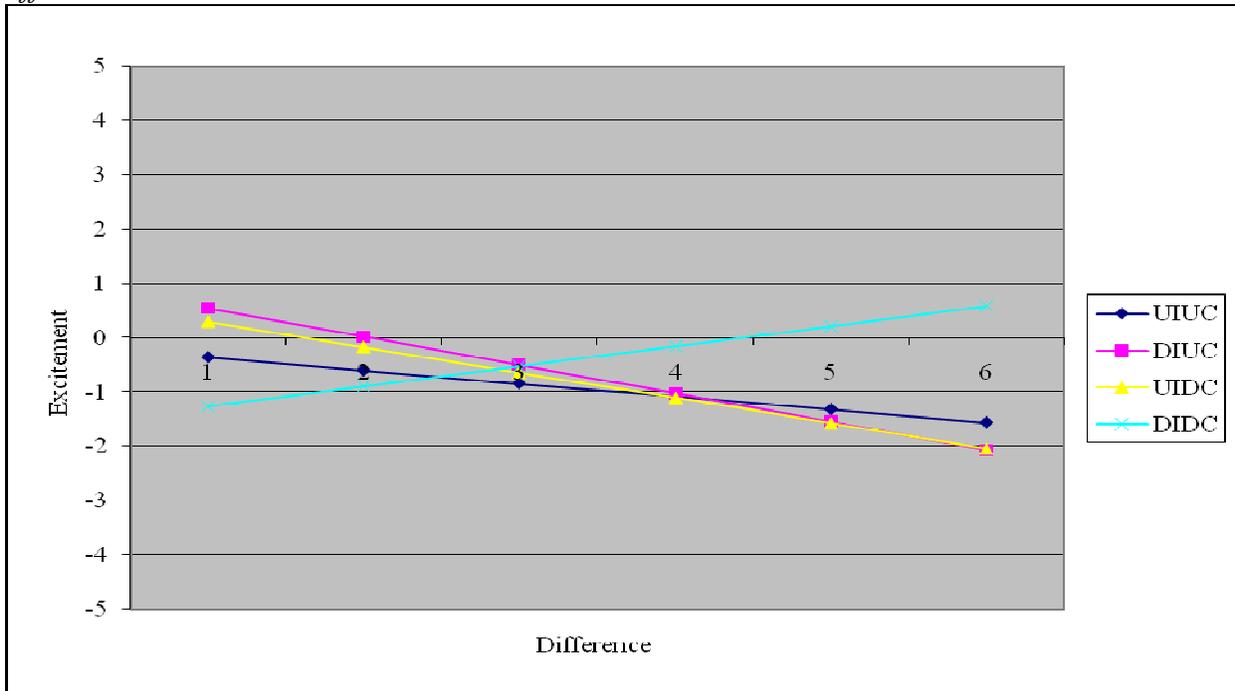
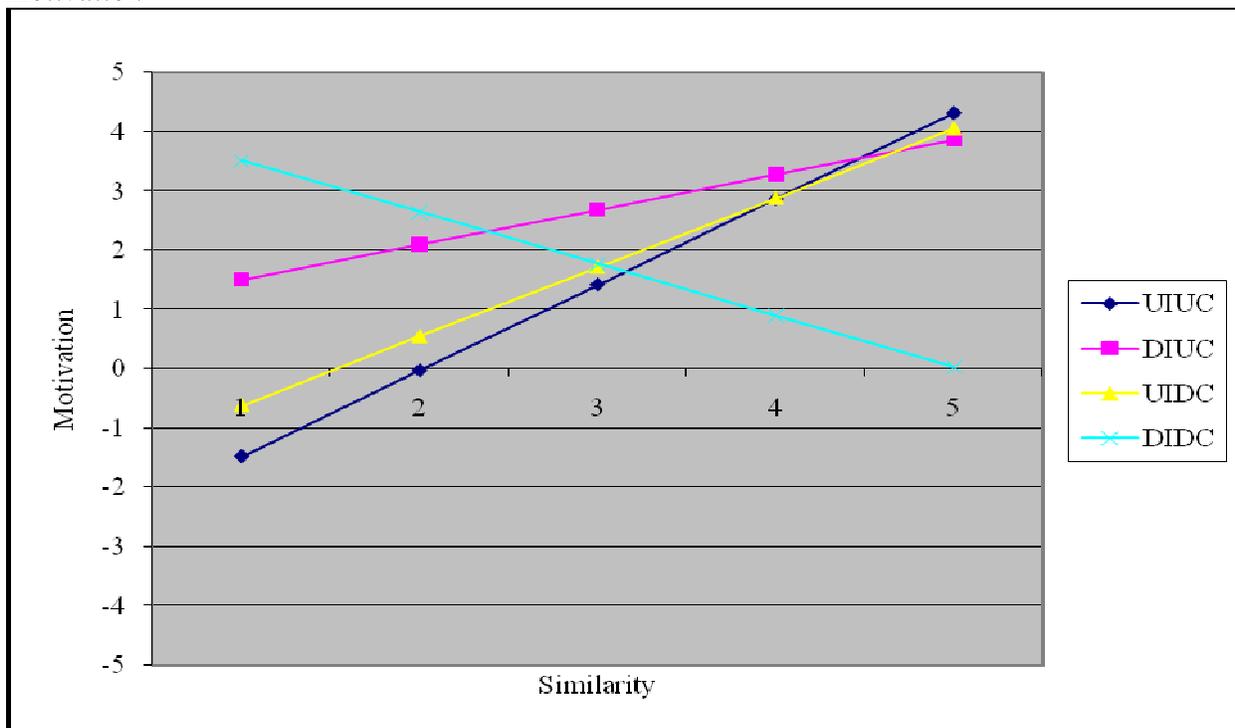


Figure 8. Interaction effects of target selection and perceived similarity on affect and motivation.

Affect



Motivation



Appendix A: Measures
Patient Rating Scale (Pilot Study)

In general, how many symptoms does this patient seem to have?

1	2	3	4	5
Very Few				Very Many

How severe do this patient's symptoms seem?

1	2	3	4	5
Very Mild				Extremely Severe

How well does this person seem to be coping with his/her symptoms?

1	2	3	4	5
Very Well				Very Poorly

Compared to this patient, how severe are your diabetes symptoms?

1	2	3	4	5
Much Better				Much Worse

Compared to this patient, how well are you coping with your symptoms?

1	2	3	4	5
Much Better				Much Worse

How did you feel after you read about this patient?

What thoughts did you have after you read about this patient?

What aspects of this person's illness were noticeable to you?

What aspects of this person's coping were noticeable to you?

Problem Areas In Diabetes (PAID) Questionnaire

INSTRUCTIONS: Which of the following diabetes issues are currently a problem for you?
Circle the number that gives the best answer for you. Please provide an answer for each question.

Not a problem 0	Minor problem 1	Moderate problem 2	Somewhat serious problem 3	Serious problem 4
------------------------------	------------------------------	---------------------------------	--	--------------------------------

1. Not having clear and concrete goals for your diabetes care? _____
2. Feeling discouraged with your diabetes treatment plan? _____
3. Feeling scared when you think about living with diabetes? _____
4. Uncomfortable social situations related to your diabetes care (e.g., people telling you what to eat)? _____
5. Feelings of deprivation regarding food and meals? _____
6. Feeling depressed when you think about living with diabetes? _____
7. Not knowing if your mood or feelings are related to your diabetes? _____
8. Feeling overwhelmed by your diabetes? _____
9. Worrying about low blood sugar reactions? _____
10. Feeling angry when you think about living with diabetes? _____
11. Feeling constantly concerned about food and eating? _____
12. Worrying about the future and the possibility of serious complications? _____
13. Feelings of guilt or anxiety when you get off track with your diabetes management? _____
14. Not "accepting" your diabetes? _____
15. Feeling unsatisfied with your diabetes physician? _____
16. Feeling that diabetes is taking up too much of your mental and physical energy every day? _____
17. Feeling alone with your diabetes? _____
18. Feeling that your friends and family are not supportive of your diabetes management efforts? _____
19. Coping with complications of diabetes? _____
20. Feeling "burned out" by the constant effort needed to manage diabetes? _____

Iowa-Netherlands Comparison Information Measure

Most people compare themselves from time to time with others. For example, they may compare the way they feel, their opinions, their abilities, and/or their situation with those of other people. There is nothing particularly “good” or “bad” about this type of comparison, and some people do it more than others. We would like to find out how often you compare yourself with other people. To do that we would like you to indicate how much you agree with each statement below, by using the following scale.

A	B	C	D	E
I disagree strongly				I agree strongly

1. I often compare how my loved ones (boy or girlfriend, family members, etc.) are doing with how others are doing.
2. I always pay a lot of attention to how I do things compared with how others do things.
3. If I want to find out how well I have done something, I compare what I have done with how others have done.
4. I often compare how I am doing socially (e.g., social skills, popularity) with other people.
5. I am not the type of person who compares often with others. (reversed)
6. I often compare myself with others with respect to what I have accomplished in life.
7. I often like to talk with others about mutual opinions and experiences.
8. I often try to find out what others think who face similar problems as I face.
9. I always like to know what others in a similar situation would do.
10. If I want to learn more about something, I try to find out what others think about it.
11. I *never* consider my situation in life relative to that of other people. (reversed)

A B C D E
I disagree I agree strongly
strongly

Upward comparison subscale

1. When it comes to my personal life, I sometimes compare myself with others who have it better than I do.
2. When I consider how I am doing socially (e.g., social skills, popularity), I prefer to compare with others who are more socially skilled than I am.
3. When evaluating my current performance (e.g., how I am doing at home, work, school, or wherever), I often compare with others who are doing better than I am.
4. When I wonder how good I am at something, I sometimes compare myself with others who are better at it than I am.
5. When things are going poorly, I think of others who have it better than I do.
6. I sometimes compare myself with others who have accomplished more in life than I have.

Downward comparison subscale

1. When it comes to my personal life, I sometimes compare myself with others who have it worse than I do.
2. When I consider how I am doing socially (e.g., social skills, popularity), I prefer to compare with others who are less socially skilled than I am.
3. When evaluating my current performance (e.g., how I am doing at home, work, school, or wherever), I often compare with others who are doing worse than I am.
4. When I wonder how good I am at something, I sometimes compare myself with others who are worse at it than I am.
5. When things are going poorly, I think of others who have it worse than I do.
6. I sometimes compare myself with others who have accomplished less in life than I have.

Eysenck Personality Questionnaire

Not at all 1	Slightly 2	Moderately 3	Very much 4	Extremely 5
------------------------	----------------------	------------------------	-----------------------	-----------------------

- Are you a talkative person? _____
- Are you rather lively? _____
- Do you enjoy meeting new people? _____
- Can you usually let yourself go and enjoy yourself at a lively party? _____
- Do you usually take the initiative in making new friends? _____
- Can you easily get some life into a rather dull party? _____
- Do you tend to keep in the background on social occasions? _____
- Do you like mixing with people? _____
- Do you like to plenty of action and excitement around you? _____
- Are you mostly quiet when you are with other people? _____
- Do other people think of you as being very lively? _____
- Can you get a party going? _____
- Does your mood often go up and down? _____
- Do you ever feel miserable for no reason? _____
- Are you an irritable person? _____
- Are your feelings easily hurt? _____
- Do you often feel "fed-up"? _____
- Would you call yourself a nervous person? _____
- Are you a worrier? _____
- Would you call yourself tense or "highly-strung"? _____
- Do you worry too long after an embarrassing experience? _____
- Do you suffer from nerves? _____
- Do you often feel lonely? _____
- Are you often troubled about feelings of guilt? _____

Pre- and Post-Selection Affect

1. How do you feel right now?

1	2	3	4	5
Sleepy				Highly Active

2. How do you feel right now?

1	2	3	4	5
Very Unpleasant				Very Pleasant

3. How do you feel right now?

1	2	3	4	5
Depressed				Excited

4. How do you feel right now?

1	2	3	4	5
Highly Stressed				Very Relaxed

Self-Ratings of Illness Severity and Coping

1. How often do you experience symptoms of diabetes?

1	2	3	4	5
Rarely				Every day

2. In general, how severe are your current symptoms?

1	2	3	4	5
Very mild				Very severe

3. In general, how many diabetes symptoms do you currently experience?

1	2	3	4	5
Very few				Very many

4. How much do your diabetes symptoms interfere with or restrict your daily activities?

1	2	3	4	5
Not at all				Very much

5. How well are you coping with your current diabetes symptoms?

1	2	3	4	5
Very well (No problems)	Fairly well (Manageable distress)	Neutral (Some distress)	Not that well (A lot of distress)	Not well at all (High distress)

Motivations for Target Selection

Please rate the extent to which each of these factors contributed to your decision to select this patient:

1	2	3	4	5
Not at all	A little bit	Somewhat	Quite a bit	Very much

1. To gain useful information about how to improve my situation. _____
2. To boost my confidence in my ability to manage diabetes symptoms. _____
3. To feel better about my own situation. _____
4. To learn that others have experiences similar to my own. _____
5. To confirm that my situation is bad. _____

Perceived Similarity

1. While reading the description of the patient you chose, how much did you focus on *differences* between yourself and the patient?

1	2	3	4	5
Not at all	A little bit	Some of the time	Quite a bit	Most of the time

2. While reading the description of the patient you chose, how much did you focus on *similarities* between yourself and the patient?

1	2	3	4	5
Not at all	A little bit	Some of the time	Quite a bit	Most of the time

Motivation to Improve Self-Care

1. How motivated are you to engage in your recommended self-care behaviors, such as watching your diet, exercising, and testing your blood sugar?

1	2	3	4	5
Not motivated at all	A little bit motivated	Moderately motivated	Highly motivated	Very highly motivated

Appendix B

Target Selection (Participant Instructions)

Now we would like you to read a short description of another patient with diabetes. Below, please indicate which type of patient you would like to read about.

I would like to read about a patient who:

- Has mild diabetes symptoms and is coping well.
- Has severe diabetes symptoms and is coping well.
- Has mild diabetes symptoms and is not coping well.
- Has severe diabetes symptoms and is not coping well.

Patient Vignettes (Selection Targets)

Upward Illness/Upward Coping Target (Mild symptoms, coping well)

“My family doctor diagnosed diabetes and referred me to a specialist based on some tests he did a while back. Before that time I had never felt depressed, and I was really down after I got the diagnosis, but emotionally I’m doing much better now. The specialist said that I can control my diabetes through diet, exercise, and monitoring my blood sugar. He said that I don’t need to be on any special medication. Right now my A1C level is 6, and I haven’t experienced any major symptoms recently. I do get thirsty and dizzy sometimes. But I’ve learned a lot about diabetes since the diagnosis and I’m hardly ever that worried about it now. It doesn’t really get in the way of my life.”

Downward Illness/Upward Coping Target (Severe symptoms, coping well)

“My family doctor diagnosed diabetes and referred me to a specialist based on some tests he did a while back. Before that time I had never felt depressed, and I was really down after I got the diagnosis, but emotionally I’m doing much better now. The specialist said that I need to change my diet, start exercising, and monitor my blood sugar. It’s been hard for me to do all that, but I’ve kept a positive outlook. He also put me on medication that he says might help, but we’ll see. Right now my A1C level is 11. I get thirsty and dizzy sometimes, I am tired a lot, and my eyesight is getting worse. Plus I have an open sore on my foot for the last few months that won’t get better. But I’ve learned a lot about diabetes since the diagnosis and I’m hardly ever that worried about it now. It doesn’t really get in the way of my life.”

Upward Illness/Downward Coping Target (Mild symptoms, not coping well)

“My family doctor diagnosed diabetes and referred me to a specialist based on some tests he did a while back. Before that time I had never felt depressed, but I’ve been really down ever since I got the diagnosis. The specialist said that I can control my diabetes through diet, exercise, and monitoring my blood sugar. He said that I don’t need to be on any special medication. Right now my A1C level is 6, and I haven’t experienced any major symptoms recently. I get thirsty and dizzy sometimes, and I get really nervous and frustrated a lot. I cry more than I used to, and I worry about how diabetes will affect the rest of my life and my relationships.”

Downward Illness/Downward Coping Target (Severe symptoms, not coping well)

“My family doctor diagnosed diabetes and referred me to a specialist based on some tests he did a while back. Before that time I had never felt depressed, but I’ve been really down ever since I got the diagnosis. The specialist said that I need to change my diet, start exercising, and monitor my blood sugar. It’s been hard for me to try to do all that. He also put me on medication that he says might help, but we’ll see. Right now my A1C level is 11. I get thirsty and dizzy sometimes, I am tired a lot, and my eyesight is getting worse. Plus I have an open sore on my foot for the last few months that won’t get better. Because of all this I get really nervous and frustrated a lot. I cry more than I used to, and I really worry about how diabetes will affect the rest of my life and my relationships.”

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preoperative anxiety and recovery from coronary-bypass surgery. *Health Psychology, 6*, 525-543.

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threat: Effects on recovery from major surgery. *Journal of Personality and Social Psychology, 71*, 967-979.

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CURRICULUM VITAE

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ACADEMIC TRAINING

- Appointed **Post-Doctoral Research Fellow**; Eating and Weight Research Team
Drexel University, Philadelphia, PA
Research Mentor: Meghan Butryn, Ph.D.
- 2012 **Doctor of Philosophy, Clinical Psychology**; Syracuse University, Syracuse, NY
Dissertation: Social Comparison Theory in the Context of Chronic Illness:
Predictors and Consequences of Target Selection among Individuals with
Type 2 Diabetes
Supervising Professor/Research Mentor: Joshua M. Smyth, Ph.D.
- 2007 **Master of Science in Clinical Psychology**; Syracuse University, Syracuse, NY
Masters Thesis: Application of a Structured Expressive Writing Intervention to
the Body Image and Weight Concerns of College Females
Supervising Professor/Research Mentor: Joshua M. Smyth, Ph.D.
- 2005 **Bachelor of Science in Psychology (Minor in English Literature)**
Summa Cum Laude; Drexel University, Philadelphia, PA
Senior Honors Thesis: Health Predictors of Sleep Quality in College Students
Supervising Professor: Jacqueline D. Kloss, Ph.D.

MARKS OF DISTINCTION

- 2011 **Citation Poster, Psychology**; Syracuse University Research Day
- 2009–2011 **Associate**; Women in Science and Engineering Future Professoriate Program,
Syracuse University (Awarded Certification in Professional Preparation)
- 2008 **Outstanding Teaching Assistant Award**; Syracuse University
- 2008–2011 **Teaching Associate**; Future Professoriate Program, Syracuse University
(Awarded Certification in University Teaching)
- 2008 **Citation Poster, Health Psychology**; Syracuse University Research Day
- 2007–2011 **Graduate Supervisor**; Allport Grant Research Projects, Syracuse University
- 2005 **Undergraduate Research Award**; Psychology Department, Drexel University
- 2004 **Outstanding Poster Presentation Award**; Drexel University Research Day
- 2004 **Inductee**; National Society for Collegiate Scholars
- 2003 **Inductee**; Psi Chi International Honor Society in Psychology

RESEARCH INTERESTS

My research investigates the interplay between physical and emotional health, with particular emphasis on two broad topics. First is the application of social comparison theory to chronic illness. This work is meant to elucidate the process and consequences of social comparisons among individuals with medical and psychiatric conditions. In this area, I am most interested in how social comparisons can guide health behaviors relevant to eating and weight (e.g., dietary choices, exercise). Populations relevant to this work include anorexia and bulimia nervosa (as well as subclinical disordered eating and body dissatisfaction), obesity, diabetes, and Celiac Disease. Second is the improvement of intervention design and delivery. This interest is informed by clinical work in integrated care environments. My focus is affect-based or emotion regulation interventions such as expressive writing; these interventions can be used as adjunctive techniques in a variety of health-relevant contexts and settings. In this area, my objective is to identify optimal methods for tailoring health behavior interventions (e.g., matching a social comparison target or role model to an individual's goals). This work is relevant to a wide range of populations, including disorders of eating and weight, insomnia and other sleep difficulties, substance use disorders, anxiety, and depression.

RESEARCH SUPPORT

- 2011 **Graduate Research Grant, Psi Chi International Honor Society.** “Glucose and Heart Rate Response to Selected Social Comparisons among Patients with Type 2 Diabetes.” Primary (Student) Investigator (Faculty Supervisor: Joshua Smyth, Ph.D.). \$1,200.
- 2011 **Syracuse University Allport Grant.** “The Role of Perceived Similarity in Social Comparisons of Health Behavior.” Graduate Student Mentor (Student Investigator: Lucas Behnke, B.A.). \$1,000.
- 2009 **Syracuse University Dissertation Grant.** “Social Comparison Theory in the Context of Chronic Illness: Target Selection among Individuals with Type 2 Diabetes.” Primary (Student) Investigator (Faculty Supervisor: Joshua Smyth, Ph.D.). \$1,000.
- 2008 **Syracuse University Allport Grant.** “Celiac Disease: Emotional Difficulties in Diet Restriction and the Potential Development of Disordered Eating Symptoms.” Graduate Student Mentor (Student Investigator: Alicia Anskis, B.S.). \$800.
- 2007–2012 **Syracuse University Graduate School and Psychology Department Travel Awards.** Primary (Student) Investigator (Faculty Supervisor: Joshua Smyth, Ph.D.). Total: \$2,500

PUBLICATIONS

- Arigo, D.**, Suls, J., & Smyth, J.M. (in press). Social comparisons and chronic illness: Literature synthesis and clinical implications. *Health Psychology Review*. doi: 10.1080/17437199.2011.634572
- Smyth, J.M., Pennebaker, J.W., & **Arigo, D.** (2012). What are the health effects of disclosure? In A. Baum, T. Revenson, & J. Singer (Eds.), *Handbook of Health Psychology* (2nd ed., pp. 175-191). New York, NY: Taylor & Francis.
- Arigo, D.**, Anskis, A.M., & Smyth, J.M. (2012). Psychiatric comorbidities in women with Celiac Disease. *Chronic Illness*, 8, 45-55. doi: 10.1177/1742395311417639
- Arigo, D.** & Smyth, J.M. (2012). The benefits of expressive writing on sleep difficulty and appearance concerns for college women. *Psychology & Health*, 27, 210-226. doi: 10.1080/08870446.2011.558196
- Smyth, J.M., & **Arigo, D.** (2009). Recent evidence supports emotion regulation interventions for improving health in at-risk and clinical populations. *Current Opinion in Psychiatry*, 22, 205-210. doi:10.1097/YCO.0b013e3283252d6d
- Smyth, J.M., Nazarian, D., & **Arigo, D.** (2008). Expressive writing in the clinical context. In J. Denollet, I. Nyclíček, & A. Vingerhoets (Eds.), *Emotion Regulation: Conceptual and Clinical Issues*. New York, NY: Springer.
- Arigo, D.**, Kloss, J.D., Kneile, K., & Gilrain, K. (2007). Beliefs about sleep and perceived sleep quality are associated with quality of life among perimenopausal women. *Behavioral Sleep Medicine*, 5, 241-255. doi: 10.1080/15402000701557342
- Platek, S., Raines, D., Gallup, G., Mohamedd, F., Thomson, J.W., Myers, T., Panyavina, I., Levin, S.L, Davis, J., Fonteyn, L.C.M., & **Arigo, D.** (2004). Reactions to children's faces: Males are more affected by resemblance than females are, and so are their brains. *Evolution and Human Behavior*, 25, 394-405. doi:10.1016/j.evolhumbehav.2004.08.007

MANUSCRIPTS IN PROGRESS AND UNDER REVIEW

- Gellis, L.S., **Arigo, D.**, & Elliott, J.C. (under revision). Investigating a cognitive refocusing technique for insomnia: A randomized controlled trial in university students.
- Arigo, D.** & Smyth, J.M. (in preparation). Expressive, creative, and mindfulness interventions show benefits for individuals with post-traumatic stress: A literature review.
- Arigo, D.**, Funderburk, J.S., Hooker, S., Dundon, P., et al. (in preparation). The Veterans' Health Administration's MOVE! Weight Loss Program: Providers' perceptions of implementation and attrition.

ONGOING PROJECTS

- Arigo, D.**, Behnke, L.D., & Smyth, J.M. The effects of perceived similarity to comparison targets on motivation to improve health behavior.
- Arigo, D.**, Heron, K., Vartanian, L.R., Pinkus, R.T., & Smyth, J.M. The role of body-focused social comparison among women.
- Arigo, D.**, & Smyth, J.M. Social comparisons among patients with type 2 diabetes: Predictors, motivations, and consequences.

CONFERENCE PRESENTATIONS

- Arigo, D.**, Behnke, L.D., & Smyth, J.M. (2012). *Health-Based Social Comparisons: The Effect of Instructions to Focus on Similarities or Differences*. Poster presented at the annual meeting of the Society for Behavioral Medicine, New Orleans, LA.
- Arigo, D.**, Funderburk, J.S., Hooker, S.A., Dundon, M., Dickenson, E...Downey, S. (2012). *Implementation of a Nationwide Weight Management Program: Providers' Feedback on the Veterans Health Administration-MOVE![®] Program for Veteran*. Poster presented at the annual meeting of the Society for Behavioral Medicine, New Orleans, LA.
- Hooker, S.A., Dundon, M. **Arigo, D.**, Funderburk, J.S, O'Donohue, J...Downey, S. (2012). *The Veterans Health Administration's MOVE![®] Program: Providers' Perceptions of Attrition*. Poster presented at the annual meeting of the Society for Behavioral Medicine, New Orleans, LA.
- Behnke, L.D., **Arigo, D.**, & Smyth, J.M. (2011, May). *Using Social Comparison to Improve Health Behavior: The Role of Perceived Similarity to the Comparison Target*. Poster presented at Syracuse University's annual Research Day, Syracuse, NY.
- Arigo, D.**, & Smyth, J.M. (2011, March). *Social Comparisons by Patients with Type 2 Diabetes: Differentiating Illness Severity and Coping Dimensions*. Poster presented at the annual meeting of the American Psychosomatic Society, San Antonio, Texas.
- Arigo, D.**, Smyth, J.M., & Suls, J.M. (2010, March). *The Impact of Social Comparisons on Health*. Poster presented at the annual meeting of the American Psychosomatic Society, Portland, Oregon.
- Arigo, D.**, Smyth, J.M., & Anskis, A.M. (2010, March). *Biopsychosocial Comorbidities in Celiac Disease*. Poster presented at the annual meeting of the American Psychosomatic Society, Portland, Oregon.
- Arigo, D.**, Smyth, J.M., Vartanian, L.R., & Pinkus, R.T. (2009, April). *A New Measure of Body-Focused Social Comparison: Implications for Body Image and Eating Concerns*. Poster presented at the annual meeting of the Society of Behavioral Medicine, Montreal, Quebec.

- Arigo, D., & Smyth, J.M.** (2008, March). *Let Me Sleep On It: The Benefits of Expressive Writing on Reported Sleep Quality in Young Women Adjusting to College*. Poster presented at the annual meeting of the American Psychosomatic Society, Baltimore, MD.
- Anskis, A.M., **Arigo, D.**, & Smyth, J.M. (2008, May). *Celiac Disease: Emotional Difficulties in Diet Restriction and the Potential Development of Disordered Eating Symptoms*. Poster presented at Syracuse University's annual Research Day, Syracuse, NY.
- Arigo, D.**, Smyth, J.M., Wonderlich, S., Crosby, R., Engel, S., & Mitchell, J. (2007, March). *Ecological Momentary Assessment of Naturalistic Coping, Binge and Purge Behavior, and Affect in Women with Bulimia Nervosa*. Poster presented at the annual meeting of the Society of Behavioral Medicine, Washington, D.C.
- Anskis, A.M., **Arigo, D.**, & Smyth, J.M. (2007, May). *A Structured Expressive Writing Technique for the Prevention of Eating Disorders: A Feasibility Study*. Poster presented at Syracuse University's annual Research Day, Syracuse, NY.
- Arigo, D.**, and Platek, S. (2005, June). *Exploring the Expression of Anxiety and Self-Esteem from an Evolutionary Perspective*. Paper presented at the annual meeting of the Human Behavior and Evolution Society, Austin, TX. Served as **session chair: Evolution and Emotion Symposium**.
- Arigo, D.**, and Kloss, J.D. (2005, April). *Health-Related Predictors of Sleep Quality in College Students*. Paper presented at the annual meeting of the Eastern Psychological Association, Boston, MA.
- Arigo, D.**, and Platek, S. (2005, April). *Exploring the Expression of Anxiety from an Evolutionary Perspective*. Paper presented at the annual meeting of the Eastern Psychological Association, Boston, MA.
- Arigo, D.**, Levin, S., and Platek, S. (2004, March). *An Evolutionary Perspective on the Expression of Anxiety (Pilot Study)*. Poster presented at Eastern Psychological Association Conference, Washington, D.C.
- Arigo, D.** and Kloss, J.D. (2003, March). *Attitude Toward Sleep Quality as a Predictor of Quality of Life in a Perimenopausal Population*. Poster presented at Eastern Psychological Association, Baltimore, MD.

RESEARCH ASSISTANTSHIP EXPERIENCE

2011–Present **Research Specialist**; Center for Integrated Healthcare, Syracuse VAMC
 MOVE! Program: Providers' Perceptions of Attrition (Data Manager)
 Integrated Treatment for Depression and At-Risk Alcohol Use (Interventionist)*
 Brief Cognitive-Behavioral Therapy for Insomnia in Depressed Veterans
 (Interventionist)*

2006–Present **Graduate Research Assistant**; Syracuse University
 Stress, Health, and Diabetes Experiences (Data Manager)**
 Cognitive Treatment for Insomnia in College Students (Interventionist)

20065–2006 **Undergraduate Research Assistant**; Drexel University
 Sleep and Women's Health Research Team (Student Investigator/Data Manager)
 Evolutionary Cognitive Neuroscience Laboratory (Student Investigator)

*Funded by the Department of Veterans Affairs

**Funded by the National Center for Complementary and Alternative Medicine

UNDERGRADUATE MENTORING AND SUPERVISION

Served as Immediate Supervisor for the following Independent Study experiences. As Supervisor, directed all lab tasks and assignments and provided education about the research process. For supervision of individual projects: oversaw study design, data collection, data analysis, expenditures, and poster preparation.

2010–Present **E. Froggatt**, Sociology and Psychology; Social Comparison and Body Image
Thesis topic TBD

2010–2011 **L. Behnke**, Psychology and Communications; Social Comparisons and Health
*Independent study project: Using Social Comparison to Improve Health Behavior: The Role of Perceived Similarity to the Comparison Target (*in preparation)*
Awards: Syracuse University Allport Grant, Citation Poster at Syracuse University Research Day

2009–2010 **C. Casey and E. Green**, Psychology; Social Comparison and Chronic Illness

2007–2008 **A. Anskis**, Nutrition and Psychology; Chronic Illness and Body Image
*Thesis: Celiac Disease: Emotional Difficulties in Diet Restriction and the Potential Development of Disordered Eating Symptoms (*manuscript, Chronic Illness)*
Awards: Syracuse University Allport Grant, Citation Poster at Syracuse University Research Day

TEACHING EXPERIENCE

- 2009–2011 **Primary Instructor, Syracuse University;** Abnormal Psychology
 Designed and implemented original syllabus, including: prepared and facilitated all lectures, developed evaluative tools (exams, homework assignments, case reports), graded all assignments
 *Mean instructor evaluation score: 4.4 (scale range: 1=unsatisfactory, 5=exceptional)
 Faculty Consultant: Peter Vanable, Ph.D.
- 2007–2008 **Teaching Assistant, Syracuse University;** Introduction to Research Methods
 Facilitated review sessions and class discussions, graded all assignments
 Faculty Supervisors: Amy Criss, Ph.D. & Abraham Rutchick, Ph.D.
- 2008–2009 **Recitation Leader, Syracuse University;** Introductory Psychology
 2006–2007 Facilitated content presentations and class discussions, graded all assignments
 *Mean instructor evaluation score: 4.25 (scale range: 1=unsatisfactory, 5=exceptional)
 Faculty Supervisor: Tibor Palfai, Ph.D.
- 2004 **Teaching Assistant, Drexel University;** Abnormal Psychology
 Gave ten one-hour lectures on high-profile case reports, facilitated class discussions regarding each case, graded all case evaluations
 Faculty Supervisor: Ludo Scheffer, Ph.D.
- 2004 **Teaching Assistant, Drexel University;** Computer Assisted Data Analysis II
 Graded all homework assignments/exams, provided individual tutoring
 Graduate Supervisor: Christopher Ochner, M.S.

CLINICAL EXPERIENCE

- 2011–2012 **Psychology Intern;** Syracuse Veterans Affairs Medical Center, Syracuse, NY
Rotations: Health Psychology (Weight and Diabetes Management, Behavioral Sleep Medicine, Behavioral Health in Primary Care, Cognitive-Behavioral Pain Management, Smoking Cessation); Outpatient Mental Health; Substance Abuse Treatment; OEF/OIF/OND Post-Deployment Clinic; Group Therapy; Weight Management Research
Outpatient and Inpatient Assessment Experiences and Instruments (all include clinical interview): Cognitive and neuropsychological evaluations (WAIS-IV, WMS-IV, RBANS, 3MS, Trails A/B), personality evaluations (MMPI-II, Millon Clinical Multiaxial Inventory), medical pre-treatment evaluations (Millon Behavioral Medicine Diagnostic)
Intervention modes: Group and individual Cognitive-Behavioral Therapy (for anxiety, depression, and insomnia), brief Cognitive-Behavioral self-management, Dialectical Behavior Therapy, Short-Term Psychodynamic Therapy, Prolonged

Exposure, Cognitive Processing Therapy, Motivational Interviewing, Acceptance and Commitment Therapy

- 2010–2011 **Behavioral Health Intern;** Syracuse University Health Services (Primary Care)
Assessments: Screening for anxiety disorders, depressive disorders, insomnia, sexual dysfunction, Attention Deficit/Hyperactivity Disorder
Intervention modes: Cognitive-Behavioral management and techniques
- 2009–2011 **Therapist and Group Facilitator;** Syracuse VA Medical Center
Assessment: Intake interviews, Clinician-Administered PTSD Scale [CAPS]
Intervention modes: Short-term psychodynamic therapy, group process/experiential therapy, Prolonged Exposure Therapy for PTSD; group and individual Dialectical-Behavior Therapy; designed and facilitated an educational group for PTSD
- 2008–2011 **Therapist and Group Facilitator;** Psychological Services Center, Syracuse University
Assessment: Intake interviews, integrated assessment of Attention Deficit/Hyperactivity Disorder
Intervention modes: Short- and long-term psychodynamic therapy, Cognitive-Behavioral Therapy, and client-centered therapy for a range of mental health conditions; designed and facilitated a Cognitive-Behavioral Therapy group for body dissatisfaction
- 2005–2006 **Mental Health Associate;** Friends Hospital, Philadelphia, PA
Responsibilities: Treatment planning and psychoeducation groups development/facilitation for eating disorders, mood disorders, anxiety disorders, and psychotic disorders

ADDITIONAL CLINICAL TRAINING ACTIVITIES

- Fall 2011 Acceptance and Commitment Therapy Seminar Series (Syracuse VAMC)
 Spring 2011 The Mini-Mental Status Exam; Professional Ethics; Crisis Intervention
 Fall 2010 Rorschach Theoretical Foundations, Administration, and Exner Scoring System
 Spring 2010 CBT for Insomnia; Psychological Evaluation in a Primary Care Setting; The Use of Actigraphy for Capturing Sleep Architecture and Outcomes
 Fall 2009 Risk Assessment and Crisis Intervention; Brief Interventions (for sleep difficulty and alcohol abuse) in a Primary Care Setting
 Fall 2009 Clinician-Administered PTSD Scale [CAPS] Administration (Syracuse VAMC)
 Fall 2007 The Maudsley Family-Based Treatment for Eating Disorders in Adolescents
 Fall 2007 Using Multifamily Therapy Group to Engage Patients, Families, and Providers in the Treatment of Eating Disorders

MEMBERSHIPS AND SERVICE

- 2011 **Training Facilitator;** Syracuse University Behavioral Health Intern Program
 2011 **Student Member;** Central New York Psychological Association
 2010 **Website Administrator;** Syracuse University Psychology Department Website
 2010 **Clinical Area Representative;** Psychology Department Chair Search Committee
 2008–Present **Ad-hoc Reviewer,** *British Journal of Health Psychology*
Basic and Applied Social Psychology
 2007–Present **Student Member;** American Psychosomatic Society
 2007–Present **Student Member;** Society for Behavioral Medicine
 2006–Present **Graduate Student Member,** Syracuse University Psychology Action Committee
 2003–2005 **President, Drexel Chapter;** Psi Chi International Honor Society in Psychology

GUEST LECTURES

- Spring 2011 **Syracuse University Social Psychology Brown Bag Lecture Series;** “Social Comparisons by Patients with Chronic Illness: Health Implications of Target Selection”
 Fall 2010 **Syracuse University Psychology Club;** Graduate School Preparation Presentation
 Fall 2010 **Women in Science and Engineering Future Professoriate Program;** “Predictors, Motivators, and Consequences of Social Comparisons by Patients with Type 2 Diabetes”
 Spring 2010 **Syracuse University Psychology Club;** Clinical Presentation (History and Current Perspectives): “Sane in Insane Places: Psychiatric Inpatient Care”
 Fall 2009 **Women in Science and Engineering Future Professoriate Program;** “It’s All Relative: The Effects of Social Comparisons on Physical and Emotional Health”
 Fall 2008 **Syracuse University Senior Seminar in Evolutionary Biology;** “The Role of Evolutionary Theory in Psychology”

REFERENCES

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