

HOW DO SOCIAL COMPARISON AND SELF-EFFICACY INFLUENCE DIABETIC
PATIENTS' MOTIVATION TOWARD A NUTRITION REGIMEN?

by

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ABSTRACT

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Social comparisons are useful for patients with chronic illness giving them a reliable information about others dealing with same illness. Patients with chronic illness may benefit from social comparisons. Learning about how others with the same disease manage self-care behavior can lessen uncertainty and anxiety about their health. Effects of social comparisons are subject to contexts. However, social comparison is relatively less understood in the context of diabetes patients. Considering the importance of nutrition regimen as a prime concern for diabetes patients, the current study examined how social comparisons along with self-efficacy influence motivation toward nutrition regimen. Results indicated that the combination of social comparisons and self-efficacy did not necessarily predict motivation for following nutrition regimen for diabetic patients. On the other hand, perceived self-efficacy on diabetes management was associated with motivation toward nutrition regimen. The findings suggest that health campaigns or nutrition education invoking self-efficacy rather than focusing on comparisons information would be more beneficial to diabetic patients who want to follow a nutrition regimen.

Keywords: social comparisons, self-efficacy, nutrition regimen, diabetes, motivation, diabetes management, self-care, health communication

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Introduction

Approximately 9.4% of the U.S. population of all ages (about 30.3 million people) received a clinical diagnosis of diabetes in 2015 according to a recent national report by the Centers for Disease Control and Prevention (CDC, 2017). The CDC (2017) reported diabetes as the 7th leading cause of death in the United States. Diabetes creates serious complications such as chronic kidney disease, cardiovascular problem, nerve damage, foot, and leg damage. Diabetes increases the risk of eye damage potentially leading to blindness (Mayo Clinic, 2018). More importantly, diabetes becomes a heavy financial burden on the entire society imposing a high medical cost. The American Diabetes Association (ADA, 2018) estimated the national cost of diabetes in 2017 at 327 billion dollars and the economic cost of diabetes increased by 26% from 2012 to 2017 due to the increased prevalence of diabetes and cost per person treatment.

However, patients with diabetes reduce the risk of complications through treatment and adopting a healthy lifestyle such as proper exercise, regulatory nutrition intake, and maintaining a healthy weight (Powers et al., 2015). Since diabetes constitutes a chronic disease that affects the body for a long time, self-care behaviors including proper regulation on diet, weight, and exercise become essential for diabetic patients in addition to medical treatment. Self-care behavior offers an important means for diabetes patients to stay healthy (Gorawara-Bhat, Huang, & Chin, 2008). However, self-regulation of behaviors presents a hard challenge sometimes for, in particular, patients struggling with chronic diseases. A chronic disease, diabetes requires patients to stick with a precise nutrition plan, healthy lifestyle, and regular exercises throughout the entire life. Imposing all these requirements on the shoulders of patients' ability of self-control might not always effective; social influence on their regulatory behaviors are necessary because patients might be less motivated toward the self-regulation especially when they feel there is not

much progress in their status of the disease. Under this circumstance, the effects of social influence on self-regulatory behavior should be addressed. Martinez et al. (2018) pointed out that little research exists on the social influence on self-care behaviors. The research of social influence on self-care behaviors focused on social support for diabetes patients from peer coaching programs or increasing the knowledge of diabetes (Martinez et al., 2018). Less attention focuses on other social influence factors. The present study examines a new direction of social influence that might contribute to increase the motivation of self-care behavior for diabetes patients.

The current study focuses on the fact that patients not only look for objective information on a general treatment but remain curious about information on fellow patients, that is, a social comparison (Buunk et al., 2012). Patients find fellow patients' information useful coming directly from patients dealing with emotions during the illness because it might provide coping strategies (Buunk et al., 2012). That is, patients consider information from fellow patients as a reliable source when seeking information about psychological issues relevant to the illness.

Diabetes, as a chronic disease, requires an individual with diabetes to perform multiple daily self-managements and care activities (Powers et al., 2015). Adhering to a healthy eating plan is the most important since the healthy eating plan helps a person with diabetes achieve optimal blood glucose level. Research establishes that healthcare goals and self-management behaviors of patients with diabetes are frequently influenced by those of peer and fellow patients (Gorawara-Bhat et al., 2008). Diabetic patients often evaluate health status and health-related decisions via comparisons to other patients with diabetes. Patients with a serious illness (e.g., cancer, depression) are interested in social comparison information from others with similar diseases (Brakel, Dijkstra, Buunk, & Siero, 2012; Buunk et al., 2012).

Previous literature focused mainly on the effects of social comparison information on patients with chronic diseases. However, previous research failed to consider how social comparison strategy actually influences patients' motivation to elicit healthy behavior. To encourage patients' motivation for healthier choice of self-management, the current study includes other factor, self-efficacy, as a potential indicator of motivation of behavioral change in addition to social comparison since the previous literature shows a person's self-efficacy under certain health threat significantly predicts motivation for a healthier choice of behavior (Bandura, 1991; Maibach, Flora, & Nass, 1991; Strecher, Devellis, Becker, & Rosenstock, 1986).

To be specific, this thesis explores how the combination of social comparison information and perceived self-efficacy of patients with diabetes influences the patients' motivation for nutrition regimen. To this end, the current study posits that the level of motivation is predicted by a combination of the level of social comparison and self-efficacy. Varying the level of social comparison and self-efficacy, the present study examines which level of combination of social comparison and self-efficacy is the most effective in terms of stimulating patients' motivation to follow healthy eating plans.

The findings of this thesis contributes to understanding the roles of social comparison and self-efficacy on patients' motivation to follow a nutrition regimen in explaining different effects of social comparison information of an individual's perception on their willingness to pursue a healthy eating plan. Moreover, the findings may useful to build the appropriate health message design for diabetic patients by paying more attention to an individual difference on the effects of social comparisons and self-efficacy.

I. Literature Review

Social Comparison Theory

The general concept of social comparison saw wide use by social philosophers and social scientists such as Platonists, Aristotle, Rousseau, Kant, and Karl Marx (Suls & Wheeler, 2000). A systematic theory of social comparison became developed in 1954 by American psychologist, Leon Festinger. Festinger's article entitled "A theory of social comparison processes" suggested that people possess an innate drive to evaluate themselves in comparison to others. According to social comparison theory, people compare themselves with others to evaluate opinions and abilities when no available objective means for evaluation exist (Festinger, 1954).

Social comparison research focused on the selection of a comparison target and the effects of comparisons (Gerber, Wheeler, & Suls, 2018). When discussing the selection of a comparison target, the direction of social comparison gained major attention in the role of social comparison. Social comparisons consist of upward and downward comparisons. The upward comparison refers to the tendency in which individuals compare to others considered better. Downward comparisons happen when individuals compare to others considered worse.

Festinger (1954) suggested that individuals generally compare themselves with others perceived as better. Hakmiller (1966), however, proposed that individuals with some types of threat prefer comparisons to others perceived as worse. Brickman and Bulman (1977) demonstrated that upward comparisons considered as threatening become avoided. Individuals responding to the threat might seek downward comparisons. Downward comparisons attracted more attention of researchers as Wills' (1981) downward comparison theory suggested that individuals compare themselves with others worse off to enhance subjective well-being. Wills' (1981) basic principle involves that "persons can increase their subjective well-being through

comparison with a less fortunate other” (p. 245). That is, individuals in a threatening situation would feel better about themselves by doing downward comparisons.

Following Will’s research, a number of studies demonstrated the prevalence of downward comparisons in different types of life-threatening situations (Buunk & Ybema, 1995; Devellis et al., 1991; Wood, Taylor, & Lichtman, 1985). However, other researchers found the prevalence and preference, even benefits for upward social comparisons (Ahrens & Alloy, 1997; Taylor & Lober, 1989).

Research in the direction of social comparisons produces several contradictory findings, involving prevalence and preferences of types of social comparisons. The inconsistency in the literature becomes attributed to the fact that the prevalence and benefits in upward and downward social comparisons depend on contexts and situations in which social comparisons occur (Arigo, Suls, & Smyth, 2012). Especially, the prevalence and preference of the direction of social comparison vary according to the types of threat or diseases. Therefore, to examine the exact effects of either upward or downward social comparison, a context-specific approach becomes necessary.

Social Comparison in the context of chronic illness

Social comparison theory increasingly receives an application to health-related behaviors generating one of the most useful and important social psychological approaches (Buunk & Gibbons, 1997). Social comparison gained popularity in health-related issues because social comparison processes play a crucial role in “how people interpret health threats, how they understand their own health risks, how and when they decide to seek care for physical symptoms, and how they adapt to serious illness and disability” (Tennen, Mckee, & Affleck, 2000, p. 443).

Although social comparison theory (Festinger, 1954) failed to consider health-related issues in perspective of comparison, the theory might be relevant to many health-related concerns since such concerns usually “imply a strong need for self-evaluation” (Buunk & Gibbons, 1997, p. 4). Difficulties in receiving objective self-evaluation for individuals with medical problems or issues increase uncertainty of health status (Tennen et al., 2000). The uncertainty may raise individuals’ reliance on social comparisons.

Individuals with chronic diseases, in particular, become vulnerable to uncertainty because of increased uncertainty about outcomes over long periods of time with chronic illness (Robinson, 2016). In a state of uncertainty, people engage in evaluating the capabilities and beliefs by social comparison (Festinger, 1954). Social comparisons may help relieve uncertainty and anxiety caused by chronic illness by comparing the others’ situations (Schachter, 1959; Wills, 1981). Patients with chronic illness may obtain information about other patients in various ways such as through conversations with other patients in hospitals, or obtaining information from media or third parties (Arigo et al., 2012). The encounters may influence patients’ attitude and self-perceptions toward their own health (Arigo et al, 2012).

A chronic condition describes “a physical or mental health condition that lasts more than one year and causes functional restrictions or requires ongoing monitoring or treatment” (Buttorff, Ruder, & Bauman, 2017, p.1). CDC (2019) reports that chronic diseases are the “leading causes of death and disability in the United States and leading drivers of nation’s \$3.3 trillion in annual health care costs” (p. 2). Chronic diseases include heart disease, cancer, diabetes, arthritis, chronic lung disease, stroke, and chronic kidney disease (CDC, 2019). With an effort of improving the living conditions of chronic diseases, there exists a substantial amount of literature about the role of social comparison across a variety of chronic health issues.

One of the most common chronic conditions in the United States, arthritis constitutes one of the chronic diseases studied in the context of social comparison. Particularly, research focused on Rheumatoid Arthritis (RA) patients' perceptions toward social comparisons (Affleck & Tennen, 1991; Blalock, DeVellis, & DeVellis, 1989; DeVellis et al., 1990). Majority of research in RA patients suggested that individuals with RA preferred downward social comparisons to upward social comparisons (Affleck & Tennen, 1991; Blalock et al., 1989; DeVellis et al., 1990; Giorgino et al., 1994). DeVellis et al. (1991) also found that RA patients denied the superiority of others coping well because the patients considered upward social comparison information as threatening.

Cancer, a chronic disease, defines a major health problem as the second leading cause of death in the United States (Siegel, Miller, & Jemal, 2019). Cancer includes challenging treatment regimens, an imbalance of work and home life, negative impacts on interpersonal relationships and uncertainty of recurrence of illness (Tennen et al., 2000). The demanding nature in the treatment of cancer gives patients constant stressful situations, at the same time, making a good context to examine social comparisons (Tennen et al., 2000). Many studies (Buunk, Collins, Taylor, Van Yperen, & Dakof, 1990; Llewellyn-Thomas, Thiel, & McGreal, 1992; Tylor, Aspinwall, Giuliano, Dakof, & Reardon, 1993; Taylor & Lobel, 1989; Taylor, Wood, & Lichtman, 1983; Van der Zee et al., 1996; Wood et al., 1985) actively examined the effects of social comparisons and social comparison directions on various types of cancer patients.

In contrary to abundant data in the context of arthritis and cancer patients with social comparison, a lack of social comparison research exists for diabetes patients. Arigo et al. (2012) reviewed a total of 37 accessible studies about chronic illness and social comparison. 22 of the studies examined cancer and arthritis patients. Only four studies out of 37 considered diabetes.

Considering the seriousness of the illness and the widespread populations of diabetes in the U.S., there needs more attention to examine the effects of social comparison on diabetes patients.

Social comparison and diabetic patients

According to Gorawara-Bhat et al. (2008), individuals with Type 2 diabetes possess knowledge about comparisons related to the illness. Social comparisons diabetic patients make to others impact the motivation for self-care (Arigo, Smyth, & Suls, 2015). Therefore, exploring the effects of social comparisons on diabetic patients becomes important to manage the illness.

Research on social comparisons in the context of diabetic patients, in particular, focused on the direction of social comparisons (Arigo, Cornell, & Smyth, 2018; Derlega, Robinett, Winstead, & Saadeh, 2005; Gorawara-Bhat et al., 2008; Schokker et al., 2010).

Derlega et al. (2005) suggested individuals with diabetes preferred interactions with someone functioning well (upward affiliations) than someone functioning poorly (downward affiliations). Diabetic patients preferred getting emotional support from someone doing better to someone doing worse (Derlega et al., 2005). The results from Derlega et al. (2005) were mostly consistent with suggestions from a theoretical model developed by Taylor and Lobel (1989).

Taylor and Lobel (1989) predicted individuals with serious medical problems use social comparisons. Persons with serious illness favored upward social comparisons for problem-solving and personal improvement because individuals doing better provide a good source of information and inspiration. On the other hand, people facing serious health issues preferred contacting others doing worse for ego-enhancement. Knowing someone is doing worse than themselves permits individuals to feel good by believing they are doing better than others. The difference in findings between Derlega et al. (2005) and Taylor and Lobel (1989) is that patients in the study of Derlega et al. (2005) avoided information seeking from someone doing poorly on

psychological management while patients in the study of Taylor and Lobel (1989) still needed downward social comparisons for their ego-enchantment.

Following Derlega et al. (2005), Gorawara-Bhat et al. (2008) examined how social comparisons functioned in Type 2 diabetic patients. The study by Gorawara-Bhat et al. (2008) especially focused on various roles of social comparisons in the old population (65 and over). Among 28 old diabetic patients, 75% of them (21 patients) were motivated by externally rather than internally. That is, old diabetic patients were curious about how family and/or peer members are coping with diabetes. Comparisons information stimulated the old patients' motivation for managing diabetes.

Indeed, 20 diabetic patients from the study of Gorawara-Bhat et al. (2008) showed downward social comparisons from family and/or peer members actually motivated the self-management on diabetes. Different from Taylor and Lobel (1989), old diabetic participants rarely used upward social comparisons. That is, only one person out of 21 externally were motivated by upward comparisons, comparing her with others doing better in terms of self-management. The results from Gorawara-Bhat et al. (2008) suggested that old diabetic patients were more motivated to do self-management practices by understanding risks associated with diabetes and developing a sense of empowerment from peer or family members doing worse than themselves. However, the results of Gorawara-Bhat et al. (2008) are not less likely to be contributed to a general understanding on effects of social comparisons in the context of diabetic patients since they only examined the old population with a very small sample size (28 participants).

Previous literature in the context of diabetic patients found that both upward and downward comparisons promote patients' motivations for healthy behaviors (Arigo et al, 2015; Gorawara-Bhat et al., 2008). However, identifying specific factors which may stimulate diabetes

patients' motivation toward healthy behaviors in the context of social comparisons theory should be addressed to clarify the consequences of making social comparisons (either upward or downward) for diabetes patients. A few studies investigated what specific factor when making social comparisons moderates diabetic patients' motivation toward self-care behaviors. Arigo et al. (2015) suggested that perceived similarity moderated the effect of diabetic patients on motivation for self-care behaviors. That is, while diabetic patients became motivated to work on self-care behaviors when perceiving similarities with target patients improving, decreased motivation existed when diabetic patients paid more attention to perceived similarities with patients doing poorly.

Furthermore, Schokker et al. (2010) presented individual difference in regulatory focus as another factor in social comparisons that can determine the effects of motivation for healthy behaviors. According to Schokker et al. (2010), regulatory focus consists of two self-regulatory systems: promotion focus and prevention focus. Self-regulation with a promotion focus refers to the "extent to which one is focused on obtaining positive outcomes," whereas self-regulation with a prevention focus is defined to the "extent to which one is focused on avoiding negative outcomes" (Schokker et al., 2010, p. 438). Connecting self-regulation systems with the directions of social comparison (upward and downward social comparisons), Schokker et al. (2010) suggested that diabetic patients with promotion focuses were more motivated to manage self-care behaviors when they encountered comparisons information from others doing better on self-management (upward social comparisons). On the other hand, prevention-focused diabetic patients increased motivation toward self-behaviors when making comparisons using information from others doing worse in managing healthy behaviors (downward social comparisons). By investigating self-regulatory systems as a moderator for the effects of social

comparisons on self-care behaviors, Schokker et al. (2010) confirmed that motivation for self-care behaviors may increase when patients receive appropriate social comparison information coinciding with the patients' regulatory focus.

Only a limited number of studies in the previous literature examined specific factors that moderate the effects of social comparisons on motivation for patients to follow self-management behaviors. Schokker et al. (2010) suggested that high self-efficacious diabetic patients may more be motivated by both of promotion-focused regulation and prevention-focused regulation. However, the results indicated that highly efficacious diabetic patients were motivated to manage their self-care behaviors by only prevention-focused regulation (downward social comparisons), not promotion-focused regulation (upward social comparisons). Though self-efficacy plays an important role as an indicator of motivation for healthy behavior or behavior change in health communication (Bandura, 1991; Maibach et al., 1991; Strecher et al., 1986), less is known about how the combination of social comparisons and self-efficacy work to elevate motivation to elicit healthy self-care behavior, in particular, for diabetic patients.

While the previous literature examined self-care behaviors in general, the current study specifies what kinds of self-management practices diabetic patients are supposed to be motivated. Since social comparisons research in health communication needs a very context-specific approach, the present study explores and focuses on, in particular, a nutrition regimen as diabetic patients' primary self-care management. Following a nutrition regimen, that is, having a healthy-eating plan is vital for diabetic patients as self-care behaviors since the nutrition regimen helps patients control blood sugar (glucose), manage weight, and prevent complications lowering the risk of getting heart disease complications (Evert et al., 2013).

In addition to specifying self-care behavior, nutrition regimen, the present study also explores self-efficacy as a factor to increase motivation toward nutrition regimen along with social comparisons for diabetes patients. Self-efficacy represents the “beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments” (Bandura, 1997, p. 3). Self-efficacy impacts on the choices people make, the amount of effort put into activities, methods of dealing with stressful and difficult situations, vulnerability to stress and depression, and resiliency (Bandura, 1986). A strong sense of self-efficacy provides “the best determinant of a new behavior” in terms of attempting and persisting the targeted behavior (Maibach et al., 1991, p. 2). Therefore, increasing self-efficacy enhances the possibility of adoption and adherence to the targeted behavior (Maibach et al., 1991).

Many scholarly discussions addressed improving self-efficacy because self-efficacy positively predicted various desirable behavioral outcomes including academic success and career development (Bandura, 1993; Klassen & Usher, 2010; Pajares, 1996). More importantly, self-efficacy influenced behavior changes related to health issues such as smoking cessation, weight control, eating disorder, exercise, alcohol abuse, contraceptive behavior, and compliance with medical regimens (Bandura, 1991; Maibach et al., 1991; Strecher et al., 1986). Self-efficacy is considered crucial to behavior changes involving positive health outcomes (Egbert & Omosun, 2017, Strecher et al., 1986). Therefore, investigating self-efficacy as another important factor to elicit the targeted behavior along with social comparisons in the context of diabetes patients can provide more practical guidance for health professionals.

So far, little is known about the effects of a combination of social comparison and self-efficacy on the motivation for an appropriate nutritional plan in the context of diabetic patients. To fill this gap in the literature, the current study examined the effects of self-efficacy and social

comparison on diabetic patients' motivation for substantive behavior change, such as nutrition regimen. In order to achieve this goal, the current study proposed the following hypotheses:

H1: The level of motivation will be predicted by a combination of the level of social comparison and self-efficacy such that the ordering of the group means (from highest to lowest) would be: (a) Upward social comparison/high self-efficacy, (b) downward social comparison/high self-efficacy, (c) upward social comparison/low self-efficacy and (d) downward social comparison/low self-efficacy.

H2: Perceived self-efficacy of diabetic patients on diabetes management is positively associated with motivation on following nutrition regimen.

II. Methods

Participants

Adult participants with Type 1 and Type 2 diabetes were recruited using Amazon Mechanical Turk (MTurk) and from an introductory communication course at a large Midwest college. Each participant completing an online survey received either a cash reward of \$5 or one unit of extra credit. All recruitment and data collection procedures were approved by the University of Wisconsin-Milwaukee Institutional Review Board. A total of 93 adult diabetic patients participated in the study. Responses from 27 participants were discarded for failure to complete the entire survey. The final participant pool included 66 respondents currently diagnosed with either Type 1 or Type 2 diabetes.

Of the 66 participants, 48 (72.7%) were male. Participants ranged in age from 18 and 61 years ($M = 27.85$, $SD = 7.38$). Table 1 provides demographic information for the participants included in the final data analysis. The sample constituted Caucasian (45.4%), Asian (36.4%), Hispanic (9.1%), African American (4.5%), Native American (3%), and other (1.5%). Regarding education level, 12.1% of participants reported high school graduation with 27.3% completed some college education, and 47% received a Bachelor's degree while the rest had earned Associate (10.6%) or Master's degree (3%). Among the participants, 40 (60.6%) were patients with Type 1 diabetes and 26 (39.4%) diagnosed with Type 2 diabetes. Average time since diabetes diagnosis was about 5 years ($M = 5.17$, $SD = 4.69$).

Procedures

After electronic informed consent, participants completed questionnaires. All subjects received three parts of questionnaire. The first part asked participants to complete demographic questions and measure of social comparison tendencies. The second part assessed self-efficacy in

diabetes management and participants evaluated their eating plans (self-perception on nutrition regimen). In the third part, participants were randomly assigned to a fragment of the interview with either upward or downward social comparisons targets. Interview model for comparisons targets was adopted from the positive and negative role models developed by Schokker et al. (2010). Upward comparisons target was associated with the positive role model; downward comparisons target was associated with the negative role model.

In the fragment of the interview, upward social comparison target (positive role model) explained how the target overcame the struggle at the initial period of a diabetes diagnosis. The target successfully adjusted the target's life to diabetes by following a healthy eating plan. On the other hand, downward social comparison target (negative role model) stated that the target failed to adjust the target's life to diabetes. The target didn't successfully follow a healthy eating plan and failed to keep healthy behaviors even though the target recognized the importance of the healthy eating plan. After reading the fragment of the interview, participants were asked to rate a potential motivation for following nutrition regimen. Also, all subjects rated their perception of following the nutrition regimen for diabetes compared to the assigned target after exposed to the interview.

Measures

Self-efficacy in diabetes management. The present study used subscales of the Diabetes Empowerment Scale (DES) developed by Anderson, Funnell, Fitzgerald, and Marrero (2000). The DES is a measure of psychological self-efficacy of people with diabetes. The DES consists of 28 items with 3 subscales including (a) managing the psychological aspects of diabetes, (b) assessing dissatisfaction and readiness to change, and (c) setting and achieving diabetes goals (Anderson et al., 2000). The subscales in the current study especially are pertinent to the patients'

self-efficacy in managing their diabetes by assigning and executing goals related directly with diabetes management. For a brief overall assessment of diabetes-related psychological self-efficacy, a short form of the DES consisting of 8 items was suggested by Anderson, Fitzgerald, Gruppen, Funnell, and Oh (2003). The 8 items are carefully selected from the remaining 28 items with “highest item to subscale correlation from each of the original eight domains” (Anderson et al., 2003, p. 1642). Each item response of all three subscales ranges from 1 (*strongly disagree*) to 5 (*strongly agree*) on a 5-point Likert scale. A higher score indicates a higher level of self-efficacy. Examples of items include the following: “In general, I believe that I am able to turn my diabetes goals into a workable plan,” “In general, I believe that I can support myself in dealing with my diabetes.” The internal consistency of the measurement was acceptable with standardized $\alpha = .76$.

Motivation to work on nutrition regimen. After patients read the fragment of the interview, they rated the extent to which the interview motivates patients to work on following nutrition regimen. Items they are asked include “I want to follow my nutrition regimen,” “It is important for me to follow my nutrition regimen,” “Following my nutrition regimen will be very difficult,” and “It is not valuable for me to follow my nutrition regimen.” Patients rated this measurement on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Cronbach's alpha for 4 items was .67.

Manipulation check

Participants were randomly assigned to read a fragment of interview involving either upward social comparison target or downward social comparison target. In the fragment of interview with upward social comparison target, the interview explained the diabetic patient maintained a healthy eating plan well and managed the diabetes self-management in a good way.

On the other hand, the fragment of interview of downward social comparison target described the patient with diabetes failed to keep a healthy eating plan and did poorly on management of diabetes. Each fragment of interviews was adapted from Schokker et al. (2010).

Manipulation check was conducted by asking participants to evaluate the extent to which participants perceived the target as compared to their diabetes management on a 5-point Likert scale (1 = *strongly disagree*; 5 = *strongly agree*) after reading the interview. To be specific, the four items they were asked included “I manage my nutrition regimen better than the person in the interview,” “My nutrition regimen has been carried out better than that of the person in the interview,” “The person on the interview managed nutrition regimen better than I did,” and “My nutrition regimen does not compare to that of the person in the interview.” In final analysis, the last item “My nutrition regimen does not compare to that of the person in the interview” was excluded because the item didn’t specify the direction of social comparisons, which made it hard for participants to evaluate the target appropriately. For conducting more exact manipulation check, three items out of four were included for the final analysis (3 items; $\alpha = .76$). Scores of three items were added toward the measurement of manipulation check.

The independent *t*-test showed that mean ratings in both conditions were significantly different for the upward comparison ($M = 9.25, SD = 2.24, n = 32$) and the downward comparison ($M = 11.85, SD = 2.24, n = 34; t(64) = -4.72, p < .05$) respectively. These results indicated that participants felt inferior to the upward target and superior to the downward target on management of nutrition regimen.

Statistical Analysis

H1 was proposed to examine how the level of motivation will be predicted by a combination of the level of social comparisons and self-efficacy. The present study used two

levels of social comparisons (upward and downward social comparisons), and two levels of self-efficacy (high and low self-efficacy) making four different conditions. To test H1, the one-way analysis of variance (ANOVA) determined whether the means for each group are statistically different from one another. Contrast coding tested the specific ordering of the cell means.

The present study tested H2 to determine if there is a positive association between diabetic patients' self-efficacy on diabetes management and motivation for a nutrition regimen. The current study run the correlations and the independent *t*-test to verify the relationship between patients' perceived self-efficacy level on diabetic management and motivation to follow the nutrition regimen.

Table 1. Demographic information of Participants ($N = 66$)

	Frequency (n)	Percent (%)
Gender		
Male	48	72.7
Female	18	27.3
Ethnicity		
Asian or Pacific Islander	24	36.4
Hispanic	6	9.1
Black or African American	3	4.5
White or Caucasian	30	45.5
Native American or American Indian	2	3
Other	1	1.5
Education		
High school graduate	8	12.1
Completed some college, no degree	18	27.3
Associate degree	7	10.6
Bachelor's degree	31	47
Master's degree	2	3
Diabetes types		
Type 1	40	60.6
Type 2	26	39.4
	Mean	SD
Age	27.85	7.38
Duration of diabetes (year)	5.17	4.69

III. Results

In H1, the present study predicted that the level of motivation should be predicted by a combination of the level of social comparison and self-efficacy. The level of social comparison was evaluated by two directions: upward social comparison, downward social comparison. The level of self-efficacy was measured by two dimensions: high self-efficacy and low self-efficacy. To examine the level of motivation of social comparisons and self-efficacy, four conditions were created including upward social comparison/high self-efficacy, downward social comparison/high self-efficacy, upward social comparison/low self-efficacy, and downward social comparison/low self-efficacy. H1 predicted that the ordering of group means for each different group should follow 1) upward social comparison/high self-efficacy, 2) downward social comparison/high self-efficacy, 3) upward social comparison/low self-efficacy and 4) downward social comparison/low self-efficacy. To examine H1, a contrast analysis was conducted. The test of the contrast indicated that no significant effect existed for the model, $t(62) = 0.81, p > .05$ (see Table 2 for means). The results failed to provide support for H1.

The results indicated that the combination of directions of social comparisons and the levels of social self-efficacy in diabetes management did not significantly differentiate diabetic patients' motivation for nutrition regimen. The results of H1 suggested that diabetes patients were not motivated by either upward or downward social comparisons, no matter how confident they were on diabetes management.

H2 predicted that perceived self-efficacy on diabetes management was expected to be positively associated with motivation on following nutrition regimen. The correlations indicated that perceived self-efficacy on diabetes management and motivation for nutrition regimen were positively correlated, $r = .51, p < .01$. In addition, the independent t -test revealed that diabetes

patients with a high sense of efficacy ($M = 16.34, SD = 2.75, n = 35$) on diabetes management reported significantly higher levels of motivation toward nutrition regimen than low efficacious diabetes patients ($M = 14.09, SD = 2.56, n = 31; t(64) = -3.42, p < .05$). The results suggested that diabetic patients with high perceived self-efficacy were more motivated to follow nutrition regimen than those with low perceived self-efficacy.

Table 2. Descriptive Statistics for means

Source	<i>M</i>	<i>SD</i>	<i>N</i>
Upward SC/Low SE	14.27	2.40	15
Upward SC/High SE	16.47	3.12	17
Downward SC/Low SE	13.94	2.77	16
Downward SC/High SE	16.22	2.44	18
Total	15.29	2.88	66

IV. Discussion

Overview

This study proposed that a combination of social comparisons and perceived self-efficacy should predict diabetes patients' motivation to follow a nutrition regimen. Also, the present study suggested that perceived self-efficacy of diabetes patients should be positively associated with motivation toward nutrition regimen.

To be specific, H1 suggested that means of four conditions should follow the order of 1) upward social comparison with high self-efficacy, 2) downward comparison with high self-efficacy, 3) upward comparison with low self-efficacy, and 4) downward comparison with low self-efficacy. Inconsistent with the first prediction, the results of H1 indicated that four different cells the pair (social comparisons, perceived self-efficacy) created did not necessarily predict diabetes patients' motivation for following nutrition regimen. The results revealed that there was not a significant interaction among four conditions with regards to the level of motivation on nutrition regimen. The study found the means associated with the conditions of high self-efficacy were relatively higher than the means associated with the conditions of low self-efficacy. The study confirmed this by examining the second hypothesis. As predicted, the results supported H2 that diabetic patients' perceived self-efficacy was positively associated with the patients' motivation on nutrition regimen. The results suggested that diabetic patients with high perceived self-efficacy on diabetes management showed more motivation toward following a healthy diet plan than low efficacious patients on diabetes management. High efficacious diabetic patients insisted that they would like to follow the healthy diet plan more willingly compared to low efficacious patients.

Theoretical Implications

Prior research on social comparison theory for diabetes patients did not specify the effects of social comparisons on a particular self-regulation behavior. Previous literature focused mainly on the effects of social comparisons on general healthy behaviors for diabetes patients. The current project examined the specific and targeted self-management behavior, nutrition regimen for diabetic patients. Nutrition is one of the most important factors; diabetic patients can monitor their blood glucose level by establishing an appropriate eating plan. As one of the most prevalent chronic diseases in the U.S. (ADA, 2018; CDC, 2017), diabetes patients are required to follow the strict diet for entire years. The present study considered the importance of nutrition in diabetes patients, and explored how to enhance their motivation toward the healthy diet plan. As one effective way to encourage patients with diabetes working on healthy eating plans, the present study suggested the combination of social comparison and self-efficacy should improve the motivation for diabetic patients to follow the strict diet plans.

The results suggest that social comparisons with others do not necessarily motivate diabetic patients' motivation toward nutrition regimen. Diabetes patients had interests in others with similar health conditions. They compared themselves with peer patients either doing better or poorly on diabetes management. However, diabetic patients' comparisons to others with the same illness did not necessarily enhance the motivation toward the targeted healthy behavior. The levels of social comparisons, in particular, did not necessarily differentiate the level of motivation on nutrition regimen. When it comes to the levels of social comparisons, the study presented two different types: upward and downward social comparisons. To represent upward and downward social comparison, the positive and negative role model were adopted from Schokker et al. (2010). Diabetic patients in the current study did not show differences in the

likelihood of their doing nutrition regimen after the participants encountered the upward and downward comparison target respectively.

Rather, this thesis found out that patients suffering from diabetes were more affected by self-efficacy than social comparisons.. The level of diabetic patients' perceived self-efficacy on the general diabetes management was associated positively with patients' motivation for managing the healthy nutrition plan. The results indicated that diabetic patients who perceived themselves as highly competent for following the general diabetes management had higher motivation toward nutrition regimen than low competent patients in the general diabetes management. The results suggest that social comparison is useful to understand how patients perceive peer patients. The current study, however, revealed that comparison to peer patients either upward or downward is not a key element for diabetic patients to be encouraged to follow nutrition regimen. More importantly, the level of self-efficacy person has is a critical factor to give diabetic patients motivation toward nutrition regimen. The findings in this thesis supported previous literature emphasizing self-efficacy to elicit healthy behaviors or achieve healthy behavior changes with general population (Bandura, 1991; Egbert & Omosun, 2017, Maibach et al., 1991; Strecher et al., 1986). To expand and deepen the understanding of healthy behavior change of the particular population, this thesis brought the context of diabetic patients into focus. With the specific population and targeted healthy behavior, the present study attempted to shed light on diabetic patients' awareness of their nutritional plans, and how the combination of social comparison and self-efficacy worked for diabetic patients' motivation on the targeted self-care behavior, nutrition regimen.

Practical Implications

Given the importance of self-efficacy to perform a healthy eating plan for diabetic patients, increasing self-efficacy for individuals with diabetes could improve their willingness to work on the solid meal plans. Health professionals should focus on improving self-efficacy for each patient with diabetes because each diabetic patient might have a different amount of self-efficacy to conduct a necessary eating plan. For instance, giving a moderate-difficult level of task might be helpful for low efficacious diabetic patients to increase their level of self-efficacy. When it comes to highly efficacious patients, encouraging them to keep working on nutrition regimen from their mastery experience would be effective since previous successful experience can be a great source to increase self-efficacy (Bandura, 1997).

Health campaigns for diabetic patients should focus more on improving self-efficacy accordingly. With using strategies for enhancing self-efficacy, designers and educators in health campaigns should consider what would be the most effective way to deliver contents for both of low and high efficacious diabetic patients. Rather than containing comparisons information, health messages for nutrition education for diabetic patients should be designed to produce or stimulate a certain amount of efficacy for the targeted health behavior.

Limitations

Although there were several strengths of this thesis, there were limitations as well. Sample size of 66 participants was unlikely to be representative of all people with diabetes. Considering that previous literature relevant to social comparisons suggested that a sample size of 100 patients would be an enough number to produce adequate power detect effects of target selection (Arigo et al., 2015), a relatively small size of sample in this thesis might be not sufficient to yield accurate effects of comparison targets on diabetic patients.

Another limitation is that this thesis is for diabetic patients in general, not considering the differences in Type 1 and Type 2. Even though nutrition is extremely important for both types of diabetic patients, specific comparison information that can stimulate diabetic patients' motivation to work on healthy eating plans might be different. The current study would be a more target-specific research if this thesis explores two different types of diabetic patients separately.

Also, though the present study explained patients' self-efficacy on motivation toward nutrition regimen, the findings in this study don't account for such motivation will actually elicit behavior change for diabetic patients. Highly motivated efficacious person have a high chance of working on a healthy behavior (Schokker et al., 2010). However, that connection should be clarified by examining the direct relation between motivation and actual behavior change toward healthy meal plan.

Additional limitation is a relatively low inter-item reliability for the measurement of motivation toward a nutrition regimen. Basic research in social science accepts a reliability of .70 or higher (Nunnally, 1978). The internal consistency of the motivation toward a nutrition regimen in the current study was slightly below .70. The present study used only three items to measure the internal consistency for the motivation. Developing enough questions is recommended to help increase the reliability of the assessment for future study.

The current study adopted the interview fragment from Schokker et al. (2010). The comparison target in each interview generally explained the status of diabetic management. Therefore, information from comparison targets included general elements of management such as how often they work out, how they deal with the illness emotionally, and how they feel about what they eat. With focusing more on nutrition information such as presenting specific foods that affect blood glucose control, participants might feel more motivated toward nutrition regimen.

More importantly, participants were randomly assigned to either upward or downward comparison target to avoid unbalanced groups. However, if participants are allowed to select comparison target according to their preference on either targets, the study also would find out patients' preference toward the direction of comparisons and its relationship on motivation they would get for nutrition regimen.

Future Research

Several factors need to be taken into account for future research. First, research in diabetic patients should directly examine the relationship between the perceived self-efficacy and the healthy eating plan. Because the current study explored diabetic patients' motivation on nutrition regimen only, addressing how the motivation indeed can lead to positive behavioral outcomes might be useful.

Second, another self-care behaviors should be examined through the perspective social comparison and self-efficacy. In the present study, comparison targets and their ways of managing diabetes were not important factors to enhance diabetic patients' motivation for following nutrition regimen. Previous literature, however, confirmed that comparison information may be useful for improving diabetic patients' motivation on self-care (Artigo et al., 2015). Some patients might seek to benefits from comparison information for other self-care behaviors. For instance, diabetes patients may be curious how often other patients work out, how they deal with mental health issues such as depression, anxiety. For other self-care behaviors other than nutrition management, some diabetic patients might find comparison targets useful for handling their self-care behaviors for diabetes.

Third, future study on nutrition for diabetes patients should explore a specific way of improving self-efficacy for low efficacious patients. This thesis found that self-efficacy plays an

important role to enhance motivation on nutrition management for diabetic patients. Expanding the findings of the current study, future research related to nutrition education for diabetes should focus more on low efficacious patients. Low efficacious patients might need a persistent monitoring of nutrition education to increase their level of self-efficacy to develop a healthy eating habit.

Conclusion

This thesis started with a question associated with how to encourage persons with chronic disease such as diabetes to carry daily, necessary but burdensome self-care behaviors more effectively. As an answer to this question, the present study proposed comparisons information from other diabetic patients along with self-efficacy might motivate patients to carry the most important self-care behavior, nutrition regimen. Keeping a healthy diet plan is a key to monitor blood glucose level for diabetes patients. The current study proposed two hypotheses. The findings suggested that comparisons to the target patients either doing well or poorly on nutrition regimen did not necessarily predict diabetic patients' motivation toward nutrition regimen. Rather than social comparisons, perceived self-efficacy of diabetes patients on the diabetes management was predictive of motivation for following the solid meal plan. Future study in the context of diabetes should examine how to improve self-efficacy especially for low efficacious diabetic patients on carrying appropriate diet plans considering the importance of self-efficacy in diabetes care for a long term. Further research also should focus more on how perceived self-efficacy actually elicits positive behavior outcomes for diabetes patients on the specific self-care behaviors such as nutrition, workout, managing mental health issues respectively.

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Appendix

Interview description

Introduction: You will see an interview answered by a patient with diabetes. This is a part of conversation where the patient explained his/her situation especially in managing self-management behaviors. After the reading the prompt message, please complete following questions.

[Positive role model] The positive role model interview read as follows:

. . . my doctor. When I was told I had diabetes, I was very frightened. Controlling my diabetes did not go very well in the initial period, but I'm doing much better nowadays. I have succeeded in adjusting my life to the diabetes. Every day I cycle to my work, and I exercise twice a week, which has a beneficial effect on my blood sugar levels. My diet is also properly adjusted to the diabetes. I eat much healthier and I have lowered my fat consumption. I eat many more vegetables and fruit now. In the beginning I found it difficult to take into account that I had to inject insulin, but now I am used to it. I think I handle my diabetes very well, especially because I know a lot about diabetes and because I engage in healthy behaviors. My blood sugar levels have been quite stable and low for years now, and I still don't suffer from any complications. According to my doctor, I should be able to maintain good health if I keep up the good work.

[Negative role model] The negative role model interview read as follows:

. . . my doctor. When I was told I had diabetes, I was very frightened. Controlling my diabetes did not go very well in the initial period, and it is still not going well. I have not succeeded in adjusting my life to the diabetes. I intended to cycle to my work every day, and I should exercise twice a week, because this would have a beneficial effect on my blood sugar levels. However, I have not put these intentions into practice yet. My diet is also not properly adjusted to the diabetes. I love snack food and I am not so crazy about vegetables and fruit. I still find it difficult to take into account that I need to inject insulin; I can't get used to it. I don't think I handle my diabetes well, because of my insufficient knowledge of diabetes, and because I engage in unhealthy behaviors. My blood sugar levels have been too high for years now, and I am beginning to develop some complications. According to my doctor, there is a very high chance that my health will deteriorate if I do not change my lifestyle.

Measures

Self-efficacy on diabetes management

Please answer the following questions about diabetes attitude.

1. I disagree strongly
2. I disagree
3. I neither agree nor disagree
4. I agree
5. I agree strongly

- (1) In general, I believe that I know what part(s) of taking care of my diabetes that I am dissatisfied with.
- (2) In general, I believe that I am able to turn my diabetes goals into a workable plan.
- (3) In general, I believe that I can try out different ways of overcoming barriers to my diabetes goals.
- (4) In general, I believe that I can find ways to feel better about having diabetes.
- (5) In general, I believe that I know the positive ways I cope with diabetes-related stress.
- (6) In general, I believe that I can ask for support for having and caring for my diabetes when I need it.
- (7) In general, I believe that I know what helps me stay motivated to care for my diabetes.
- (8) In general, I believe that I know enough about myself as a person to make diabetes care choices that are right for me.

Motivation to work on nutrition regimen

Please answer the following questions about motivation to work on nutrition regimen after reading a fragment of an interview.

1. I disagree strongly
2. I disagree
3. I neither agree nor disagree
4. I agree
5. I agree strongly

- (1) I want to follow my nutrition regimen.
- (2) It is important for me to follow my nutrition regimen.
- (3) Following my nutrition regimen will be very difficult.
- (4) It is not valuable for me to follow my nutrition regimen.

Comparisons to the models (manipulation check)

After reading the part of interview, please answer how you perceive the target as compared to your own diabetes management.

1. Strongly disagree
2. Disagree
3. Neither disagree nor agree
4. Agree
5. Strongly agree

- (1) I manage my nutrition regimen better than the person in the interview.
- (2) My nutrition regimen has been carried out better than that of the person in the interview.
- (3) The person on the interview managed nutrition regimen better than I did.

(4) My nutrition regimen does not compare to that of the person in the interview.

Demographics

1. Please specify your year of birth (four digit)
XXXX

2. Please specify your ethnicity.
 - 1) African American
 - 2) Asian / Pacific Islander
 - 3) Hispanic
 - 4) Native American or American Indian
 - 5) White
 - 6) Other

3. What is your gender?
 - 1) Female
 - 2) Male
 - 3) Gender not listed here; please specify “_____”.

4. What is the highest degree or level of school you have completed? If currently enrolled, the highest degree received.
 - 1) No schooling completed
 - 2) Competed for some high school, no diploma
 - 3) High School graduate
 - 4) Completed some college, no degree
 - 5) Associate degree
 - 6) Bachelor’s degree
 - 7) Master’s degree
 - 8) Doctorate degree

5. What is your marital status?
 - 1) Single, never married
 - 2) Married
 - 3) Widowed
 - 4) Divorced
 - 5) Separated

6. Types of diabetes
Please specify your kind of diabetes
 - 1) Type 1
 - 2) Type 2

7. How long you have been diagnosed with diabetes?

Please write down a period time you have been diagnosed with diabetes (for example, 2 year)