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Foot-Care Self-efficacy Beliefs, Physical Self-Concept and actual Foot-Care Behavior in People with Diabetes Mellitus

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Background: The concept of self efficacy and physical self-concept have been shown to be an effective predictor of behavior in many areas of health. This study investigated the relationships between foot-care self-efficacy beliefs, Physical self-concept, self-reported foot-care behavior in people with diabetes.

Methods and Material: This is a cross sectional study in which the 90 diabetic individuals who had been admitted to the diabetic clinic of health centers located in Mashhad- Iran between the years 2015 and 2016 was invited to be entered into the study. The demographic questionnaire and the self-report "Foot Care Confidence Scale" (FCCS) questionnaire and also the self-report Marsh "Physical Self-Description Questionnaire" (PSDQ) were applied to measure data. SPSS 20.0 was used for the analyses.

Results: Ninety patients with a mean age of 51.82 ± 11.3 years were assessed. There is the significant association between foot-care self-efficacy beliefs and higher foot care behavior. ($r = 0.4$, $P < 0.05$). Also, there was a significant association between physical self-concept and foot-care, so that people who had a better physical self-concept had better foot care behavior.

Conclusions: This study has found that foot-care self-efficacy beliefs and physical self-concept improvement could help foot-care behavior improvement among diabetic people.

Keywords: Foot-care, Self-efficacy Beliefs, Physical self-concept, Foot-care Behavior

Introduction

In 2014 the global prevalence of diabetes was estimated to be 9% among adults aged 18 + years.. In 2012, an estimated of 1.5 million deaths were directly caused by diabetes ((Who, 2014). With an impact of over 300 million people worldwide, diabetes has become the fastest developing chronic disease (Matricciani & Jones, 2014). Diabetic Foot Ulcers (DFUs), one of the most common complications of diabetes, have an annual incidence rate of 1% to 4% and a lifetime risk of 15% to 25% (Snyder & Hanft, 2009).

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Approximately 15% of people with diabetes worldwide suffering from diabetic foot ulceration at some stage in their illness. Through mechanisms that are not well understood, damage to the vascular and nervous systems occurs in diabetes, leading to complications (Aidan Searle et al., 2005). Foot ulcers may take weeks or months to be healed, and non-healing ulcers may be followed by infection, gangrene and amputation of the affected limb. Indeed, these ulcers constitute the most common reason for hospitalization of people with diabetes mellitus (Aidan Searle et al., 2005).

Peripheral neuropathy is a major contributing factor in the development of DFUs, along with deformity, callus, trauma, and vascular insufficiency (Boulton, Kirsner & Vileikyte. 2004; Boulton et al., 2005).

Diabetes with severe foot infections (e.g., necrotizing fasciitis, gas gangrene, ascending cellulites, infection with systemic toxicity or

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metabolic instability) has risen significantly during the past decade. DFUs can be painful and limit daily and social activities, leading to reduced quality of life (Snyder & Hanft, 2009). DFUs is very costly so that in a retrospective cohort study was shown that in the first year after DFU diagnosis, patients with ulcers had more emergency room visits, more outpatient visits, and more inpatient days. Furthermore, in the second year, emergency room visits remained unchanged for the DFU group, but outpatient visits and inpatient days were declined (Snyder & Hanft, 2009). The high rate of mortality in patients with DFUs has been well known, but how it could be compared with other serious medical conditions was less well understood (Snyder & Hanft, 2009).

Foot infections are a major cause of hospitalization and subsequent lower extremity amputation among patients with diabetes mellitus who have a history of a preexisting ulceration (Zgonis et al., 2008). Appropriate and timely foot self-care practices may prevent diabetes-related foot complications. However, self-care practices are often neglected, particularly by older adults (Matricciani and Jones, 2014). There is strong historical and anecdotal suggestion that certain foot-care behaviors can prevent diabetes-related foot pathology. However, the evidence suggests that people with diabetes often fail to employ the suggested behavioral strategies suggested in educational interventions. For example, two large population-based studies have found that only 20% of participants with diabetes inspected their feet daily and 23-25% never inspected their feet (Perrin, Swerissen & Payne 2009).

According to the American Association of Diabetes Educators Self-Care Behaviors framework, people with Type 2 Diabetic Mellitus (T2DM) should be skilled in self-care behaviors that improve their quality of life while reducing associated complications of this condition. The skills needed to accomplish this include monitoring of blood glucose levels; monitoring of blood pressure; eliminating smoking; foot self-checks; and routine eye, foot, and dental exams (Bonner, Foster & Spears-Lanoix 2016), Boren et al., 2007).

Diabetes, including diseases that can be affect physical self-description, individual's view of his or her body, state of health, physical appearance, skills, and sexuality. In other words, physical self-description of one's own views includes all the pros and cons person (Mosharraf et al., 2007). Physical self-concept includes all perception within each individual image (appearance, values and beliefs) that impact on individuals' behavior and it indicates when someone uses word “I” (Tanner, 2006). Our review indicates that little research has been conducted on the association between foot-care self-efficacy beliefs, physical self-concept and actual foot-care behavior. The aim of the current study is to explore the relationships between foot-care self efficacy beliefs, physical self-concept and actual foot-care behavior among patients with type 2 diabetes in a whole model. Based on literature review, we hypothesized that self-efficacy beliefs and physical self-concept, would directly affect foot-care behaviors in patients with type 2 diabetes (Figure 1).

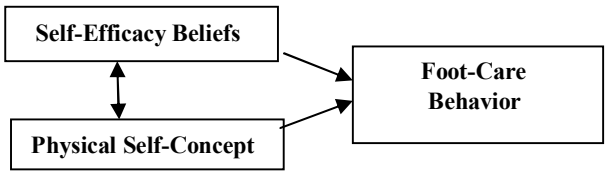

Figure 1. Model of the relationships between foot-care self-efficacy beliefs, physical self-concept and actual foot-care behavior among patients with type 2 diabetes.

Methods and Material

This is a cross sectional study in which 90 diabetic patients who had been admitted in the diabetic clinic of health centers located in Mashhad-Iran from, 2015 to, 2016 were invited to participate in the study.

Key inclusion criteria were as being diagnosed diabetic through standard laboratory test and having health record in the diabetic clinic of health centers. However, the patients who were unsatisfied to enter into the study were excluded from the study. Participants were provided with informed consent form to be signed before being interviewed and were assessed by the principal researcher to determine the following variables as age, gender, duration of diabetes, education level, marital status, FBS level (mg/dl), Hba1c level (mg/dl), and preventative behavior score.

To measure foot-care self-efficacy beliefs, each participant completed the self-report "Foot Care Confidence Scale" (FCCS) questionnaire (Sloan, 2002). The FCCS consists of twelve statements (Figure 2) about the "confidence"

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level which the participants had in undertaking various foot-care activities using a five-point Likert scale response. In response to a statement about undertaking foot-care behavior (e. g. "I can protect my feet"), the participant could respond with the following Likert responses: "strongly not confident", "moderately not confident", "confident", "moderately confident" and "strongly confident" (Perrin, Swerissen & Payne. (2009).

The FCCS has internally consistent (Cronbach's α = 0.90), strong content validity and also one-dimensional construct. (Sloan, 2002). The maximum score is sixty, with higher scores indicating a higher level of self-efficacy beliefs. To measure foot-care behavior, a self-report questionnaire was used that was derived from a tool developed previous research (Perrin, Swerissen & Payne. 2009, Vileikyte et al., 2006). This questionnaire was completed for illiterate people to interview.

Foot care behaviors were evaluated by 17-item questionnaire that it was split into two behavioral subscales: nine items pertaining to preventative behavior and eight items to potentially damaging behavior (Figure 3).

According to the previous research (Perrin, Swerissen & Payne. (2009) .the responses were rated on two different scales: a 6-point scale for "during the past week" questions (twice a day, daily, every other day, twice a week, once a week, or never) and on a four- point scale for "in general" questions (always, most of the time, occasionally, or never).Because of the difference in scaling, items were converted to a scale that ranged from 0 to 1 before summating scores. After re-coding, higher scores (i.e. closer to 1) indicating both more preventative and potentially foot-damaging behaviors (Perrin, Swerissen & Payne, 2009).

To measure physical self-concept, each participant completed the self-report Marsh "Physical Self-Description Questionnaire" (PSDQ) (Marsh, Martin & Jackson 2010). The short form questionnaire of this scale contains 40 questions and each PSDQ item is a simple declarative statement and the individuals respond the items using a 6-point true-false response scale. Each of the 40 items from PSDQ-S instrument is denoted by three codes (below). The first is a two digit number (01-40) indicating the item number on the PSDQ-S instrument. Physical self-concept have 11 components which include: Health (HE): not getting sick often, getting well quickly, Coordination (CO): being good at coordinated movements, smooth physical movements, Activity (AC): being physically active, doing lots of physical activities regularly, Body Fat (BF): not being overweight, not being too fat, Sport (SP): being good at sports, being athletic, having good sports skills, Global Physical (GP): feeling positive about one's physical self, Appearance (AP): being good looking, having a nice face, Strength (ST): being strong, a powerful body, lots of muscles, Flexibility (FL): being able to bend and turn your body easily in different directions, Endurance (EN): being able to run a long way without stopping, not tiring when exercising hard, Global Esteem (ES): overall positive feelings about self (Marsh, Martin & Jackson. (2010). SPSS 20.0 was used for the analyses. To determine the relationship of FCCS scores with both preventative and potentially damaging behavior scores, the pearson product-moment coefficient of correlation was determined in each case. For these correlation analyses, $\alpha < 0.05$ was considered significant.

Results

Characteristics of the participants were reported in Table 1. A high percentage of the participants were female and were diagnosed with type 2 diabetes, and there were a high proportion of the participants who completed secondary school.

Pearson product-moment coefficient of correlation was performed and showed a small positive correlation between physical self-concept scores and preventative behavior scores ($r = 0.36$, $p = 0.05$), So that by increasing physical self-concept, preventative behavior was even higher. Table 2 includes correlations among study variables. There is the significant association between foot-care and self-efficacy beliefs and higher foot care behavior. ($r = 0.4$, $P < 0.05$). Also, there was a significant association between physical self-concept and foot-care, so that people who had a better physical self-concept, foot care behavior was higher and Estimated model of the of the relationships of foot-care self efficacy beliefs, Physical self-concept and actual foot-care behavior among patients with type 2 diabetes (Figure 4).

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Table 1. ***Characteristics of study population.***

Variable		*N = 90 Mean*	*N = 90 Mean*
	Age (years)	51.82	51.82
	FBS (mg/dl)	154.26	154.26
	Duration of diabetes (years)	69.82	69.82
	Hba1c FBS(mg/dl)	7.3	7.3
	FCCS score	30.13	30.13
	Preventative behavior score	43.67	43.67
	Potentially damaging behavior score	25.55	25.55
	Physical self-concept	126	126
Variable		N	N
Female	gender (%)	70	70
Male		20	20
Never married	Marital Status (%)	6	6
Married		82	82
Unlettered	Education (%)	22	22
Completed primary school			
Undertook some secondary school			
Completed secondary school			
Completed undergraduate university degree			

1- I can protect my feet
2- Even without pain/discomfort, I can look at my feet daily to check for cuts, scratches, blisters, redness or dryness
3- After washing my feet, I can dry between my toes
4- I can judge when my toenails need to be trimmed by a podiatrist
5- I can trim my toenails straight across
6- I can figure out when to use a pumice stone to smooth corns and/or calluses on my feet
7- I can test the temperature of the water before putting my feet into it
8- If I was told to do so, I can wear shoes and socks every time I walk (includes walking indoors)
9- When I go shopping for new shoes, I can choose shoes that are good for my feet
10- I can call my doctor about pro my shoes for problems that could harm my feet
11- Before putting them on, I can check the insides of my shoes for problems that could harm my feet
12- If directed to do so, I can routinely apply lotion to my feet

Figure 2 The FCCS statements.

Behavior subscale	Question
Preventative	1- During the past week how often did you examine your feet?
Preventative	2- During the past week how often did you wash your feet?
Preventative	3- During the past week how often did you check the inside of your shoes?
Preventative	4- During the past week how often did you use moisturizing oils or creams for your feet?
Preventative	5- During the past week how often did you change your socks?
Preventative	6- During the past week how often did you test the water temperature with your hand / elbow before taking a bath or a shower?
Potentially damaging	7- During the past week how often did you walk barefoot indoors?
Potentially damaging	8- During the past week how often did you walk barefoot outdoors
Potentially damaging	9- During the past week how often did you wear shoes without the socks?
Potentially damaging	10- In general, how often do you use chemical agents or plasters to remove corns and calluses?
Potentially damaging	11- In general, how often do you yourself treat corns or calluses with a blade?
Preventative	12- In general, how often do you cut your toenails straight across?
Preventative	13- In general, how often do you have your feet measured when buying a new pair of shoes?
Preventative	14- In general, how often do you wear trainers/sneakers or lace-up shoes?
Preventative	15- In general, how often do you rely on feeling the fit of the shoes when buying a new pair?
Potentially damaging	16- In general, how often do you wear sandals or slipons?
Potentially damaging	17- In general, when your feet feel cold at night, how often do you use hot water bottles/heating pads to warm them?

Figure 3. The behavior questions.

Table 2. Correlations among study variables.

Physical self-concept	FCCS score	foot care	Variable
		1	foot care
	1	0.4*	FCCS score
1	0.42*	0.372*	Physical self-concept

*p < 0.05

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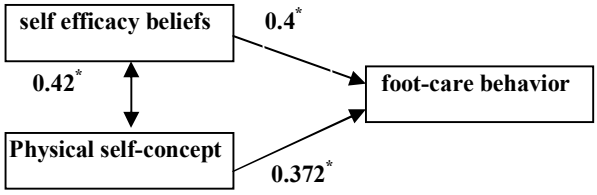

Figure 4. Estimated model of the of the relationships of foot-care self efficacy beliefs, Physical self-concept and actual foot-care behavior among patients with type 2 diabetes. Note: Coefficients are standardized path coefficients. For tests of significance of individual paths, ∇p > 0.05, * p < 0.05.

The result of independent t-test shown between gender and marriage conditions did not significant differences with foot-care. The ANOVA tests show there was no significant correlation between education level and foot-care.

To investigate the relationship between foot care, physical self-concept and demographic variables Pearson and Spearman correlation coefficient was used (Table 3).

Table 3 Correlation matrix of foot care, Physical Self-Concept and demographic variables.

Variable	Foot care		Physical self-concept	
correlation	Person		Person	
	r	P	r	P
Age (years)	0.026	0.8	-0.23	0.03
Hemoglobin (mg/dl)	0.18	0.13	-0.23	0.8
Variable	foot care		Physical self-concept	
correlation	spearman		spearman	
	r	P	r	P
Diabetes duration (years)	0.19	0.07	0.1	0.3
FBS (mg/dl)	0.13	0.19	0.09	0.3

The above table shows a significant negative relationship between age and Physical self-concept ($r = -0.23$, $P < 0.05$). Also, there was not statistically significant between other demographic variables with physical self-concept and foot care.

Discussion

To the authors' knowledge, this is the first study to have directly investigated the relationship between foot-care self-efficacy beliefs and physical self-concept and actual foot-care behavior.

This sample has a preponderance of older females with type 2 diabetes that have low levels of education. These demographics are consistent with other populations of people with diabetes, and who are at high risk of future diabetes-related foot problems. These characteristics may influence the results of this study which was consistent with the results of the study of Byron and et.al (Perrin, Swerissen & Payne 2009). Males generally are less likely to rest or seek medical advice during an illness and engage in fewer health promoting activities. However, gender had no significant impact on the behavior of foot care.

In current study, There was the greater self efficacy predicted more frequent foot-care that it was related with results of previous research (Aljasem et al., 2001) was suggested that a greater self efficacy predicted more frequent blood glucose testing, less frequent skipping of medication and binge eating, and closer adherence to an ideal diet. Also in previous research (Gao et al., 2013) research it shown that were significant positive direct paths from self-efficacy to diabetes self-care that consist our study. These findings were confirmed in both studies (Bohanny et al., 2013; Lee et al., 2015) showed patients who had higher self-efficacy and who were married had better self-care behaviors. Compliance with a chronic disease can affect a person's physical self-concept. The chronic diseases such as diabetes, need to self-care behaviors in life (Safavi, Samadi & Mahmoodi. 2013). In current study, physical self-concept was a strong predictor for foot-care and this relationship confirmed. In addition, results of previous research (Patrizia, Sebastiano & Rosalba. 2013) showed that multidimensional model of physical self-concept is a strong predictor for exercise. In previous research (Martin & Whalen, 2012). This result is produced and reported to positive perceptions of multidimensional physical self-concept (M's ranging from 3.3 to 5.9 of 6). Using multiple regression analyses, were able account for 29 and 47 percent of the variance in global self-concept and physical activity, respectively.

There are several limitations to this study. First, data used in this analysis were collected through a cross-sectional design. The cross-sectional nature of the design ensured that the sample was only investigated at one point in time rather than exploring patterns of change over time, such as the changes in self-efficacy beliefs, actual

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behavior (Portney & Watkins, 2000). Although we took several technical measures to enhance the efficacy of the association analysis, such as interviews.

Finally, it is important to be aware of the issue of sample size and its effect on tests of significance in relation to correlations we determined in our study. As the sample size was relatively large, we have taken a more conservative approach that focused on the correlation coefficient, which was medium. Although the correlation between FCCS scores and physical self-concept scores was just statistically significant ($p = 0.05$) and the correlation was actually middle ($r = 0.3$). A larger sample size would have ensured more statistical power, although the clinical implications of this are unknown.

Conclusion

The results suggested the management of people with diabetes disease problems must take place in a context that includes consideration of psychosocial and behavioral factors in addition to patho physiological factors. However, this study has found that it is unlikely that the evaluation of foot-care self-efficacy beliefs and physical self-concept were particularly useful in assessing the actual foot-care behavior of people with diabetes and loss of protective sensation in their feet. Detailed Semi-experimental research and educational interventions is now required to definitively determine the relationship between self-efficacy beliefs and physical self-concept and the incidence of foot-care behavior of people with diabetes.

Conflict of Interest

There is no conflict of interest for this article.

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Author contribution

F. P; Study implementation, Data collection and analysis, writing the first draft of Paper.

F. P, AAA, MH, D, R, P: Study design and data analysis, editing and confirming the final draft of the paper.

F. P, AAA, MH, D, R, P: Study design, confirming the final draft of the paper.

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