



Diabetes self-care maintenance, comorbid conditions and perceived health

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Introduction

Diabetes mellitus (DM) is a chronic and debilitating condition that affects approximately 53 million Europeans and over 240 million people worldwide.¹ Vigilant self-care maintenance (SCM) is considered an essential component of DM management, as a means of delaying the natural progression of disease and preventing end-organ complications. Perceived health is an important subjective outcome in DM that predicts mortality² and health status³ in persons with DM, independent of other known risk factors. Knowledge of the relationship between SCM and perceived health may provide an insight into underlying mechanisms of DM health outcomes that are amenable to strategic intervention.

Accordingly, the purpose of this study was to describe the relationship between SCM and perceived health in persons with DM, controlling for the influence of socio-demographics and comorbid conditions. We tested the hypothesis

Abstract

Background: The rising global prevalence of diabetes mellitus (DM) has made it increasingly important for healthcare providers to examine how amenable factors beyond optimal medical care might influence health outcomes. DM self-care maintenance (SCM) is an important influential component of overall care, and perceived health is an important subjective health outcome. However, the relationship between DM SCM and perceived health has not been examined extensively.

Aim: To study the relationship between DM SCM and perceived health.

Methods: A secondary analysis was performed using cross-sectional descriptive self-reported data from 1154 adults with DM living in Pennsylvania. Multivariate hierarchical logistic regression modelling was used to determine whether better SCM was significantly associated with better perceived health, controlling for the influence of sociodemographics and comorbid conditions.

Results: Higher levels of engagement in SCM (healthier diet and more exercise) were significantly associated with better perceived health. Three comorbid conditions included in the model were associated with worse perceived health.

Conclusion: Our data suggest that interventions designed to improve outcomes for patients with DM should take into account the relationship between SCM and perceived health. Although further research is needed to replicate our findings in more heterogeneous patient populations, nurses should consider improving SCM as a means of improving health outcomes, such as health status in patients with DM.

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Key words

Diabetes; self-care maintenance; perceived health; comorbid conditions

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that better SCM was significantly associated with better perceived health. Testing this hypothesis may provide insight into aspects of patient health that cannot be measured objectively;⁴ testing may also provide guidance for nurse clinicians and researchers who aim to improve DM SCM behaviours, to help improve health outcomes in this patient population.

Research design and methods

To examine the relationship between SCM and perceived health in persons with DM, we completed a secondary analysis of self-reported data collected from the

Philadelphia Health Management Corporation's Community Health Data Base 2006 Southeastern Pennsylvania Household Health Survey, which took place between June and September 2006.⁵

Parent survey and study

The parent survey was conducted through telephone interviews in English or Spanish using probability sampling of 10 100 households in a five-county area, which included the city of Philadelphia. The sample was stratified by 54 service areas to ensure sufficient representation from all geographical areas and sub-populations. Some



sub-populations (age 60–74 years, age ≥ 75 years and the Latino population) were oversampled to analyse sub-population-specific issues. The survey response rate was approximately 24%, calculated using the American Association for Public Opinion Research method.⁶ Since the interviews were conducted by telephone, written informed consent was not obtained for the parent study. Instead, at the initial stage, the interviewers asked whether the participant agreed to be interviewed; approximately 5% did not agree.

The parent study enrolled 1154 participants who responded 'yes' to the question 'Have you EVER been told by a doctor or other health professional that you (he/she has) have or had diabetes?'. For the proposed study, Institutional Review Board exemption was approved by the University of Pennsylvania. Sociodemographics such as gender, age, and race/ethnicity were collected by self-reporting. Comorbid conditions that elevated the risk of cardiovascular disease for patients with DM,⁷ including high blood pressure (HBP), high blood cholesterol (HBC), and high body mass index (BMI), were also assessed. The parent study did not specifically define HBP and HBC: individuals with HBP were defined as those who answered 'yes' to the question 'Have you EVER been told by a doctor or other health professional that you have high blood pressure or hypertension?'; individuals with HBC were defined as those who answered 'yes' to the question 'Have you EVER been told by a doctor or other health professional that you have high cholesterol?'. Based on self-reported height and weight, BMI was calculated (weight[kg]/height[m²]).

SCM was defined as routine health behaviours that help to maintain physiological stability,⁸ and was divided into general SCM (dentist visit within one year) and DM-specific SCM (diet and exercise). Dentist

Variable	Response	Frequency n (%) or M \pm SD
Age (years)	–	60.97 \pm 14.08
Race/ethnicity	White/Caucasian	633 (54.9)
	Black	383 (33.2)
	Others	121 (10.5)
Education	High school or lower	660 (57.5)
	Some college or graduate	372 (32.3)
	Post-college	116 (10.1)
Employment	Employed	426 (36.9)
	Unemployed/retired	723 (62.6)
Marital status	Married/living with partner	478 (41.4)
	Single/widowed/divorced/ separated	672 (58.2)
	Diet (fruit and vegetables)	
	≤ 3 servings/day	860 (76.5)
	≥ 4 servings/day	257 (22.3)
Exercise	≤ 3 half-hour sessions/week	530 (45.9)
	> 3 half-hour sessions/week	390 (33.8)
Last dentist visit	< 1 year	682 (59.1)
	> 1 year	457 (39.6)
Body mass index	–	31.37 \pm 7.49
High blood pressure	–	779 (67.5)
High blood cholesterol	–	636 (55.1)
M, mean; SD, standard deviation		

Table 1. Baseline self-reported characteristics of 1154 adults interviewed in a survey of self-care maintenance in people with diabetes mellitus

visits within one year were measured through response to the question 'About how long has it been since you last had a visit to a dentist?'. Diet was measured through response to the question 'How many servings of fruit and vegetables do you eat on a typical day? A serving of a fruit or vegetable is equal to a medium apple, half a cup of peas or half a large banana.' Exercise was measured through response to the question 'Thinking about the past month, how many times per week did you participate in any physical activities for exercise that lasted for at least one half hour, such as walking, basketball, dance, rollerblading or gardening?'. Perceived health was measured through response to the question 'Would you say your health, in general, is excellent, good, fair, or poor?'.

Statistical analyses

Multivariate hierarchical logistic regression modelling was used in

the analysis of perceived health as a dichotomous variable (poor/fair versus good/excellent). All analyses were completed using SPSS for Windows version 15.0 (Chicago, IL, USA). Statistical significance was predetermined at $p < 0.05$. With 1154 participants, assuming $p < 0.05$ and maintaining a power of 0.80, we would be able to detect a minimal odds ratio (OR) of 0.845 or 1.180 as being statistically significant. Three model blocks (sociodemographics, comorbid conditions and SCM variables) were taken into account in the analysis of perceived health. The significance of model factors was assessed by calculating OR and 95% confidence intervals.

Results

Table 1 shows the baseline characteristics for the study sample, which was 67.9% female and in middle-to-older adulthood; the majority of



Variable	Odds ratio	95% Confidence intervals	p-value
Sociodemographic factors			
Gender (Female)	0.780	–	ns
Age	1.002	–	ns
Race/Ethnicity			
Black*	0.719	0.534–0.967	0.029
Other*	0.473	0.298–0.751	0.002
Annual income	1.034	–	ns
Comorbid conditions			
Body mass index	0.962	0.944–0.981	<0.001
High blood pressure	0.571	0.425–0.766	<0.001
High blood cholesterol	0.550	0.429–0.720	<0.001
Self-care maintenance			
Diet	1.195	1.014–1.409	0.034
Exercise	1.229	0.416–0.753	0.032
Dentist visit	0.699	0.533–0.916	0.009
*Relative to self-identified Caucasian participants Diet, number of servings of fruit and vegetables on a typical day; Exercise, number of times per week a participant exercised for at least 30 minutes; Dentist visit, within 1 year; ns, not significant			

Table 2. Odds of reporting good or excellent health in the study of participants with diabetes mellitus

participants self-identified as being Caucasian, and most participants had not progressed further than a high school education. The majority of participants were unemployed or retired, and most (50.7%) earned a yearly income of <US\$40 000/€29 795. The majority of subjects ate ≤3 servings of fruit and vegetables per day, and almost half exercised ≤3 times per week. The majority of participants had visited the dentist within the past year. HBP or HBC were common comorbid conditions, and the mean BMI (31.37±7.49) was considered obese.⁹ Around half of the sample (53.1%) reported poor/fair perceived health, and the rest of the sample (46.9%) reported good/excellent perceived health.

Sociodemographic factors were significant in explaining the odds of having better perceived health ($\chi^2=39.74$, $p<0.001$) (Table 2). Comorbid conditions added

significance in explaining the odds of having better perceived health ($\chi^2=114.74$, $p<0.001$). Measures of SCM also were significant in explaining odds of having better perceived health ($\chi^2=134.08$, $p<0.001$). Compared with Caucasian subjects, those participants who self-identified as being black or other non-white race/ethnicity were less likely to report good/excellent perceived health. People with higher BMI, with a history of HBP or HBC were less likely to report good/excellent perceived health. Regarding DM SCM, people who exercised ≥3 times per week and those who ate ≥4 servings of fruit and vegetables per day were more likely to report good/excellent health. In contrast, persons who visited the dentist within the past year were less likely to perceive their health as good/excellent.

Conclusions

There is strong evidence that SCM in patients with DM influences health outcomes such as glycaemic control,^{10,11} quality of life and healthcare cost.^{12–16} To the best of our knowledge, however, this is the first study to examine the relationship between SCM and perceived health in patients with DM. We believe our results can be generalised to European populations: the concept of SCM is a general one and DM management guidelines are very similar in European countries¹⁷ and the USA,¹⁸ particularly for DM-related SCM activities.

We found that DM-specific SCM is an important determinant of perceived health in our sample population. This finding suggests that healthcare providers should emphasise DM-specific self-care activities (namely, actively managing diet and exercising more frequently) to improve subjective outcomes of DM management, including perceived health. Our results provide empirical support for the common and intuitive nursing practice of assessing and fostering optimal self-care behaviours in all patients with DM. In addition, these findings provide evidence that common comorbid conditions (obesity, hypertension, and hypercholesterolaemia) are negatively associated with perceived health, which is consistent with previous findings.^{19,20}

Notwithstanding the important implications of our study results, our research has several limitations. First, we only examined a subset of DM self-care activities, and did not include important activities that were not examined in the parent study (such as foot care and blood glucose self-monitoring). Future research is needed to learn more about how the DM-specific SCM behaviours not included in this study may influence subjective and objective health outcomes.



Secondly, there was a possibility of biased data since the response rate was only 24%; however, this rate was similar to other published studies that use random-digit-dialing survey methodology.²¹ Finally, an analysis based on cross-sectional data only allowed for the evaluation of strong associations; it did not provide insight into causal mechanisms. There is conflicting evidence as to the direction of causality between SCM and perceived health in the general population.^{22–24} Longitudinal studies would augment the results of this study by providing information on causality in the relationship between SCM and perceived health in patients with DM.

Future research is needed to evaluate the inter-relationships among the indices of self-care and comorbid conditions in persons with DM. Particularly, having actual values (eg glycosylated haemoglobin, blood pressure and total cholesterol levels) to represent certain comorbid conditions, may produce more clinically relevant results. In addition, interventions that aim to improve DM self-care practices are needed to determine if such self-care activities help persons with DM achieve glycaemic targets¹⁸ and have better health outcomes.

Conflict of interest statement:

None

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