



Psychosocial factors

Understanding the influence of psychological and socioeconomic factors on diabetes self-care using structured equation modeling



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ABSTRACT

Objective: To develop and test latent variables of the social determinants of health that influence diabetes self-care.

Methods: 615 adults with type 2 diabetes were recruited from two adult primary care clinics in the southeastern United States. Confirmatory factor analyses (CFA) identified the latent factors underlying socioeconomic determinants, psychosocial determinants, and self-care (diet, exercise, foot care, glucose testing, and medication adherence). Structured equation modeling (SEM) investigated the relationship between determinants and self-care.

Results: Latent variables were created for diabetes self-care, psychological distress, self-efficacy, social support and social status. The initial model ($\chi^2(254) = 388.04, p < 0.001, RMSEA = 0.03, CFI = 0.98$) showed that lower psychological distress ($r = -0.13, p = 0.019$), higher social support ($r = 0.15, p = 0.008$), and higher self-efficacy ($r = 0.47, p < 0.001$) were significantly related to diabetes self-care. Social status was not significantly related to self-care ($r = 0.003, p = 0.952$). In the trimmed model ($\chi^2(189) = 211.40, p = 0.126, RMSEA = 0.01, CFI = 0.99$) lower psychological distress ($r = -0.13, p = 0.016$), higher social support ($r = 0.15, p = 0.007$), and higher self-efficacy ($r = 0.47, p < 0.001$) remained significantly related to diabetes self-care.

Conclusion: Based on theoretical relationships, three latent factors that measure social determinants of health (psychological distress, social support and self-efficacy) are strongly associated with diabetes self-care.

Practice implications: This suggests that social determinants should be taken into account when developing patient self-care goals.

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1. Introduction

Diabetes affects 382 million people worldwide, and is associated with long-term complications and decreased quality of life [1]. Self-care behaviors are an integral aspect of comprehensive care for patients with type 2 diabetes, including exercise, diet, blood sugar testing, foot care, and adherence to oral medications [2,3]. As

diabetes self-management education (DSME) is a critical element for improving self-care, clinicians and researchers continue to investigate how to enhance current efforts [2,4,5]. Current standards note that there is no one 'best' approach, and recommend consideration of behavioral and psychosocial strategies and development of personal strategies [4,6,7]. One overarching framework to use in considering how to develop individualized strategies is consideration of how social determinants of health may influence whether patients engage in self-care behaviors. Social determinants of health are the circumstances in which people are born, live, work, and age [8]. This includes socioeconomic circumstances, neighborhood environments, psychosocial factors, and upstream political, economic and sociocultural drivers [9]. Current evidence suggests that

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social determinants of health influence diabetes prevalence and outcomes [10,11]. Consideration of social determinants known to influence DSME may assist in understanding how to personalize DSME efforts and improve self-care.

Structured equation modeling (SEM) is a set of strategies, combining regression, path analysis, and factor analysis, which allows complex modeling of closely related predictors [12]. Through the use of latent variables, or hypothetical constructs that reflect a concept not directly observable, SEM also incorporates measurement error into models [12–14]. As a result of the ability to explicitly take measurement error into account and determine the extent to which a theoretical model is supported by sample data, SEM can advance understanding of complex relationships and model multiple outcomes simultaneously [12,14]. Latent variables are appropriate for investigating the relationship between social determinants of health and diabetes self-care because of the number of underlying and unobserved variables involved [15]. For example, social determinants of health research shows the importance of education, income, and employment, all causal indicators of a larger social status latent variable [16,17]. Similarly, while extensive work has been done on depression, diabetes distress and serious psychological distress [18–20], an underlying construct of emotional distress has been suggested to explain the influence previously measured by individual factors [21].

A conceptual framework developed by the World Health Organization (WHO) for investigation of social determinants of health found that material circumstances, behaviors, and psychosocial factors influence health status and well-being [22]. Since SEM provides a way to determine whether certain factors are more strongly related to overarching constructs, this study was designed to determine which social determinants most strongly influence diabetes self-care. A search of the literature showed that constructs hypothesized to influence diabetes self-care fit into WHO's categories of material circumstances and psychosocial factors. Based on a literature review in 2005, more self-efficacy and less distress may be most important in influencing self-care in diabetes [23]. A systematic review of the barriers to self-management conducted in 2011 found more financial resources, less comorbidities and more social support to be influential [24]. While individual studies have looked at the impact of these factors as observed variables on self-care [25–28], few studies have incorporated latent variables for various socioeconomic and psychosocial factors in order to address measurement error inherent in these concepts.

The aim of this study was to develop and test latent variables using SEM to provide a better understanding of the social determinants of health that influence diabetes self-care. Based on a review of the literature for constructs that are regularly shown to influence self-care, latent variables were hypothesized for social status and the psychological factors of self-efficacy, social support and psychological distress. Structured equation modeling was then used to test the associations between these social determinants of health and a latent variable for diabetes self-care. Our hypothesis was that low social status and psychological distress will be associated with poor self-care, while higher self-efficacy and social support will be associated with good self-care behaviors.

2. Methods

2.1. Sample

615 patients were recruited from two adult primary care clinics in the southeastern United States, after institutional review board approval. Eligibility included ages 18 years or older, diagnosis of

type 2 diabetes in their medical record, and ability to communicate in English. Patients were ineligible if through interaction or chart documentation patients were determined to be cognitively impaired as a result of significant dementia or active psychosis. Patients showing interest after receiving letters of invitation or being approached in the clinic waiting room were provided a detailed explanation of the study and consented. Participants completed validated questionnaires that captured social determinants of health factors along with demographic and self-care information. Validated questionnaires were included based on a modified version of the conceptual framework by Brown et al. relating socioeconomic factors to diabetes processes and outcomes [29].

2.2. Social determinants of health variables

2.2.1. Socioeconomic status

Previously validated items from the 2002 National Health Interview Survey [30] were used to capture household income, years of education and employment status. Household income was categorized into 4 income units: <\$20,000, \$20,000–\$49,999, \$50,000–\$74,999, ≥\$75,000. Years of education were categorized into 4 units: less than high school, high school graduate, college education, and more than college education. Employment was dichotomized as not employed and employed.

2.2.2. Subjective social status

Subjective Social Status (SSS) is a perceived measure of social status where respondents mark on a ladder with 10 rungs where they would place themselves where 10 are people with the most money, education and well respected jobs, and 1 are people with the least money, education and well respected jobs [31]. Responses were categorized based on quartiles into a 4 category categorical variable.

2.2.3. Fatalism

Fatalism is a psychological state characterized by perceptions of despair, hopelessness, and powerlessness [32]. It was assessed with the Diabetes Fatalism Scales (DFS); a 12-item scale where higher scores represent greater diabetes fatalism [32]. The DFS has a Cronbach's alpha of 0.80 [32].

2.2.4. Self-efficacy

Self-efficacy was assessed with the Perceived Diabetes Self-Management Scale (PDSMS); an 8-item measure where higher scores indicate higher self-efficacy [33]. This is a valid and reliable measure of diabetes self efficacy (Cronbach alpha = 0.83) [33].

2.2.5. Depression

Depression was assessed with the Patient Health Questionnaire (PHQ-9); a 9 item scale based on DSM-IV criteria for depression with sensitivity of 88% and a specificity of 88% for major depression [34,35].

2.2.6. Diabetes distress

Distress was assessed with the Diabetes Distress Scale (DDS); a 17-item measure with questions about disease management, support, emotional burden and access to care [36]. The sensitivity and specificity ranged from 0.85 to 0.97 [36].

2.2.7. Serious psychological distress

Serious Psychological Distress (SPD) was assessed with the Kessler-6 (K6); a 6-item scale with higher scores representing higher probability of severe mental illness. The scale has good precision and consistent psychometric properties across major sociodemographic samples [37].

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