ORIGINAL ARTICLE

Quantifying Direct Effects of Social Determinants of Health on Glycemic Control in Adults with Type 2 Diabetes

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Abstract

Background: The aim of this study was to investigate if self-care is the pathway through which social determinants of health impact diabetes outcomes by analyzing the direct and indirect effects of socioeconomic and psychosocial factors on self-care and glycemic control.

Subjects and Methods: Six hundred fifteen adults were recruited from two primary care clinics in the southeastern United States. A series of confirmatory factor analyses identified the latent factors underlying social status, psychosocial determinants (psychological distress, self-efficacy, and social support), and self-care (diet, exercise, foot care, glucose testing, and medication adherence). Structured equation modeling investigated the relationship among social determinants, self-care and glycemic control.

Results: Latent variables were created for diabetes self-care, psychological distress, self-efficacy, social support, and social status. The final model [$\chi^2(275)=450.07$, $P<0.001$, $R^2=99$, root mean square error of approximation=0.03, comparative fit index=0.98] showed lower psychological distress ($r=-0.13$, $P=0.012$), higher social support ($r=0.14$, $P=0.01$), and higher self-efficacy ($r=0.47$, $P<0.001$) were significantly related to diabetes self-care. Lower psychological distress ($r=0.10$, $P=0.03$), lower social support ($r=0.10$, $P=0.02$), and higher self-efficacy ($r=-0.37$, $P<0.001$) were significantly related to lower glycemic control. When social determinants of health variables were included in the model, self-care was no longer significantly associated with glycemic control ($r=0.01$, $P=0.83$).

Conclusions: This study suggests a direct relationship between psychosocial determinants of health and glycemic control. Although associated with self-care, the relationship between social determinants of health and glycemic control is not mediated by self-care. Development of interventions should take psychosocial factors into account as independent influences on diabetes outcomes, rather than as indirect influences via self-care behavior.

Introduction

THE PREVALENCE OF DIABETES has increased markedly over the past two decades, from 5.5% in 1988–1994 to 9.3% in 2005–2010 in the United States.¹ The burden of diabetes worldwide is reflected in increased morbidity and mortality, increased health expenditures, and the growing number of premature deaths due to diabetes.² Improved glycemic control reduces the risk of microvascular complications by 40% for every percentage drop in hemoglobin A1c (HbA1c) and results in a modest reduction in cardiovascular

disease outcomes.^{3,4} Despite improvements in glycemic control at a population level, a large proportion of those in the United States diagnosed with diabetes are not achieving HbA1c targets, which suggests further work is needed.¹

Conventional treatment focuses on pharmacological interventions, medical nutrition therapy, physical activity, and diabetes self-management education and support.³ An additional recommendation to perform a psychological and social assessment of patients is included in the 2014 Standards for Medical Care because of the ability for psychological and social problems to impair self-care.³ Both the Standards of

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Medical Care and a recent consensus report on empowering clinicians in behavioral medicine recommended that patients are screened for factors such as depression and diabetes distress and that the social context is taken into account when planning goals.^{3,5} The basis for these efforts is the possible influence that socioeconomic and psychosocial factors have on self-care, which in turn drives glycemic control. Although there is a good evidence base for the importance of self-care in improving glycemic control,⁶ it is unclear whether this is the pathway through which psychosocial factors influence glycemic control.

Based on recent work on social determinants of health, socioeconomic and psychosocial influences themselves may have an impact on health outcomes.⁷ The psychological and behavioral demands of diabetes may intensify this possible pathway.⁸ A systematic review by Harkness et al.⁹ found that integrated interventions with lifestyle and psychological components were more effective at improving mental health than either lifestyle or psychological interventions alone. In addition, a recent systematic review found that social determinants of health are likely to impact diabetes outcomes through glycemic control.¹⁰ As a result, although evidence exists on the influence of psychosocial and socioeconomic factors on glycemic control,^{11–16} less work has been done to understand the relationship and determine if social determinants of health have a direct and/or indirect influence on diabetes outcomes.

The aim of this study was to investigate if self-care is the pathway through which social determinants of health impact diabetes outcomes by analyzing the direct and indirect effects of socioeconomic and psychosocial factors on self-care and glycemic control. We hypothesized that there would be both direct and indirect effects, with self-care partially mediating the association between social determinants of health and glycemic control.

Subjects and Methods

Sample

We recruited 615 adults diagnosed with type 2 diabetes from two adult primary care clinics in the southeastern United States. The institutional review board approved all procedures prior to enrollment. Eligibility included 18 years of age 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 received letters of invitation or were approached in the clinic waiting room. They were provided a detailed explanation of the study and consented prior to completing 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.¹⁷ The HbA1c level was abstracted from the electronic medical record as an outcome measure.

Social determinants of health variables

Socioeconomic status. Previously validated items from the 2002 National Health Interview Survey¹⁸ were used to capture household income and years of education. Household income was categorized into four income groups: <\$20,000,

\$20,000–\$49,999, \$50,000–\$74,999, and ≥\$75,000. Years of education were categorized into four groups: less than high school, high school graduate, college education, and more than college education.

Subjective social status. Subjective social status (SSS) is a perceived measure of social status. Respondents mark on a ladder with 10 rungs where they would place themselves if 10 is people with the most money, education, and well-respected jobs, and 1 is people with the least money, education, and well-respected jobs.¹⁹ Responses were categorized based on quartiles into four categories.

Self-efficacy. Self-efficacy was assessed with the Perceived Diabetes Self-Management Scale, an eight-item measure where higher scores indicate higher self-efficacy.²⁰ This is a valid and reliable measure of diabetes self-efficacy (Cronbach's $\alpha=0.83$).

Serious psychological distress. Serious psychological distress (SPD) was assessed with the K6, a six-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.²¹

Social support. Social support was assessed with the three-item positive social interaction portion of the Medical Outcomes Study Social Support Survey. The total scale ($\alpha=0.97$) has high internal consistency, good criterion and discriminant validity, and 1-year test–retest reliability (0.72–0.76).²²

Diabetes self-care

Self-reported medication adherence. Medication adherence was assessed with the Morisky Medication Adherence Scale, an eight-item scale with higher values indicating higher adherence.²³

Behavioral skills. Diabetes behavior was assessed with the Summary of Diabetes Self-Care Activities scale, using items measuring frequency of self-care activity in the last 7 days for general diet (follow healthy diet), specific diet (ate fruits/two fat diet), exercise, blood glucose testing, and foot care.²⁴

Diabetes outcomes

Clinical measures. The HA1c level was abstracted from the electronic medical record using values within the previous 6 months.

Overview of structured equation modeling

Structured equation modeling (SEM) combines regression, path analysis, and factor analysis to allow estimation and modeling of closely related predictors.^{25–27} The ability to use multiple independent and multiple dependent variables allows flexibility for simultaneous regression models and provides insight into direct and indirect effects of variables.²⁵ In addition, the inclusion of latent variables, hypothetical constructs that reflect a concept not directly observable, allows incorporating of measurement error into models.^{25–28} Factor analysis defines latent constructs by using variance–covariance characteristics to explore which observed

FIG. 1. Hypothesized model of the relationship between social determinants of health and glycemic control. HbA1c, hemoglobin A1c.

variables explain the pattern of covariation in a set of observed variables.^{27–29} SEM combines a measurement model defined in factor analysis, with a structural model developed through regression and path analysis.^{27,28} Nonexperimental designs can be analyzed using SEM, but they do not provide evidence of causation, and interpretation of results should be realistic and within the confines of the data.²⁶ A model is based on a priori specifications based on hypotheses and analyzed to determine if the model is supported by the data, or if alternative models can exist.²⁶ The two concurrent objectives of an SEM analysis are ensuring a theoretically basis and creating a reasonably parsimonious model supported by the data.²⁶

Statistical analysis

A sample size of 600 adults provides the recommended 20:1 ratio (subjects to variables) necessary to maintain 80% power while estimating parameters and SEs.^{27,30} Given the number of variables and paths, this sample size provides stability of parameter estimates while minimizing the possibility of oversaturating the model.^{27,31}

All analyses were conducted using STATA version 13 software (StataCorp, College Station, TX). Descriptive statistics were performed to describe the data and ensure data were multivariate normal, linearly related, and at least interval scale to meet assumptions.²⁹ Analyses were performed using the maximum likelihood estimation procedure. As confirmatory factor analysis (CFA) is particularly sensitive to missing data,^{29,31} the “mlmv option” in STATA version 13 was used, which retains variables rather than using listwise deletion.

A series of CFA models were estimated to identify the latent factors. Diet, exercise, foot care, glucose testing, and medication adherence were hypothesized to load on a single self-care latent variable. Income, education, and subjective social status were hypothesized to load on a single social status latent variable. Psychosocial factors were hypothesized to load onto three latent variables: psychological distress, self-efficacy, and

social support. The α statistics and factor analysis were used to examine the loading, after which CFA was used to test goodness of fit of hypothesized latent variables and factors. Factors were analyzed using principal component factor analysis.

SEM was used to investigate the relationship among determinants of health, self-care, and glycemic control. Self-care was hypothesized to partially mediate the relationship between socioeconomic and psychosocial determinants of health and glycemic control (Fig. 1). Self-care would be defined as a mediator if it followed the criteria set by Baron and Kenny.³² Direct and indirect mediation effects were assessed, and full mediation was assumed if a previous significant relationship between social determinant of health variables and glycemic control was no longer significant after self-care was added to the model.³² All analyses were completed using standardized estimates, which are interpreted as the change in SD of the outcome due to a 1 SD increase in the predictor and are useful when variable scales are incongruent, as is the case in this study.²⁵ Parameters were evaluated through inspection of direction and magnitude of path coefficients. Because the χ^2 statistic is sensitive to sample size, model fit was primarily evaluated using the root mean square error of approximation (RSMEA) and the comparative fit index (CFI).³³ RSMEA ranges from 0 to infinity, with values lower than 0.05 indicating good fit and 0.08 indicating reasonable fit. CFI ranges from 0 to 1, where 1 indicates perfect data fit, 0.9 indicates adequate fit, and 0.8 indicates marginal fit.³³

Results

Sample demographics

Demographic characteristics for this sample of 615 adults with type 2 diabetes are shown in Table 1. The mean age was 61 years, with the majority being men (61.6%), non-Hispanic black (64.9%), and employed (65.3%). Thirteen percent had less than a high school diploma, and 41.6% earned less than

TABLE 1. SAMPLE DEMOGRAPHIC CHARACTERISTICS
(*N*=615)

Characteristic	Value
Age (years)	61.3 ± 10.9
18–34	1.6
35–44	5.2
45–64	53.6
65 +	39.6
Gender	
Women	38.4
Men	61.6
Race/ethnicity	
Non-Hispanic black	64.9
Non-Hispanic whites	33.0
Hispanic/other	2.1
Marital status	
Married	49.7
Not married	50.3
Educational level	
Less than high school graduate	13.0
High school graduate	28.2
College education	47.1
More than college	11.7
Employment status	
Employed	34.7
Not employed	65.3
Annual income level	
< \$20,000	41.6
\$20,000–\$49,000	38.9
\$50,000–\$74,999	10.1
\$75,000 +	9.4
Subjective Social Status	
1 st quartile	13.85
2 nd quartile	32.50
3 rd quartile	19.89
4 th quartile	33.75

Data are or mean ± SD values or percentages as indicated.

\$20,000 annually. Table 2 shows the means and SDs for self-care, psychosocial factors, and glycemic control. Table 3 shows correlation among the study variables. As noted in Table 3, HbA1c was associated with education, self-efficacy, SPD, social support, medication adherence, general diet, exercise, and blood sugar testing. Income was associated with education, SSS, and all psychosocial variables, but only two behaviors (medication adherence and foot care). Education was associated with SSS, self-efficacy, SPD, and foot care. SSS was associated with psychosocial variables and self-care except blood sugar testing and foot care. Self-efficacy was associated with psychosocial variables and self-care variables except foot care. SPD was associated with social support, medication adherence, general diet, specific diet, and exercise. Social support was associated with psychosocial and self-care variables. Self-care variables (medication adherence, general diet, specific diet, exercise, blood sugar testing, and foot care) were associated with each other.

Latent variable for diabetes self-care

CFA assessed the measurement properties of a latent variable for diabetes self-care using six variables (general

TABLE 2. SELF-CARE, PSYCHOSOCIAL FACTORS,
AND GLYCEMIC CONTROL

Measure	Mean ± SD
Self-care	
General Diet	4.7 ± 2.0
Special Diet	4.0 ± 1.5
Exercise	2.6 ± 2.2
Blood Sugar Testing	4.6 ± 2.5
Foot Care	4.3 ± 2.5
Medication Adherence	5.9 ± 2.0
SPD	
SPD-1	1.2 ± 1.2
SPD-2	0.7 ± 1.2
SPD-3	1.2 ± 1.3
SPD-4	0.7 ± 1.2
SPD-5	1.2 ± 1.3
SPD-6	0.6 ± 1.1
Self-efficacy	
PDSMS-1	3.4 ± 1.1
PDSMS-2	3.2 ± 1.1
PDSMS-3	3.8 ± 0.9
PDSMS-4	3.8 ± 0.9
PDSMS-5	3.7 ± 0.9
PDSMS-6	3.5 ± 1.1
PDSMS-7	3.4 ± 1.1
PDSMS-8	3.8 ± 0.9
Social support	
MOS-16	3.9 ± 1.2
MOS-17	3.9 ± 1.3
MOS-18	3.9 ± 1.3
Glycemic control	7.9 ± 1.8% (63 ± 19.7 mg/dL)

MOS, Medical Outcomes Study; PDSMS, Perceived Diabetes Self-Management Scale; SPD, Serious Psychological Distress.

diet, specific diet, exercise, blood sugar testing, foot care, and medication adherence). The α statistic for the six items was 0.61. The variables loaded onto one factor explaining 35% of the variance, with factor loadings ranging from 0.46 to 0.70. The fit of final model was satisfactory [$\chi^2(8) = 9.94$, $P = 0.26$, RMSEA = 0.02, CFI = 0.99]. The standardized loadings ranged from 0.33 to 0.65, with all significant at the $P < 0.001$ level.

Latent variable for social status

CFA was used to assess the measurement properties of a latent variable for social status based on three variables (income, education, and SSS). The α statistic for the three items was 0.65. The variables loaded on one factor explaining 60% of the variance, with factor loadings ranging from 0.74 to 0.82. Standardized loadings ranged from 0.55 to 0.77.

Latent variables for psychosocial determinants. The CFA model for psychosocial determinants hypothesized three factors: psychological distress, social support, and self-efficacy. SPD was used to represent psychological distress with an α statistic of 0.92. The variables loaded onto one factor explaining 73% of the variance, with factor loadings ranging from 0.79 to 0.89. The fit of the psychological distress model was satisfactory [$\chi^2(6) = 10.61$, $P = 0.101$, RMSEA = 0.035, CFI = 0.99]. The standardized loadings ranged from 0.74 to 0.89. The α statistic for self-efficacy was 0.83. The

TABLE 3. PAIRWISE CORRELATIONS FOR SELF-CARE, PSYCHOSOCIAL FACTORS, AND GLYCEMIC CONTROL

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. HbA1c	—												
2. Income	−0.06	—											
3. Education	−0.08 ^a	0.45 ^c	—										
4. Social subjective status	−0.02	0.21 ^c	0.15 ^b	—									
5. Self-efficacy	−0.34 ^c	0.13 ^b	0.12 ^b	0.18 ^c	—								
6. Serious psychological distress	0.13 ^b	−0.16 ^b	−0.13 ^b	−0.18 ^c	−0.24 ^c	—							
7. Social support	−0.09 ^a	0.18 ^c	−0.02	0.26 ^c	0.38 ^c	−0.36 ^c	—						
8. Medication adherence	−0.20 ^c	0.09 ^a	0.03	0.14 ^b	0.27 ^c	−0.21 ^c	0.20 ^c	—					
9. General diet	−0.12 ^b	0.06	0.04	0.10 ^a	0.37 ^c	−0.16 ^b	0.24 ^c	0.28 ^c	—				
10. Specific diet	−0.07	0.04	0.01	0.14 ^b	0.22 ^c	−0.15 ^b	0.20 ^c	0.26 ^c	0.36 ^c	—			
11. Exercise	−0.10 ^a	−0.01	0.07	0.08 ^a	0.21 ^c	−0.13 ^b	0.11 ^b	0.13 ^b	0.29 ^c	0.15 ^b	—		
12. Blood sugar testing	0.09 ^a	−0.05	−0.05	0.03	0.09 ^a	−0.02	0.11 ^b	0.16 ^c	0.21 ^c	0.19 ^c	0.11 ^b	—	
13. Foot care	0.03	−0.11 ^b	−0.10 ^a	0.001	0.08	−0.003	0.08 ^a	0.23 ^c	0.22 ^c	0.22 ^c	0.12 ^b	0.28 ^b	—

^a $P=0.05$, ^b $P<0.01$, ^c $P<0.001$.

<HbA1c, hemoglobin A1c.

variables loaded onto one factor explaining 47% of the variance, with factor loadings ranging from 0.59 to 0.78. The fit of the self-efficacy model was satisfactory [$\chi^2(13)=18.33$, $P=0.145$, RMSEA=0.26, CFI=0.99]. The standardized loadings ranged from 0.14 to 0.85. The positive social interaction portion of the Medical Outcomes Study was used to represent social support with an α statistic of 0.97. The variables loaded onto one factor explaining 94% of the variance, with factor loadings ranging from 0.96 to 0.97. The standardized loadings ranged from 0.94 to 0.97.

Mediation analysis

Following the recommendations of Baron and Kenny³² for testing mediation, several SEM models were performed to test whether the social determinants of health had a significant effect on glycemic control through the mediating variable of self-care. The first step involved an SEM model of the mediating variable and the social determinant of health variables. The model [$\chi^2(254)=388.04$, $P<0.001$, $R^2=99$, RMSEA=0.03, CFI=0.98] showed that lower psychological distress ($r=-0.13$, $P=0.02$), higher social support ($r=0.14$, $P=0.01$), and higher self-efficacy ($r=0.47$, $P<0.001$) were significantly related to diabetes self-care. Social status ($r=0.004$, $P=0.95$) was not significantly related to diabetes self-care. The second step involved an SEM model of the mediating variable and glycemic control. The model [$\chi^2(279)=491.55$, $P<0.001$, $R^2=99$, RMSEA=0.04, CFI=0.98] showed that higher self-care was significantly related to lower HbA1c ($r=-0.29$, $P<0.001$). The third step involved an SEM model of glycemic control and the social determinant of health variables. The model [$\chi^2(276)=450.11$, $P<0.001$, $R^2=99$, RMSEA=0.03, CFI=0.98] showed that lower psychological distress ($r=0.09$, $P=0.03$), lower social support ($r=0.11$, $P=0.02$), and higher self-efficacy ($r=-0.36$, $P<0.001$) were significantly related to lower HbA1c. Social status ($r=-0.04$, $P=0.41$) was not significantly related to glycemic control.

The final model was an SEM model of social determinant of health variables, diabetes self-care, and glycemic control (Fig. 2). The model [$\chi^2(275)=450.07$, $P<0.001$, $R^2=99$, RMSEA=0.03, CFI=0.98] showed lower psychological distress ($r=-0.13$, $P=0.012$), higher social support ($r=0.14$,

$P=0.01$), and higher self-efficacy ($r=0.47$, $P<0.001$) were significantly related to diabetes self-care. In addition, lower psychological distress ($r=0.10$, $P=0.03$), lower social support ($r=0.10$, $P=0.02$), and higher self-efficacy ($r=-0.37$, $P<0.001$) were significantly related to lower glycemic control. Social status was not significantly related to diabetes self-care ($r=0.004$, $P=0.95$) or glycemic control ($r=-0.04$, $P=0.41$). When social determinants of health variables were included in the model, self-care was no longer significantly associated with glycemic control ($r=0.01$, $P=0.83$).

Discussion

Using mediation analysis and structural relationships, we found that in a sample of adults with type 2 diabetes, psychological distress, social support, and self-efficacy have a direct effect on both self-care and glycemic control. Contrary to our hypothesis, this association was independent of self-care. In the final model, lower psychological distress, lower social support, and higher self-efficacy were significantly related to lower glycemic control, but social status was not associated with either self-care or glycemic control.

This study adds to the literature by providing an understanding of the relationship between social determinants of health and glycemic control while taking into account measurement error. SEM methodology allows investigation of both multiple independent variables and latent constructs to provide a more comprehensive understanding of the relationships between these variables. In addition, these results provide evidence that a direct pathway exists between social determinants of health and glycemic control. One possible explanation for this pathway is the biological impact of stress and the stress-buffering theory.^{34,35} Models of social stress have documented physiological responses such as elevated blood pressure, heart rate, and cortisol secretions in response to social/environmental stress, which over time influence health.³⁴ Evidence also suggests inflammation may link stress to mental and physical health.³⁶ Psychosocial factors that either increase or buffer the stress response may therefore directly influence health outcomes.^{35,36} Longitudinal data that account for change over time will be needed to elucidate this pathway and provide better understanding of

FIG. 2. Structured equation modeling of social determinants of health on diabetes outcomes. Note that coefficients are standardized path coefficients. The fit of the final model was as follows: $\chi^2(275, n = 615) = 450.07, P > 0.000, R^2 = 99$, root mean square error of approximation = 0.03, comparative fit index = 0.98. Statistically significant difference are indicated: * $P < 0.05$, ** $P < 0.001$. All loadings onto latent variables were significant at the $P < 0.001$ level. HbA1c, hemoglobin A1c; MOS, Medical Outcomes Study; PDS, Perceived Diabetes Self-Management; SPD, Serious Psychological Distress.

the biological mechanisms that link social determinants to health outcomes in diabetes.

Although self-care and self-management training have been shown to improve outcomes, the lack of mediation by self-care in this study suggests psychosocial interventions, in addition to self-management training, may be needed to improve diabetes outcomes. The American Diabetes Association recommends psychosocial assessment as part of comprehensive diabetes care, but it is noted that this is important to address barriers to self-care.³ A consensus report on behavioral medicine in the context of empowering clinicians and patients with diabetes similarly recognizes the importance of psychological factors and social support and recommends recognition of broad ecological influences in setting patient goals.⁵ These results suggest the importance of assessing psychosocial influences separate from an assessment of self-care behaviors and including interventions to address these factors directly rather than reliance on self-management training.

These results correspond to literature suggesting a relationship between social determinants of health and diabetes outcomes.^{13–16} Previous work has found that social support and self-efficacy are directly associated with self-care and glycemic control.^{13,14} Similar to our results, self-efficacy was found to be the psychosocial factor with the strongest association to both self-care and glycemic control in a sample of Turkish patients.¹⁶ Additionally, these results agree with previous work using SEM and path analysis to investigate self-care^{37–39}; however, this analysis used latent constructs

for both social determinants of health and self-care in order to investigate the influence on glycemic control. Using a latent construct for psychological distress corresponds to the call of Fisher et al.¹⁵ to use the underlying construct of emotional distress, rather than focusing on diabetes distress or depression when trying to understand the impact on health outcomes. Generally, the literature supports a relationship between social status and diabetes outcomes; however, this study did not find a significant association. Most studies investigate measures of social status separately,¹¹ whereas this study used the measures as a latent variable. Future work should investigate the importance of this distinction and how best to measure social status in order to understand its impact on diabetes outcomes.

Although the sample size and methodology of this analysis strengthen the findings, there are some limitations to the study. The first is the cross-sectional nature of the data, precluding conclusions regarding causality. Similar studies should be conducted using longitudinal data to expand the understanding of the relationship between social determinants of health and diabetes outcomes. Second, the study was conducted in the southeastern United States and may not be representative of other areas. Important behaviors such as diet and physical activity, belief/attitudes toward diabetes, and psychosocial constructs such as trust, spirituality, and social support that may impact the findings of this study may vary across regions (e.g., South vs. Northwest); hence it is important to validate these findings in other populations. Third, there may be additional factors and covariates important in understanding the

relationship, such as duration of diabetes, disease severity, complications, access to care, trust, and spirituality that were not available in our data and may be worthwhile to explore in future studies.

In conclusion, this study suggests a direct relationship between psychosocial social determinants of health and glycemic control. Although these variables are also associated with self-care, the relationship with glycemic control is not mediated by self-care. Therefore, development of interventions should take psychosocial factors into account as independent influences on diabetes outcomes, rather than only influences on self-care behavior. The recommendation by the American Diabetes Association to provide psychosocial assessment as part of comprehensive diabetes care could provide an avenue to take these results into account in clinical care.

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