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# Patient–provider perceptions of diabetes and its impact on self-management: a comparison of African-American and White patients

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### Abstract

**Aims** To compare patient–provider differences in diabetes-related perceptions between African-American and White patients and to examine its association with self-care behaviours.

**Methods** One hundred and thirty patient–provider pairs were recruited from the greater Detroit area. Patients and providers completed a survey assessing perceptions about diabetes-related concepts and demographic background. The Diabetes Semantic Differential Scale was used to measure diabetes-related perceptions. Patients also reported the frequency of performing self-care behaviours, including following a healthy eating plan, engaging in physical activity, blood glucose monitoring, and taking medication and/or insulin.

**Results** There were a greater number of patient–provider differences in diabetes-related perceptions for the African-American patients (nine of 18 concepts) compared with the White patients (four of 18 concepts). Stepwise regression analyses found patients' semantic differential scores to be significantly associated with five self-care behaviours for African-American patients and two self-care behaviours for White patients. Providers' semantic differential scores emerged as predictors of self-care behaviours for African-American patients, but not for White patients.

**Conclusions** Our findings suggest that compared with White patients, African-Americans differ in a greater number of diabetes-related perceptions than their providers. Patients' and providers' perceptions of diabetes care concepts have a significant impact on a greater number of self-care behaviours for African-American patients than White patients.

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**Keywords** diabetes, race, self-care, self-management

**Abbreviation** DSDS, Diabetes Semantic Differential Scales

### Introduction

A growing body of literature has examined patient–provider congruence with regard to diabetes-related attitudes, beliefs and perceptions [1–8]. Qualitative studies, involving subjective analysis of data for exploratory purposes, have reported that patients and providers generally agree on the core components of effective diabetes care, but disagree in their understanding of, or priorities for, self-management [1–4]. Quantitative studies, involving objective analysis of numerical data, have

also documented incongruence between patients' and providers' perspectives with regard to self-management education priorities [9], continuity of care [10], barriers to self-care [11], treatment goals [12], quality of patient–physician communication [13], adherence to self-care regimen [14] and diabetes-related attitudes [15,16].

According to Heisler and colleagues [17], when patients and their providers prioritize the same primary self-care strategy, patients report greater confidence in managing their diabetes. Furthermore, patients rate their self-management efforts more favourably when they share a greater number of treatment goals with their provider. Similarly, Jahng and colleagues [18] have found that stronger agreement between patients and providers with regard to collaborative care is associated with

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increased patient satisfaction and adherence to treatment recommendations.

Recent studies on patient–physician concordance have focused on diabetes-related perceptions. According to Fitzgerald *et al.* [19], diabetes perceptions are the manner in which a person identifies and understands diabetes. Providers' perceptions of diabetes tend to be denotative. That is, providers understand diabetes within a specific context (e.g. the clinical encounter) in which concepts such as 'high blood sugar' have a literal meaning of an elevation in blood glucose. In contrast, patients' perceptions of diabetes are often connotative and formed within multidimensional and ever-changing contexts of family, work, relationships and self-identity. For patients, concepts such as 'high blood sugar' can evoke charged emotions and images such as being a failure or having no willpower and discipline. For example, Johnson and colleagues [1] found that whereas patients and providers both recognize the importance of proper footwear, providers focus on the positive health impact of therapeutic shoes and patients focus on the social stigma associated with specialist footwear.

Few studies have examined the impact of race and/or ethnicity on patient–provider differences in diabetes-related perceptions. Fitzgerald *et al.* [19] found that, of 18 diabetes-related concepts examined, African-American and White patients had perceptions that were significantly different from providers for at least six concepts. Interestingly, there was little overlap in the concepts which differed between patient and provider in the two groups. Specifically, African-American patients held different perceptions from providers for the concepts of having diabetes, blood sugar testing, emotions about diabetes, diabetes complications, taking diabetes pills, help from friends, and paying for diabetes. In contrast, White patients held different perceptions from providers for the concepts of controlling blood sugar, high blood sugar, diabetes diet, exercise and diabetes, taking diabetes pills and paying for diabetes. It should be noted that this study did not compare the perceptions of patients with their own providers, but instead a group of patients with an unrelated group of diabetes-related healthcare providers.

To our knowledge, there have been no studies using patient–provider pairs to examine differences in perceptions of important diabetes care concepts between racial groups and to explore the impact of patient–provider differences on self-care behaviours. This study will address the following questions:

1. Do African-American and White patients have different perceptions toward diabetes-related concepts from their own providers?
2. Are there greater patient–provider differences in diabetes-related perceptions for African-American patients compared with White patients?
3. Do patients' and providers' diabetes-related perceptions have an impact on self-care behaviours for African-American and White patients?

We hypothesized that both African-American and White patients would differ in their diabetes-related perceptions compared with their own providers and that African-American

patients would have a greater number of patient–provider differences than their White counterparts.

## Patients and methods

### Participants and recruitment

The University of Michigan Institutional Review Board approved this study. Recruitment was conducted in two phases, with the first phase recruiting patients and the second phase recruiting patients' self-identified healthcare providers. Patients were recruited from the Human Subjects Core of the UM Older Americans Independence Center, newspaper advertisements, and flyers in the greater Detroit area. To be eligible, participants had to (i) be  $\geq 40$  years of age, (ii) have no cognitive impairment, (iii) be under the care of a healthcare provider and (iv) have a known duration of diabetes mellitus of at least 1 year. There were no exclusion criteria. Individuals interested in participating called a toll-free number to obtain more information. Recruitment continued until the target sample size was attained.

Potential participants were screened by telephone. If eligible, a research assistant scheduled an interview conducted at a location suggested by the participant. Prior to the scheduled interview, a confirmation letter, a consent form and a survey were mailed to the participant. Patients received \$35 (£17) for their participation. Phase 1 of recruitment yielded 273 patients.

In Phase 2, patients were asked to suggest potential providers to participate in the study. Patients were invited to provide the contact information for the primary provider of their diabetes care and permission to contact the provider. Providers were mailed a consent form, survey, a copy of the consent form signed by their patient, and \$15 (£7) for their participation. One hundred and eighty-three unique providers were asked to participate; 71 providers (39%) agreed and returned their provider survey. Seventy of these providers represented 130 African-American and White patients. Thus, Phases 1 and 2 of recruitment yielded 130 patient–provider pairs.

### Measures

Patients and providers completed a survey assessing diabetes-related perceptions and demographic information. Patients also completed a section on diabetes self-care behaviours.

*Diabetes-related perceptions* were assessed using the Diabetes Semantic Differential Scales (DSDS) developed and piloted by Fitzgerald and colleagues [19]. The DSDS employs the 'semantic differential' method to measure patient and provider perceptions of 18 diabetes-related concepts (see Table 2). The 'semantic differential' method, originally developed by Osgood *et al.* [20], measures the connotation of concepts rather than the denotation. The DSDS presents participants with a diabetes-related concept (e.g. blood sugar testing) and then invites participants to rate this concept on a set of seven-point linear scales anchored by contrasting adjective pairs. The nine adjective pairs were adopted by Wikblad *et al.* [21] and are shown in Fig. 1.

For each of the nine adjective pairs, the '1' through '7' points or spaces on the scale were converted to numbers (leftmost space = 1, rightmost space = 7) and treated as dimensional. A

Please rate 'Blood sugar testing'										
Constrained	—	:	—	:	—	:	—	:	—	Free
Weak	—	:	—	:	—	:	—	:	—	Strong
Dominant	—	:	—	:	—	:	—	:	—	Submissive
Worthless	—	:	—	:	—	:	—	:	—	Valuable
Difficult	—	:	—	:	—	:	—	:	—	Easy
Unsafe	—	:	—	:	—	:	—	:	—	Safe
Tense	—	:	—	:	—	:	—	:	—	Relaxed
Routine	—	:	—	:	—	:	—	:	—	Varied
Independent	—	:	—	:	—	:	—	:	—	Dependent

**FIGURE 1** Example of item in the Diabetes Semantic Differential Scales (DSDS) scale.

mean response score (across the nine semantic differential scales for each concept) was calculated for each of the 18 diabetes-related concepts. This scoring method provides summary measures that are labelled DSDS 'mean scores' [22]. Mean scores range from 1 to 7, with low scores reflecting more negative and high scores reflecting more positive perceptions. Two of the scales were reverse scored (the dominant-submissive and the independent-dependent pairs) to make their negative-positive end-points and scoring consistent with the other adjective pairs. Internal reliability for the DSDS has been found to be good with Cronbach's coefficient alphas ranging from 0.70 to 0.80 [19].

*Self-care behaviour* was assessed using the Summary of Diabetes Self-Care Activities Measure-Revised [23,24]. This self-report instrument measures participants' frequency (over the past 7 days) of engaging in diabetes self-care behaviours: following a healthy diet (five items), engaging in physical activity (three items), monitoring blood glucose (two items), using insulin (one item) and taking medication (one item). When necessary, participants' responses were reversed so that higher scores indicate better self-management. Scale scores were calculated using the method described by Toobert *et al.* [25]. Except for insulin and medication taking, scores for the variables in each self-care domain were converted to z-scores and then averaged. Reliability and validity for this instrument have been found to be adequate [24].

*Demographic background* data included age, gender, race and years of education. Patient-specific items included marital status, income, insurance coverage and years since diagnosis. Provider-specific items included years of practice and percentage of time devoted to diabetes.

### Statistical analyses

Descriptive statistics were used to assess the demographic characteristics of patients and providers. Patient self-care behaviours were correlated with their semantic differential means to find significant associations. Paired *t*-tests were performed to examine patient-provider differences for the 18 diabetes-related concepts. The comparison analyses were conducted separately for African-American and White patients.

Finally, stepwise regressions were conducted to identify predictors of self-care behaviours from (i) patient semantic differential mean scores and (ii) provider semantic differential

mean scores. We elected to use patients' and providers' semantic differential scores instead of the patient-provider difference score to include the valence of these perceptions. A difference score describes who perceived a concept more positively, but not whether both perceived it generally negatively, neutrally, or positively.

Patients' semantic differentials that were significantly associated with the self-care behaviour of interest were entered into the model. Entry of the providers' semantic differential was based on patient-provider differences. Providers' semantic differential scores that were significantly different from the patients' scores were entered into the model. Regression analyses were conducted separately for African-American and White patients. For both groups, a series of regression models were tested to predict the frequency of performing five self-care behaviours: following a healthy diet, engaging in physical activity, monitoring blood glucose, using insulin, and taking medication.

## Results

### Characteristics of the participants

Participants' ( $n = 130$ ) ages ranged from 41 to 87 years, with a mean  $\pm$  SD of  $61 \pm 11.9$ ; 64% were women. Thirty-six percent ( $n = 47$ ) self-identified as African-American. Eighty-six percent of the patients had high school graduation equivalency or more. Forty-eight percent were currently married. Thirty-four percent had household incomes under \$15 000 (£7500); 39% from \$15 000 (£7500) to just under \$50 000 (£25 000). Twelve percent had no health insurance. Mean known duration of diabetes was  $10.8 \pm 10.8$  years. Nine percent ( $n = 12$ ) reported using insulin only; 23% ( $n = 30$ ) reported using a combination of insulin and oral medication; 57% ( $n = 73$ ) reported using oral medication only; and 10% ( $n = 13$ ) reported not using insulin or oral medication.

No group differences between the African-American and White patients were found for age, gender, marital status, years since diagnosis, or treatment modality (insulin vs. oral agents, vs. no medication). The two groups differed in their distributions of educational status ( $\chi^2 = 5.64$ , d.f. 1,  $P = 0.018$ ), household income ( $\chi^2 = 22.0$ , d.f. 2,  $P < 0.001$ ) and health insurance coverage ( $\chi^2 = 26.2$ , d.f. 1,  $P < 0.001$ ). Twenty-three percent of African-American patients had not completed high school, their income levels were lower [i.e. 56% had household incomes  $< \$15 000$  (£7500)] and 32% did not have health insurance coverage.

Providers were between the ages of 25 and 77 years with a mean of  $47 \pm 10.3$  years. Fifty-seven percent were men; 89% self-identified as White. Over 95% were physicians with a mean of  $18 \pm 10.7$  years of clinical practice. One-fifth of providers devoted at least 50% of their practice to diabetes care.

### Associations between self-care behaviours and semantic differentials

Table 1 presents correlations found between patients' semantic differentials and self-care behaviours. For African-American

**Table 1** Semantic differentials significantly associated with self-care behaviour

Self-care behaviour	African-American	<i>r</i>	White	<i>r</i>
Healthy diet	Emotions and diabetes	0.370*	Diabetes diet	0.264*
	Controlling blood sugar	0.315*	Exercise and diabetes	0.244*
	Diabetes diet	0.438†		
	Exercise and diabetes	0.315*		
Physical activity	Diabetes	0.352*	Diabetes	0.232*
	Heart disease and diabetes	0.311*	Heart disease and diabetes	0.286*
	Having diabetes	0.414†	Caring for diabetes	0.245*
	Emotions and diabetes	0.336*	Emotions and diabetes	0.250*
	Controlling blood sugar	0.291*	Controlling blood sugar	0.361†
	High blood sugar	0.417†	Exercise and diabetes	0.569†
	Complications of diabetes	0.333*		
	Diabetes diet	0.447†		
	Using insulin	0.364*		
	Lifelong disease	0.356*		
	BG testing	Blood sugar testing	0.311*	
Using insulin	Using insulin	0.556†		
Taking medication	Taking diabetes pills	0.346*		

\**P* < 0.05; †*P* < 0.01.

patients, semantic differentials were significantly associated with all five self-care behaviours. For White patients, semantic differentials were significantly associated with only two self-care behaviours: following a healthy diet and engaging in physical activity.

#### Patient-provider differences: African-American patients

Paired *t*-tests found patient-provider differences on the DSDS for nine of 18 diabetes-related concepts (see Table 2). African-American patients held more positive perceptions than their providers with regard to caring for diabetes, low blood sugar, emotions and diabetes, high blood sugar, diabetes complications, help with diabetes from family, help with diabetes from friends, and paying for diabetes. They held a significantly more negative perception with regard to using insulin.

#### Patient-provider differences: White patients

Paired *t*-tests found patient-provider differences for four of 18 diabetes-related concepts (see Table 2). White patients held significantly more positive perceptions than their providers for emotions and diabetes, help with diabetes from family, and paying for diabetes. Their perception toward exercise and diabetes was significantly more negative than their providers.

#### Predictors of self-care behaviours: African-Americans

Table 3 presents the regression models for predicting self-care behaviours among African-American patients. For each regression model, patients' semantic differential scores significantly associated with the self-care behaviour of interest were entered into the respective self-care model (see Table 1).

Providers' semantic differential scores for the nine diabetes-related concepts in which there were patient-provider differences were entered into each regression model.

The regression model for following a healthy diet was significant ( $F_{2,42} = 7.36$ ,  $P = 0.002$ ). Patients' perception (i.e. DSDS score) of the diabetes diet ( $r = 0.472$ ,  $P = 0.001$ ) and providers' perception of help with diabetes from family were predictors for frequency of following a healthy diet ( $r = -0.323$ ,  $P = 0.032$ ). African-American patients who had a positive perception of the diabetes diet and whose providers had a negative perception of help with diabetes from family reported following a healthy diet more frequently.

The regression model for engaging in physical activity was significant ( $F_{2,29} = 7.47$ ,  $P = 0.002$ ). Patients' perception of heart disease and diabetes ( $r = 0.443$ ,  $P = 0.013$ ) and providers' perception of help with diabetes from friends were predictors for frequency of engaging in physical activity ( $r = 0.432$ ,  $P = 0.015$ ). African-American patients who had a positive perception of heart disease and diabetes and whose providers had a positive perception of help with diabetes from friends reported exercising more frequently.

The regression model for blood glucose monitoring was significant ( $F_{1,44} = 4.73$ ,  $P = 0.035$ ). Patients' perception of blood sugar testing emerged as the only predictor for frequency of monitoring blood glucose ( $r = 0.311$ ,  $P = 0.035$ ). African-American patients who had a positive perception of blood sugar monitoring reported monitoring their blood sugars more frequently.

The regression model for following the recommended insulin regime was significant ( $F_{2,14} = 8.49$ ,  $P = 0.004$ ). Patients' perception of using insulin ( $r = 0.726$ ,  $P = 0.001$ ) and providers' perception of using insulin were predictors for injecting insulin ( $r = -0.588$ ,  $P = 0.016$ ). African-American patients who had a

**Table 2** Mean semantic differential means differences between patients and their providers

Semantic differential	African-Americans					Whites						
	N	Mean difference, Pt-HCP	SD	P two-tailed test	95% CI of the difference		N	Mean difference, Pt-HCP	SD	P two-tailed test	95% CI of the difference	
					Lower	Upper					Lower	Upper
Diabetes	47	-0.21	1.26	NS	-0.58	0.16	76	-0.16	1.17	NS	-0.43	0.11
Heart disease and diabetes	46	-0.14	1.33	NS	-0.53	0.26	77	0.12	1.32	NS	-0.18	0.42
Caring for diabetes	47	0.52	1.08	0.002	0.20	0.83	79	-0.06	1.24	NS	-0.33	0.22
Low blood sugar	44	0.58	1.05	0.001	0.26	0.90	76	0.24	1.30	NS	-0.05	0.54
Having diabetes	47	0.06	1.25	NS	-0.30	0.43	79	0.11	1.21	NS	-0.16	0.38
Blood sugar testing	47	-0.28	1.49	NS	-0.72	0.16	79	0.26	1.28	NS	-0.02	0.55
Your emotions and diabetes	47	0.60	1.34	0.004	0.20	0.99	80	0.62	1.44	> 0.000	0.30	0.94
Controlling your blood sugar	47	-0.09	1.34	NS	-0.49	0.30	79	-0.15	1.10	NS	-0.39	0.10
High blood sugar	46	0.64	1.25	0.001	0.27	1.01	78	0.00	1.16	NS	-0.26	0.26
Diabetes complications	45	0.65	1.29	0.002	0.26	1.03	78	0.29	1.37	NS	-0.02	0.60
Diabetes diet	46	0.12	1.77	NS	-0.41	0.64	80	-0.27	1.24	NS	-0.55	0.00
Exercise and diabetes	45	0.16	1.52	NS	-0.29	0.62	79	-0.48	1.25	0.001	-0.76	-0.20
Using insulin	34	-0.67	1.49	0.013	-1.19	-0.15	66	-0.17	1.28	NS	-0.48	0.15
Taking diabetes pills	44	-0.22	1.43	NS	-0.66	0.21	78	0.14	1.23	NS	-0.14	0.42
Lifelong disease	46	-0.41	1.44	NS	-0.84	0.01	79	0.07	1.22	NS	-0.21	0.34
Help with diabetes from family	46	1.24	1.51	> 0.000	0.79	1.69	79	0.31	1.34	0.040	0.01	0.61
Help with diabetes from friends	43	0.73	1.58	0.004	0.25	1.22	78	0.19	1.35	NS	-0.12	0.49
Paying for diabetes	44	1.04	1.07	> 0.000	0.72	1.37	79	0.51	1.13	>0.000	0.26	0.77

Pt, Patient; HCP, healthcare provider.

**Table 3** Predictors of self-care behaviours: African-Americans

	B	SE of B	P-value of coefficient	Partial correlation	Adjusted R <sup>2</sup>
Healthy diet					0.224
Patient—diabetes diet	0.279	0.080	0.001	0.472	
Provider—help from family	-0.258	0.117	0.032	-0.323	
Physical activity					0.295
Patient—heart disease and diabetes	0.283	0.107	0.013	0.443	
Provider—help from friends	0.404	0.157	0.015	0.432	
Blood glucose monitoring					0.076
Patient—blood sugar testing	0.247	0.114	0.035	0.311	
Taking insulin					0.484
Patient—using insulin	0.816	0.207	0.001	0.726	
Provider—help from family	-0.646	0.237	0.016	-0.588	
Taking medication					0.220
Patient—taking diabetes pills	0.336	0.129	0.015	0.428	
Provider—paying for diabetes	0.616	0.249	0.019	0.412	

**Table 4** Predictors of self-care behaviours: Whites

	B	SE of B	P-value of coefficient	Partial correlation	Adjusted R <sup>2</sup>
Healthy diet					0.073
Patient—diabetes diet	0.198	0.074	0.009	0.292	
Physical activity					0.307
Patient—exercise and diabetes	0.622	0.106	0.000	0.562	

positive perception of using insulin and whose providers had a negative perception of help from family reported following their insulin regimen more frequently.

The regression model for taking medication was significant ( $F_{2,30} = 5.52$ ,  $P = 0.009$ ). Patients' perception of the diabetes pills ( $r = 0.428$ ,  $P = 0.015$ ) and providers' perception of paying for diabetes were predictors for taking medication ( $r = 0.412$ ,  $P = 0.019$ ). African-American patients who had a positive perception of diabetes pills and whose providers had a positive perception of paying for diabetes reported taking their medication more frequently.

#### Predictors of self-care behaviours: White patients

Table 4 presents the regression models for predicting self-care behaviours in White patients. For each regression model, patients' semantic differential scores significantly associated with the self-care behaviour of interest were entered into the respective self-care model (see Table 1). Providers' semantic differential scores for the four diabetes-related concepts in which there were patient-provider differences were entered into each regression model.

The regression model for following a healthy diet was significant ( $F_{1,77} = 7.180$ ,  $P = 0.009$ ). Patients' perception of the diabetes diet was the only predictor for frequency of following a healthy diet ( $r = 0.292$ ,  $P = 0.009$ ). White patients who had

a positive perception of the diabetes diet reported following a healthy diet more frequently.

The regression model for engaging in physical activity was significant ( $F_{1,75} = 34.63$ ,  $P = 0.001$ ). Patients' perception of exercise and diabetes emerged as the only predictor for performing physical activity ( $r = 0.562$ ,  $P < 0.001$ ). White patients who had a positive perception of exercise and diabetes reported exercising more frequently.

No regression models were significant for blood glucose monitoring, following insulin regimen, or taking medication as recommended in the White patients.

#### Discussion

The purpose of this study was to examine patient-provider differences in diabetes-related perceptions for African-American and White patients, to compare the number of patient-provider differences between African-American and White patients, and to investigate the impact of patient and provider diabetes-related perceptions on self-care behaviours.

Findings from this study revealed significant differences in diabetes-related perceptions between patients and providers for both African-American and White patients. African-American patients reported a greater number of patient-provider differences (nine out of 18 concepts) than White patients (four out of 18 concepts). Although these results

support our hypothesis, they are different from the results of the study of Fitzgerald *et al.* [19], who reported similar numbers of patient–provider differences between racial groups. A possible explanation for this discrepancy is that Fitzgerald and associates [19] compared a group of patients with an unrelated group of providers, whereas our study compared patient–provider pairs. A study of patient–provider pairs by Luftey and Ketcham [26] also found a greater patient–provider difference in perceived treatment adherence for African-American patients compared with White patients.

Where we found patient–provider differences in diabetes-related perceptions, patients were generally more positive than their providers, regardless of patient race. Consistent with this finding, previous studies have shown, compared with their providers, patients with diabetes report more favourable assessments of self-care adherence [14], better emotional status [13] and less diabetes-related psychosocial impairment [16]. Perhaps, by living with diabetes on a daily basis, patients gradually learn to adjust their sense of self and worldview to accommodate this lifelong aspect of their lives. In contrast, providers are more likely to experience snapshots of the diabetes experience in which self-management frustrations and psychosocial challenges are raised by patients in isolated clinical encounters. As a result of these differing perspectives, overall, patients may hold more positive perceptions of diabetes than their providers.

This study also explored the impact of patient and provider diabetes-related perceptions on self-care behaviours. Diabetes-related perceptions were significantly associated with a greater number of self-care behaviours for African-American than for White patients. However, the more striking difference between African-American and White patients was the impact of providers' diabetes-related perceptions on self-care behaviours. Specifically, providers' perceptions predicted self-care behaviours for African-American patients, but not for White patients. This finding has important clinical implications. Given that providers can influence self-care behaviours of certain high-risk groups, it is worthwhile to explore and understand the diabetes-related perceptions of these patients. In fact, Greene *et al.* [27] have found that in a medically under-served community, patients who rated their providers higher on support behaviour performed self-care practices more frequently. Furthermore, according to Golin and colleagues [28], patients who have providers that encourage collaborative decision-making report greater satisfaction with care.

Interestingly, African-American patients whose providers have a more negative perception of 'help with diabetes from family' were more likely to follow a healthy diet and take insulin as recommended. It is possible that providers perceive that African-American patients receive less social support from family. Consequently, providers may employ compensatory support strategies such as providing greater encouragement or suggesting diabetes support groups. These alternative sources could contribute to improved self-management practices.

Generally, positive perceptions towards specific diabetes-related concepts (e.g. diabetes diet) were correlated with greater frequency of performing the corresponding diabetes self-care behaviour (e.g. frequency of following healthy diet). This finding provides evidence that the connotation (DSDS score) of diabetes-related concepts is consistently related to reported self-care behaviour related to that concept.

Two limitations to this study need to be acknowledged. Most of our patients and providers were recruited within a healthcare system. Therefore, results from this sample cannot be generalized to all patients and physicians, particularly patients who do not have healthcare coverage or a consistent healthcare provider. To target the most high-risk patients, future investigations might recruit from more diverse healthcare settings, including community-based clinics and free clinics. In addition to this limitation, it could be argued that we should have used the patient–provider difference score to predict self-care behaviour. However, using patients' and providers' semantic differential scores allowed the model to predict behaviour by valence as well as by patient–provider differences. For example, among African-Americans, frequency of following recommended insulin regime was associated with positive patient perceptions of 'using insulin', but negative provider perceptions of 'help with diabetes from family'.

Although patients and providers may share the same clinical meaning of diabetes-related concepts, the way in which they understand and experience (i.e. perceptions) these concepts can be different in important ways. Research, to date, has demonstrated that greater agreement between patients and providers is linked to improved patient outcomes including self-care adherence and patient satisfaction. For patient groups in which patient–provider discordance is more prominent, it is particularly important for providers to communicate with patients about diabetes-related attitudes, beliefs and perceptions. As patient care is a continual and dynamic relationship, both patients and providers can have an impact on self-care practices and health outcomes.

## Competing interests

None to declare.

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