



Testing proximal, intermediate, and health outcomes of patient centered communication among non-pregnant women of childbearing age with diabetes mellitus: Findings from the Medical Expenditure Panel Survey 2012-2018

Tiffany B. Kindratt ^{a,*}, Godfred O. Boateng ^{a,c}, Grace Ellen Brannon ^b,
Bala Yadu Vamsi Sankuratri ^a, Kyrah K. Brown ^a

^a Department of Kinesiology, University of Texas at Arlington, Arlington, TX, USA

^b Department of Communication, University of Texas at Arlington, Arlington, TX, USA

^c School of Global Health, York University, Toronto, ON, Canada

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ABSTRACT

Objective: To determine associations between patient-centered communication (PCC) and overall healthcare ratings, self-efficacy, and management adherence among reproductive-age women with diabetes within the framework of Epstein and Street's conceptual model.

Methods: We analyzed longitudinal data from the 2012–2018 Medical Expenditure Panel Survey. The sample included 493 non-pregnant women of childbearing age (18–45 years) with diabetes. Independent variables were domains of PCC (listening, explaining, respecting, spending time, giving instructions, among others). Dependent variables were overall healthcare ratings, self-efficacy, and management adherence. Crude and adjusted associations were evaluated.

Results: Non-pregnant women of childbearing age who reported that their provider always listened to them, explained things, showed respect, and spent enough time with them had greater odds of reporting high overall healthcare ratings. Those who reported their provider always listened to them and spent enough time with them had greater odds of reporting better diabetes care adherence than those whose health care providers did not.

Conclusion: Findings demonstrate that non-pregnant women of childbearing age who report having optimal PCC are more likely to adhere to their diabetes care regimen.

Innovation: This is the first known study using a nationally representative sample of non-pregnant women of childbearing age to examine multiple layers of PCC.

1. Introduction

The prevalence of diabetes is increasing among young adults in the United States (US) [1]. This trend is particularly concerning for women of childbearing age (18–49 years). Recent research found that almost 5% of non-pregnant women of childbearing age have been diagnosed with diabetes and 30% remain undiagnosed [2]. Severe morbidity and mortality are more likely to occur in pregnant women of childbearing age who have diabetes, as well as in their newborns [3]. This population faces significant challenges in adhering to the complex guidelines for monitoring and controlling the disease. According to the American Diabetes Association (ADA), comprehensive diabetes care includes having HbA1c checked at least two times per year, and an annual dilated eye exam, blood cholesterol

test, foot exam, and influenza vaccination [4]. Adherence to these recommended monitoring guidelines decreases the risk of uncontrolled diabetes. However, among non-pregnant women of childbearing age with diabetes in the US, over half (51.5%) have diabetes that is uncontrolled [2]. Uncontrolled diabetes can have significant negative impacts on the quality of life of the non-pregnant women with the disease and their families [5]. Biologically, it could lead to life-threatening complications including diabetic ketoacidosis [6,7], heart attack [8,9], stroke [10] or periodontitis [11]. Emotionally, it is associated with fear of long-term complications such as necrobiosis, amputation, death, or hypoglycemic episodes [12–15]. Socially, uncontrolled diabetes has shown to have an impact on patients' daily interactions and social experiences [5], with the potential to feel alienated from caregivers, family, and friends [12,16,17]. Moreover,

* Corresponding author at: Department of Kinesiology, University of Texas at Arlington, 500 W. Nedderman Drive, Arlington, TX 76019, USA.
E-mail address: tiffany.kindratt@uta.edu (T.B. Kindratt).

it is well-documented that healthcare providers continue to have knowledge gaps in their provision of care to women of childbearing age with diabetes which has a substantial impact on patient-provider communication [18]. Overall, this makes the need for treatment, management, and care of patients suffering from diabetes critical in averting these adverse effects.

The American Diabetes Association recommends that treatment decisions are made “collaboratively with patients based on individual preferences, prognoses, and comorbidities” (recommendation 1.1) and approaches to diabetes management should emphasize “person-centered team care, integrated long-term treatment approaches to diabetes and comorbidities, and ongoing collaborative communication and goal setting between all team members (recommendation 1.2)”. Quality communicative interactions between patients and their health care providers are essential for women of childbearing age with diabetes to understand treatment expectations and be adherent to recommended monitoring guidelines. Previous studies demonstrate that specific qualities of patient-provider communication (PPC) are associated with reduced risk of diabetes complications and hospitalization from complications [19]. For example, Hong and colleagues evaluated national data from the 2011–2016 longitudinal Medical Expenditure Panel Survey (MEPS) and found that adults (18 years and older) with diabetes who reported their health care providers always gave them instructions that were easy to understand and asked them to describe how they will follow instructions had lower odds of diabetes complications and hospitalization due to complications than adults who reported their providers did not demonstrate these qualities [19]. However, when PPC is poorly managed, it could lead to diabetes distress [20] or non-adherence to medication [21,22]. Very little is known about the role of PPC, or in other terms, patient-centered care, in the context of diabetes care [23,24].

Patient-centered care is defined as the specific and varied “communicative behaviors that can enhance the quality of the relationship between the health care provider and patient, or the patient’s family” [25]. One of the most central components of patient-centered care is that of communication. Patient-centered communication (PCC) encompasses four processes and outcomes related to the patient-clinician interaction, specifically by focusing on the patient’s perspective (including concerns, feelings, and expectations), understanding the patient within their psychological and social contexts, “reaching a shared understanding of the patient’s problem and related treatments”, and encouraging the patient’s involvement in shared decision making by offering the patient meaningful involvement in choices relating to one’s health [26]. When a health care provider engages in higher quality PCC like spending time with their patients, showing respect, and listening to the patient concerns, treatment avoidance is decreased [27].

Epstein and Street’s [26] ecological model provides an established framework to examine different layers of PCC outcomes. In this model, outcomes of PCC can include proximal communication outcomes, intermediate outcomes, and health outcomes. Proximal communication outcomes (e.g., understanding or satisfaction) focus on immediate outcomes stemming from encounters, like increased or self-efficacy [28]. Intermediate outcomes include the patient’s health behaviors evaluation of healthcare quality [28]. Health outcomes include improved survival (or behaviors contributing to improved survival) and quality of life [26]. When a person with diabetes engages in diabetes self-management behaviors, their quality of life should increase as well. While this model was originally proposed and tested within the cancer context, the researchers claim that it is applicable in non-cancer contexts as well [29]. Importantly, there is still a knowledge gap about how PCC affects non-pregnant women of childbearing age with diabetes’ ratings of their overall healthcare experiences and the outcomes of their diabetes management. To address this gap, our objective is to use nationally representative data to determine associations between PCC and overall healthcare ratings (proximal communication outcome), diabetes care self-efficacy (intermediate outcome), and monitoring adherence (intermediate outcome among non-pregnant women of childbearing with diabetes (inclusive of both Type 1 and Type 2 diabetes).

2. Methods

2.1. Study design and data

Secondary, longitudinal data from panels 16–22 of the public-use 2012–2018 Medical Expenditure Panel Survey (MEPS) files were combined and analyzed. The MEPS collects data using a multi-stage five-panel design that spans two years consisting of in-person interviews and self-administered questionnaires. The panel design allows for longitudinal analysis of predictor and outcome variables. In this study, predictor variables were measured during panel 2 during year 1 and outcome variables were measured during panels 3 and 5 during year 2. More information about the sampling and data collection has been reported previously [30]. The sample included non-pregnant women of childbearing age (18–45 years) who reported that their health care provider ever told them that they had diabetes (either Type 1 or Type 2). Variables used for inclusion criteria were collected during panel 2 during the first year of data collection. The final size included 493 women representing 1,129,605 women when weighted.

2.2. Variables

2.2.1. Predictor variables

The predictor variables in this study were patients’ perceptions of PCC as part of their experience (Epstein and Street’s ‘communication between clinicians and patients’), which were measured using data from panel 2 during the first year of data collection. Major dimensions of PCC include empathy and response to patients’ emotion, information exchange, and shared decision-making. In this study, PCC was measured by combining seven questions assessing PPC domains as a composite measure and evaluated as seven separate questions assessing specific PCC domains. Questions were validated as part of the Consumer Assessment of Healthcare Providers and Systems (CAHPS®) questionnaires [31]. During panel 2, women were asked to report how often in the last 12 months doctors or other health professionals “listen carefully to you,” “explain things in a way that was easy to understand,” “show respect for what you had to say,” and “spend enough time with you” on a Likert scale from 1 to 4 (1 = never, 2 = sometimes, 3 = usually, 4 = always). Women were also asked whether a doctor or other health professional would “give instructions about what to do about a specific illness or health condition.” Women who reported “yes,” that their health care provider gave them instructions, were also asked how often the health care provider asked them “how often were these instructions easy to understand” and “to describe how you were going to follow these instructions.” Like previous research, these questions reflect major dimensions of PCC: meeting informational needs (explaining, giving specific instructions, instructions easy to understand, confirming understanding), meeting emotional needs (showing respect), and involving enough two-way interaction and shared decision-making (listening and spending enough time) [28].

Dichotomous variables were created to compare health care providers who “always/yes” or “not always/no” demonstrated each specific domain of PCC based on previous studies using MEPS data. We combined all seven specific domains to create a dichotomous variable which compared providers who “always/yes” versus “not always/no” (usually, sometimes or other) demonstrated all domains of PCC, or “optimal PCC” based on previous studies [32–34]. The internal consistency of this scale was high ($\alpha = 0.87$).

2.2.2. Outcome variables

The outcomes variables of interest in this study included: 1) overall healthcare rating (proximal communication outcomes); 2) diabetes self-efficacy (intermediate outcomes); and 3) diabetes care management (intermediate outcomes). *First*, women reported their overall health rating on the care they received from all health care providers in the last 12 months on a scale from 0 (worst) to 10 (best). Based on the skewness of the data and previous studies [30], ratings were dichotomized (0–7 and 8–10). *Second*,

women reported their diabetes self-efficacy by answering the question, “how confident are you in taking care of your diabetes?” Women were reported their self-efficacy on a scale from 1 to 4 (1 = not confident at all, 2 = somewhat confident; 3 = confident, 4 = very confident) [30]. A dichotomous variable was created to compare women who were “somewhat” or “not confident” to women who were “confident” or “very confident.” Third, women answered five questions on diabetes care adherence in the past 12 months. Women reported whether they had an eye exam in which pupils were dilated (yes or no), received a flu vaccine (yes or no), had their feet checked (yes or no), had their blood cholesterol checked (yes or no), and the number of times (0,>1) testing for HbA1c in the past year. To compare diabetes care adherence, an ordinal variable was created to describe adherence to 0, -2, 3, 4, or 5 monitoring recommendations based on the distribution of responses based on the American Diabetes Association's recommendations for a comprehensive medical evaluation at follow-up visits [35].

2.2.3. Covariates

Covariates that we evaluated included age, race/ethnicity, marital status (never married, married, or divorced/widowed/separated), education level (no degree/less than high school (HS), HS graduate or GED, bachelor's degree or higher), poverty (income <200% federal level, income >200% federal level), health insurance (any private, public only, none), and perceived health status (poor/fair, good/very good/excellent).

2.3. Statistical analysis

Descriptive statistics were used to present selected characteristics of the sample. Crude and adjusted logistic regression models were used to determine associations between PCC and 1) ratings of health care and 2) diabetes care self-efficacy, before and after adjusting for covariates. Ordinal multinomial regression analyses were used for diabetes care management adherence before and after adjusting for covariates. We analyzed PCC as a composite measure (always vs. not always on all domains) as well as by separate domains of PCC. Data analysis was conducted using STATA 17.0. The longitudinal weight was divided by seven to reflect the total number of panels in the analysis based on MEPS analytic recommendations.

Our institutional review board deemed this study as not human subjects' research based on federal regulation 45 CFR 46 because it involves publicly de-identified available data.

3. Results

3.1. Descriptive results

Bivariate results are presented in Table 1. The mean age of women in the sample was 36.4 years. Almost half (49.1%) of women were non-Hispanic White, while 18.3% were Hispanic and 20.6% were non-Hispanic Black women. Almost half of the women in the sample were married (48.9%) and had an income >200% of the federal poverty level (49.6%). Only 25.7% of women had a bachelor's degree or higher level of education. Most women had either any private (55.7%) or public (35.2%) health insurance coverage. Most women self-perceived their health as good, very good, or excellent (73.6%) and reported high (8–10 on scale 1–10) ratings of health care (88.6%). While 88.6% of women were confident or very confident in their ability to care for their diabetes, only 43.8% were adherent to all five diabetes care management recommendations.

3.2. Regression results

Results from logistic and ordinal regression for the PCC composite measure are shown in Table 2 and outlined separately by PCC domains in Table 3. Of note, only 19.47% of non-pregnant women of childbearing age reported their health care provider exhibited all qualities of PCC during the past 12 months.

Table 1

Selected characteristics of the sample, 2011–2018 MEPS (Panels 16–22), N = 493.

	N (%) [*]
Age Mean (SE)	36.4 (0.42)
Race/Ethnicity	
Hispanic	158 (18.3)
Non-Hispanic White	145 (49.1)
Non-Hispanic Black	144 (20.6)
Non-Hispanic Other/Multiple Race	46 (12.0)
Marital Status	
Never married	188 (32.4)
Married	202 (48.9)
Divorced/Widowed/Separated	103 (18.8)
Education	
No degree/Less than HS	129 (16.7)
HS graduate/GED	282 (57.9)
Bachelor's degree or higher	81 (25.4)
Federal Poverty Level (FPL)	
<200% FPL	318 (50.4)
≥200% FPL	175 (49.6)
Health Insurance	
Any Private	211 (55.7)
Public Only	217 (35.2)
Uninsured	65 (9.1)
Perceived Health Status	
Poor/Fair	90 (24.4)
Good/Very Good/Excellent	403 (75.6)
Diabetes care self-efficacy	
Somewhat confident/not confident at all	58 (11.4)
Confident/very confident	374 (88.6)
Rating of health care (0–10)	
0–7	98 (26.4)
8–10	239 (73.6)
Diabetes care adherence**	
0–2	49 (11.0)
3	66 (17.8)
4	128 (27.4)
5	166 (43.8)

Abbreviations: FPL = Federal poverty level; GED = general education development; HS = high school; MEPS = Medical Expenditure Panel Survey; NH = non-Hispanic.

^{*} Unweighted frequencies, weighted percentages reported.

^{**} Diabetes care adherence composite variable includes the total number of recommended care recommendations.

3.2.1. Diabetes care self-efficacy

Using the composite measure of PCC, there were no statistically significant differences in diabetes care self-efficacy by PCC among non-pregnant women of childbearing age with diabetes. Despite not reaching significance, the point estimates suggest women who report optimal PCC may have lower odds (OR = 0.63; 95% CI = 0.30–1.43) of confident/very confident in care for their diabetes than women who reported optimal PCC quality.

When evaluated as separate domains of PCC, non-pregnant women of childbearing age who reported that their health care provider always explained things so they understood had 2.52 times greater odds (95% CI = 1.14–5.59) of reporting that they were confident of very confident in caring for their diabetes compared to women whose health care provider did not always demonstrate this domain of PCC. However, results were attenuated and no longer significant after adjusting for age, race/ethnicity, marital status, education, poverty level, health insurance, and perceived health status.

3.2.2. Overall healthcare ratings

Using the composite measure of PCC, there were no statistically significant differences in overall healthcare ratings by PCC among non-pregnant women of childbearing age with diabetes before or after adjusting for covariates. The point estimates represent non-significant tendencies that women who report optimal PCC may have slightly lower odds (OR = 0.96; 95% CI = 0.39–2.02) of reporting high overall healthcare ratings

Table 2

Regression results for overall healthcare rating, diabetes self-care efficacy, diabetes care adherence for PPC quality composite, 2012–2018 MEPS.

	Overall healthcare rating		Diabetes care self-efficacy		Diabetes care adherence	
	Crude	Adjusted***	Crude	Adjusted*	Crude	Adjusted*
Patient-Centered Communication (PCC) Quality Composite						
Not Always (ref)	1.00	1.00	1.00	1.00	1.00	1.00
Always	0.88 (0.39, 2.02)	0.96 (0.40, 2.33)	0.76 (0.35, 1.65)	0.65 (0.30, 1.43)	1.80 (1.03, 3.20)	2.02 (1.09, 3.76)

* Adjusted for age, race/ethnicity, marital status, education, poverty level, health insurance, perceived health status.

** Odds ratios and 95% CI represent "always" compared to "not always" for a composite measure including all domains of patient-centered communication (PCC) quality.

Table 3

Regression results for diabetes care self-efficacy, overall healthcare rating, and diabetes care adherence separated by PCC domains, 2012–2018 MEPS.

	Overall healthcare rating		Diabetes care self-efficacy		Diabetes care adherence	
	Crude	Adjusted*	Crude	Adjusted*	Crude	Adjusted*
Not Always/No (ref)	1.00	1.00	1.00	1.00	1.00	1.00
In past 12 months, health care provider always:**						
Listened to you	4.09 (2.03, 8.25)	4.07 (1.83, 9.03)	0.72 (0.30, 1.71)	0.88 (0.34, 2.32)	2.11 (1.19, 3.72)	2.38 (1.23, 4.59)
Explained so understand	3.61 (1.37, 9.56)	3.32 (1.23, 9.02)	2.52 (1.14, 5.59)	2.53 (0.92, 6.90)	1.50 (0.54, 4.18)	1.44 (0.46, 4.46)
Showed respect	5.59 (2.16, 14.50)	5.06 (1.68, 15.31)	1.29 (0.48, 3.47)	1.27 (0.37, 4.28)	2.55 (1.05, 6.19)	2.82 (1.05, 7.56)
Spent enough time with you	2.43 (1.21, 4.90)	2.18 (1.05, 4.55)	1.58 (0.57, 4.41)	1.63 (0.60, 4.40)	1.81 (1.05, 3.13)	1.96 (1.05, 3.65)
Gave specific instructions	1.52 (0.62, 3.71)	1.20 (0.55, 2.62)	0.46 (0.19, 1.09)	0.29 (0.11, 0.76)	1.22 (0.58, 2.58)	1.37 (0.55, 3.40)
Instructions easy to understand	1.55 (0.70, 3.41)	1.30 (0.62, 2.74)	0.67 (0.27, 1.66)	0.46 (0.17, 1.25)	1.27 (0.69, 2.34)	1.31 (0.65, 2.64)
Asked to describe instructions	1.29 (0.69, 2.42)	1.37 (0.71, 2.63)	1.01 (0.46, 2.18)	0.96 (0.44, 2.09)	1.01 (0.46, 2.18)	0.96 (0.44, 2.09)

* Adjusted for age, race/ethnicity, marital status, education, poverty level, health insurance, perceived health status.

** Odds ratios and 95% CI represent "always" compared to "not always" for all domains of patient-centered communication (PCC) quality.

(8–10 on scale of 1–10) than women who reported suboptimal PCC after adjusting for socio-demographic factors.

When evaluated as separate domains of PCC, non-pregnant women of childbearing age who reported that their health care provider always listened to them, explained so they understood, showed respect, and spent enough time with them had greater odds of reporting high overall healthcare ratings before and after adjusting for covariates.

3.2.3. Diabetes care adherence

Using the composite measure of PCC, diabetes care adherence was significantly greater among non-pregnant women of childbearing age with diabetes with optimal PCC compared to those with suboptimal PCC. In the crude model, non-pregnant women of childbearing age with diabetes who reported optimal PCC had 1.80 times greater odds (95% CI = 1.03–3.20) of reporting higher levels of diabetes care management than women who reported suboptimal PCC. Results remained statistically significant (OR = 2.02; 95% CI = 1.09–3.76) after adjusting for covariates.

When evaluated as separate domains of PCC, non-pregnant women of childbearing age who reported that their health care provider always listened to them and spent enough time with them had greater odds of reporting higher levels of diabetes care management than those whose health care providers did not always demonstrate these qualities before and after adjusting for covariates.

4. Discussion and conclusions

4.1. Discussion

The purpose of this study was to examine associations between patient-centered care (PCC) and self-efficacy, overall healthcare ratings, and management adherence among reproductive-age women with diabetes within the framework of Epstein and Street's conceptual model. Our results showed that non-pregnant women of childbearing age with diabetes who reported optimal PCC had greater diabetes care management adherence than non-pregnant women of childbearing age who reported suboptimal PCC. Our findings therefore correspond with previous research showing that patients who report optimal PCC are more likely to perform diabetes self-management behaviors, which are directly linked with improved

health outcomes such as glycemic control [36] and contribute to improved diabetes quality of life. This finding is especially important considering prior research demonstrating that non-Hispanic Black women of childbearing age with diabetes have a 54% lower odds of reporting higher levels of diabetes care management after adjustment [30]. It is important to note that non-Hispanic White women represented 48% of those reporting always receiving high quality patient provider communication compared to the racially/ethnically minoritized women in this sample. Future studies with larger samples of racially/ethnically minoritized women with diabetes are needed to examine factors associated with PCC stratified by race/ethnicity and other sociodemographic variables.

Optimal PCC was not associated with diabetes care self-efficacy among non-pregnant women of childbearing age with diabetes in the United States. This finding therefore counters previous research showing that patient perceptions of PCC is associated with improved diabetes care self-efficacy [37]. This association is important because self-efficacy itself is associated with diabetes self-care and management behaviors, and ultimately glycemic control [24]. Our results may be explained by the overall high levels of diabetes care self-efficacy in this sample of childbearing age women with diabetes, which has been observed in prior research [30]. It is not clear what factors may have contributed to the higher levels of diabetes care self-efficacy and future research is needed to understand what other factors might influence diabetes care self-efficacy in this population.

Further, the provision of care to women of childbearing age with diabetes can be complex [4]. Oftentimes, healthcare teams provide information in a manner that makes it difficult for patients to comprehend or recall. To improve patient recall, and therefore self-efficacy, recent recommendations for practitioners to involve patients in their diabetes care have included using techniques like teach-back [38]. Teach-back is an interactive communication loop between the patient and provider and encourages patient involvement in diabetes care education [39]. While recent research shows that when teach-back is implemented, there are associations with higher confidence in diabetes care adherence, teach-back as a technique is unfortunately underutilized [40]. Therefore, healthcare practitioners should engage in using teach-back for childbearing age women with diabetes.

Optimal PCC was also not associated with ratings of health care. Given that diabetes is a chronic condition, most diabetes care occurs outside of the

clinical setting, requiring patient involvement and commitment to their diabetes care routine [41]. These daily diabetes management decisions may influence one's perspective of overall healthcare ratings, even if the practitioner is not the one who ultimately performs most tasks due to the nature of caring for diabetes. For example, to an individual who struggles with managing their diet and exercise plan, thereby regularly having high HbA1C levels, it may not matter that their practitioner provides optimal PCC if their biophysical markers are not in the preferred range. Further, recent research shows that there are mediating proximal communication factors (e.g., trust) that can affect the intermediate outcome of perceived quality of healthcare [40]. Further, the strength of this mediating relationship increased as patients visited the hospital more frequently [40]. Since Epstein and Street's (2007) model is recursive, it could be that the participants in this sample did not have the repeated experiences of PCC over time that are necessary to build relationships.

This study has several limitations that need to be considered when interpreting the results. First, the MEPS data is based on patient self-report which presents the risk of recall bias. This is particularly relevant for this study as patients might not accurately assess quality communicative patterns in the medical encounter, including diagnosis accuracy. For future research examining PCC, it may be important to include patient records or observational data to improve accuracy. Because this study relied on secondary data collected through MEPS, it relied on the available PCC measures. There is a chance that all aspects of PCC were not measured in this study. Further, two of the outcomes (self-efficacy and overall healthcare rating) measures in this study were assessed by a single item. While a single-item measure can hold reliability and validity for some constructs, future research should examine similar relationships using multiple-item measures [42]. Finally, our results are based upon a secondary dataset, which limits the ability to determine other potential variables and their associations with the dependent variables. Future research can identify and investigate other potential variables using a variety of mixed-method approaches, including interviews or photovoice, to understand the relationships more clearly between PCC and diabetes care variables.

4.1.1. Practice implications

Currently recommended, but not yet fully implemented communication-centered skills like teach-back should be regularly implemented in patients' diabetes care. With the results given, further considerable research and policy attention should be given to improving patient-centered communicative practices. It is important for health systems to support PCC caregiving practices by not penalizing practitioners for engaging in longer consultations (which may be necessary to fully listen to or explain things to the patient). It is particularly important to further facilitate conversations with relevant stakeholders to improve health outcomes among Black or Hispanic women who may be further at risk of poorer health outcomes due to systemic health care barriers and inequities.

4.2. Innovation

This study contributes to the growing body of literature surrounding PCC for non-pregnant women of childbearing age living with diabetes [30]. Specifically, it contributes by examining how PCC relates with diabetes management outcomes within Epstein & Street's (2007) conceptual model. This is the first known study using a nationally representative sample of non-pregnant women of childbearing age to examine multiple layers of the conceptual model.

5. Conclusion

Using Epstein and Street's (2007) framework, we found that among non-pregnant women of childbearing age with diabetes, those reporting optimal PCC quality had greater diabetes care adherence than non-pregnant women of childbearing age who reported suboptimal PCC. To

continuously improve PCC, overall healthcare ratings, and self-efficacy in this population, practitioners should consider utilizing communication-facilitating techniques. Future research should focus on investigating the relationships between PCC and other characteristics in this population in light of the numerous implications of this study for interventions and health policy.

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Data availability

The longitudinal data reported in the final manuscript are publicly available from the Agency for Healthcare Research and Quality's website for the Medical Expenditure Panel Survey. <http://meps.ahrq.gov/>. STATA syntax is available with the companion files in the Open ICPSR data repository. <https://doi.org/10.3886/E182923V1>

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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