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*Perceptions of Diabetes Distress and Counseling During the Pandemic: Rural Provider Perspectives*Ranjita Misra, PhD¹, Brenna Kirk, MPH, PhD¹,
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ABSTRACT

INTRODUCTION: West Virginia is an Appalachian rural state that ranks highest in the nation in the prevalence of diabetes (16.2%). The COVID-19 pandemic impacted routine diabetes care. As a result, individuals experienced diabetes distress over the physical and psychological burdens of diabetes management. In rural and medically underserved counties (71%), diabetes care is often provided by primary care physicians. However, healthcare providers' perspectives on diabetes distress and related counseling to address them are unclear. This cross-sectional study's objective was to explore healthcare providers' (HCP) perspectives regarding their patient's diabetes distress and how it guided their counseling for diabetes self-care during clinic visits.

METHODS: Participants included 72 West Virginia Practice-Based Research Network members who completed an online survey in June 2021. However, only HCPs (physicians and advanced practice professionals, N=59) were included in the analysis. Data was collected using validated measures of diabetes distress, health literacy, and counseling for diabetes self-care.

RESULTS: HCPs frequently evaluated their patients' diabetes distress and health literacy levels to guide their conversations. Furthermore, HCPs perceived high diabetes distress (58.5%) in their patients during the pandemic and provided optimal counseling, especially for healthier diets and improved physical activity (98%). Multivariable logistic regression showed a significant reduction in diabetes distress with diabetes counseling. Results also showed HCPs were less likely (65%) to counsel for diet and 4.2 times more likely to counsel for exercise for patients with high diabetes distress.

CONCLUSION: Formal training of providers on the importance of assessing diabetes distress and tailoring their counseling can further improve diabetes management.

KEYWORDS

Patient counseling, primary care provider recommendations, diabetes distress, health literacy, provider-patient communication

INTRODUCTION

Type 2 diabetes (T2DM) is highly prevalent in West Virginia (WV), with 16.2% of T2DM adults making it the highest affected state in the nation. T2DM individuals in West Virginia also have high rates of comorbid chronic conditions, including obesity, cardiovascular disease, hypertension, and physical inactivity¹ (42% vs 30% nationally).² The COVID-19 environment severely disrupted routine diabetes

care.³ This was exacerbated by the isolation suffered by these patients because of geographical isolation, COVID infection/hospitalization, lack of social support, and diabetes distress that impacted self-care (e.g., diet, physical activity, medication adherence)⁴ and glycemic control.³ In rural and health professional shortage areas (71% of WV counties), diabetes care is often provided by primary care clinicians challenged to juggle competing demands within the limits of brief clinic visits. The pandemic not only

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impacted T2DM self-care due to suboptimal social determinants of health (SDoH) factors (such as low health literacy and poor or lack of access to health care and healthy food),⁵ but also impacted the routine diabetes clinical care provided by healthcare providers (HCP) due to frequent lockdowns and switching from in-person to telehealth. These factors impacted access to lifestyle counseling and emotional well-being, especially as they related to the distress over the physical and psychological burden of diabetes management.⁶ Globally and in the US, healthcare professionals providing diabetes care (including those working in primary care) reported substantial service disruption.⁷

There is also evidence of some adverse effects of COVID-19 on the mental health of individuals and how this, in turn, impacted the health-promoting lifestyles they followed.⁸ Evidence suggests that T2DM was a contributor to the severity of COVID-19, hospitalizations, and related deaths compared to those without diabetes.⁹ Greater psychological distress and increased rates of anxiety have been reported among those with chronic diseases such as diabetes.⁷ Studies have shown us that psychosocial factors, such as diabetes distress, isolation, depression, and one's psychological state of health, can impact diabetes self-management. Diabetes distress refers to the often-hidden emotional burdens, stresses, and worries resulting from managing a complex and demanding chronic disease like T2DM and is distinctly different from depression.¹⁰ Individuals can experience diabetes distress due to the diagnosis, burdens, and demands of complex disease management regimens, the challenges of interacting with primary care providers, and/or inadequate support or indifferent interpersonal relationships.¹¹ This, in turn, has been shown to result in poor glycemic control.¹² Moreover, individuals with limited health and digital literacy have higher distress related to poor self-care and associated medication nonadherence, poor glycemic control, and subsequent increased hospitalization rates.¹³

The COVID-19 pandemic impacted routine diabetes care, exacerbated existing health inequities, and resulted in patients experiencing diabetes distress over the physical and psychological burden of diabetes management.^{7,8} Studies have reported that

increased diabetes distress may be due to disruption of routine care, geographical isolation, and restricted social support.⁴ However, HCPs' perception of their patients' diabetes distress and related counseling to address them is unclear. This is significant, particularly in WV's rural and medically underserved areas, where populations are also impacted by socio-cultural and/or systemic and organizational factors.¹⁴⁻¹⁸

PURPOSE

This study examined HCPs' perceptions of patients' diabetes distress and health literacy and how it guided their counseling for diabetes self-care during the pandemic.

METHODS

THEORETICAL FRAMEWORK

This study was guided by the personalized patient activation and empowerment (P-PAE) framework¹⁹ to improve population health and translate effective guidelines into practice. When this theoretical model is explicitly adapted to diabetes care, the framework articulates the role of the provider for diabetes education and support as a key contributor to patient activation and empowerment for diabetes self-care to reduce diabetes-related distress, resulting in improved outcomes.

STUDY DESIGN

A cross-sectional study design was used for this research. Data was collected as part of the 2021 West Virginia Practice-Based Research Network (WVPBRN) Collective Outreach and Research Engagement survey in June 2021. Data was collected using an online RedCap survey from PBRN providers (physicians [MD/DO], administrators, social workers, and advanced practice professionals [NP, PA, RN]). Email invitations with a link to the survey were sent with follow-up reminders for completion.

STUDY SAMPLE

The study sample consisted of 72 members



representing all the WVPBRN sites. However, 13 respondents were not physicians or advanced practice professionals (i.e., administrators, LPNs, and social workers). Hence, they were removed from the analysis. The final sample comprised 59 HCPs, including physicians and advanced practice professionals.

MEASURES

Diabetes self-management was adapted from the Summary of Diabetes Self-Care Activities Measure.²⁰ The 8-point scale (0-7) assessed the core diabetes self-care activities (DSCA): diet, exercise, blood glucose (BG) testing, and medication adherence. Furthermore, some of the responses to exercise counseling by HCPs were modified to include responses for (a) 30 minutes of moderate intensity, (b) at least 5 or more times a week, and (c) measures to monitor their exercise progression every week. Similarly, counseling for blood glucose monitoring included testing blood sugar using capillary blood and glucometer and testing frequently as recommended.

Health literacy is the patient's capacity to access, understand, assess, and apply health information. We adapted the brief 3-item Health Literacy Survey¹³ to assess provider/administrators' perceptions of patients' health literacy level.

Diabetes distress was measured by the Diabetes Distress Survey (short version; 4-item Likert scale)²¹ with high levels of accuracy to the original 17-item scale.²² The modified questions assessed HCPs' perceptions of patients' diabetes distress during the past month on a 6-item scale ranging from 1, "not a problem," to 6, "very bothersome/very serious problem."

Demographic factors included provider types (physicians and advanced practice professionals), HCPs' duration of work in the current health system, age of their primary patient population (categories), and prevalence of patients with 3 or more comorbid chronic conditions.

STATISTICAL ANALYSIS

Descriptive statistics and univariate analysis

were computed for participant demographic characteristics, HCP perception of health literacy, diabetes distress, and counseling for their patient's diabetes self-care. Assumptions of normality and homogeneity of variance were checked, and means \pm standard deviations (SD) for continuous variables and frequencies for categorical variables were calculated. Analysis of variance (ANOVA) compared HCP perception of health literacy, diabetes distress, and counseling by provider types (physician vs APP) to determine the consistency in diabetes management given by all providers. Multivariable logistic regressions were used to analyze the association of perceived diabetes distress (high vs low/moderate) with health literacy assessment, provider types, prevalence of comorbid chronic conditions, percent of patient population over 65 years of age, and HCP counseling for diabetes self-care. All statistical analyses were conducted using SPSS 28.0, and statistical inferences were based on a significance level of P (two-sided) ≤ 0.05 .

RESULTS

Demographic characteristics indicated HCPs' modal duration of work in the current health system was 1-3 years (26.4%) with approximately half ≤ 6 years. The majority (56.9%) of clinic patient population was over 65 years of age, and 51.4 % of patients had 3 or more comorbid chronic conditions.

HCP COUNSELING FOR PATIENTS' DIABETES SELF-CARE DURING THE PANDEMIC

Table 1 summarizes HCPs' counseling for diabetes self-care during the pandemic. Approximately two-thirds of PBRN providers reported counseling for diet, exercise, and testing and/or monitoring blood sugar levels for diabetes self-care. The majority (79.2%) of DSCA dietary counseling included limiting sweets (e.g., desserts, candies, and non-diet sodas), reducing the number of calories to lose weight (49.1%), eating at least 5 servings of fruits and vegetables, and eating food high in dietary fiber (49.1%) each day. More than a quarter (30.2%) advised following a low-fat or complex carbohydrate plan, and approximately 13% provided additional tailored dietary advice. Physicians and advanced practice professionals were similar in their dietary



Diabetes self-care activities (DSCA)– Dietary counseling. <i>Which of the following do you or your health care team* advise your patients with diabetes to do?</i>	No (%)	Yes (%)
1. Follow a low-fat eating plan	69.8	30.2
2. Follow a complex carbohydrate diet	69.8	30.2
3. Reduce the number of calories to lose weight	50.9	49.1
4. Eat food high in dietary fiber	50.9	49.1
5. Eat at least 5 servings of fruits and vegetables	50.9	49.1
6. Eat very few sweets (e.g., desserts, non-diet sodas, candy, etc.)	20.8	79.2
7. Other (specify) – eat fewer carbs, eat smaller portions, eat low carb diet	86.8	13.2
8. I have not given any advice about dietary modification to patients	98.1	1.9
Diabetes self-care activities (DSCA)– Exercise counseling. <i>Which of the following do you or your health care team* advise your patients with diabetes to do?</i>	No (%)	Yes (%)
1. Get low level exercise (such as walking) on a daily basis.	39.6	60.4
2. Exercise continuously for at least 30 minutes (moderate intensity) at least 5 or more times a week.	58.5	41.5
3. Fit exercise into your daily routine (for example, take stairs instead of elevators, park a block away and walk, etc.)	28.3	71.7
4. Monitor progression of exercise every week.	67.9	32.1
5. Other (specify): Exercise after a meal if blood sugar is high	96.2	3.8
6. I have not given any advice about exercise for patients.	98.1	1.9
Diabetes self-care activities (DSCA)– Counseling for blood glucose (BG) monitoring <i>Which of the following do you or your health care team* advise your patients with diabetes to do?</i>	No (%)	Yes (%)
1. Test blood sugar using a drop of blood and a glucometer.	45.3	54.7
2. Test blood sugar as frequently as recommended.	34.0	66.0
3. Other (specify): use CGM, freestyle libre & test blood sugar twice daily (fasting and after a meal) to find out how food affects their blood sugar.	86.8	13.2
4. I have not given any advice about testing either blood or urine for patients.	92.5	7.5
Diabetes self-management – Prescribed medications for diabetes <i>Which of the following medications for diabetes have you prescribed for your patients with diabetes?</i>	No (%)	Yes (%)
1. An insulin shot 1 or 2 times a day.	37.7	62.3
2. An insulin shot 3 or more times a day.	52.8	47.2
3. Diabetes pills to control blood sugar level.	34.0	66.0
4. Other (specify): all other options oral and injectable & non-Insulin Medications GLP-1 Agonist injections	92.5	7.5
5. I have not prescribed either insulin or diabetes pills for patients	81.1	18.9

*Health care team includes doctor, nurse, dietitian, or diabetes educator in the practice.

TABLE 1. HCP counseling for patients' diabetes self-care (N=53 providers)

counseling to patients (p=0.17; not shown in the table).

DSCA exercise or physical activity counseling indicated 71.7% of HCPs recommended their patients fit exercise into their daily routine (e.g., take stairs instead of elevators or park a block away and walk). In addition, 60.4% advised patients to get low levels of exercise, such as walking daily. Furthermore, two-fifths (41.5%) of HCPs counseled patients to follow the Surgeon General's recommendation of exercising continuously for at least 30 minutes (moderate

intensity) at least 5 or more times a week and monitoring the progression of exercise every week (32.1%). Only 3.8% indicated providing additional exercise suggestions. Similar to dietary counseling, HCPs were consistent in their exercise counseling to patients (p=0.42).

Provider counseling for DSCA BG monitoring was consistent by provider types (p=0.47). Two-thirds (66%) advised frequent blood sugar testing as recommended, and more than half suggested capillary blood sugar testing using a glucometer.



Only 13.2% recommended other blood glucose monitoring strategies, such as continuous glucose monitoring (CGM); 7.5% reported they provided no BG monitoring advice during the pandemic.

Prescribed DSCA medications ranged from insulin shots 1-2 times per day (62.3%), ≥ 3 insulin shots per day (47.2%), and diabetes pills to control blood sugar level (66%). Approximately one-fifth (18.9%) of HCPs did not prescribe diabetes medications during clinic visits.

HCPs' PERCEPTIONS OF PATIENTS' HEALTH LITERACY LEVEL

Assessment of health literacy levels is important

for HCPs' ability to identify patients for appropriate educational materials and counseling during clinic visits. Table 2 summarizes HCPs' assessment and perceptions of patients' health literacy levels during the pandemic. Most HCPs (61.4%) reported that their team always or often assessed a patient's ability to learn and understand written information about diabetes self-care and that someone helped their patients read forms or materials during the visit (31.8%) if necessary. Only 13.7% reported having the confidence for patients to fill out forms themselves (13.7%). No differences in perceptions of patients' health literacy were noted between physicians and advanced practice professionals ($p=0.43$; not shown in the table).

<i>N=53 Providers</i>					
<i>Health literacy* questions</i>	Never (%)	Rarely (%)	Sometimes (%)	Often (%)	Always (%)
1. How often do you or your health care team** assess a patient's ability to learn about their medical condition (diabetes) and understand written information provided to effectively self-manage their diabetes?	6.8	4.5	27.3	43.2	18.2
2. How often do you have someone help your patients read hospital materials?	6.8	29.5	31.8	22.7	9.1
	Extremely confident	Quite a bit confident	Somewhat confident	A little bit confident	Not at all confident
3. How confident are your patients filling out medical forms by themselves?	11.4	25.0	50.0	11.4	2.3

*Health literacy assessment included provider's assessment of their patients' health literacy level. The modified 3-item Health Literacy Survey questionnaire was used for this study.

**Health care team includes doctor, nurse, dietitian, or diabetes educator in the practice.

TABLE 2. Assessment of Health Literacy



HCPs' PERCEPTIONS OF PATIENTS' DIABETES DISTRESS

Providers responded to how their patients' diabetes distress bothered them during the past month. HCPs' perceptions of their patients' diabetes distress are summarized in Table 3. The majority of HCPs (39.6%) reported their patients with diabetes were overwhelmed by the demands of living with the disease; 28.3% perceived they were failing with their routine diabetes self-care, 37.7% of patients were not motivated to keep up with their diabetes self-management regimen, and 17% of patients felt angry, scared, and/or depressed about living with diabetes. The 4-item diabetes distress items were summed and grouped into low/moderate (score of 1 to 3.99) vs high (4-6); 58.5% of providers perceived their patients to have high diabetes distress. However, no differences in perceptions of patients' diabetes distress were noted between physicians and advanced practice professionals ($p=0.77$; not shown in the table).

MULTIVARIATE ANALYSIS: DIABETES DISTRESS AND HCP COUNSELING

Adjusted odds ratios and their associated 95% confidence intervals (CI) from multivariable logistic regression analyses are summarized in Table 4. The dependent variable was provider perceptions of their patients' diabetes distress (low/moderate vs high). The unadjusted odds ratios showed no significant differences in diabetes distress by provider groups ($p=0.72$). However, adjusting for confounders such as chronic diseases (i.e., prevalence of 3 or more), health literacy, percent of patient population over 65 years of age, HCP types (physicians vs APP), and HCP counseling for diabetes self-care (diet, physical activity, blood glucose monitoring, and medication adherence), diabetes distress was significantly associated with HCP counseling. Interestingly, HCPs were 65% less likely to counsel for diet for those with high diabetes distress than patients with lower diabetes distress ($P=0.028$). However, they were 4.2 times more likely

<i>Perceptions of patient's diabetes distress*</i>	Not a Problem (%)	Slight problem (%)	Moderate Problem (%)	Somewhat Serious Problem (%)	Serious Problem (%)	Very Bothersome or very Serious Problem (%)
1. To what extent do you perceive your patients are overwhelmed by the demands of living with diabetes.	0	0	18.9	22.6	30.2	9.4
2. To what extent do you perceive your patients feel they are failing with their routine diabetes self-care.	0	9.4	17.0	26.4	24.5	3.8
3. To what extent do you perceive your patients are not motivated to keep up with their diabetes self-management regimen.	0	1.9	20.8	20.8	28.3	9.4
4. To what extent do you perceive your patients feel angry, scared, and/or depressed about living with diabetes.	0	17.0	18.9	28.3	13.2	3.8
Diabetes Distress Score (range 1-6)	Moderate to low diabetes distress (range 1 to 3.99) = 41.5%				High diabetes distress (range 4 to 6) = 58.5%	

Diabetes distress was measured by provider perceptions of their patients' diabetes distress during the past month using the short version (4-item Likert scale) of the Diabetes Distress Survey; 4-item. Total diabetes distress score was computed by combining the items; higher score indicates a higher diabetes distress.

TABLE 3. Diabetes distress during the pandemic.



to counsel for exercise for those they perceive to have high diabetes distress. HCPs were also more likely to counsel patients for blood glucose monitoring among those with high diabetes distress, although this association only approached statistical significance (P=0.085) in the logistic regression model.

DISCUSSION

This survey has provided some novel insights into HCP perceptions of their patients' diabetes distress in WV. To our knowledge, this is the first study that showed PBRN providers consistently perceived higher levels of diabetes distress in their patients, suggesting that the pandemic negatively impacted the physical and psychological well-being of T2DM adults. This finding has implications for diabetes

treatment and counseling and is concordant with the increases in anxiety, diabetes distress, and depression observed during the pandemic.⁷ Fifty-eight percent of HCPs reported their patients had high diabetes distress, a worrying finding corroborated by other studies.²³ Providers perceived that their patients were overwhelmed by the demands of living with diabetes, were scared and/or depressed and were even unmotivated for diabetes self-care. The adverse physical and psychological impacts of non-adherence to self-care were associated with concomitant increases in blood sugar and diastolic and systolic blood pressure during the pandemic period.²⁴ In addition, higher symptoms of diabetes distress were of heightened concern due to reduced capacity for psychological support and increased rates of anxiety and depression in those with chronic diseases such as diabetes.²⁴

Predictor Variables	Beta	Significance	Exp(B)	95% CI	
				Lower	Upper
DSCA Diet*	-1.055	.028	.348	.136	.891
DSCA PA**	1.445	.018	4.242	1.286	13.993
DSCA BG***	1.234	.085	3.434	.843	13.994
DSCA Medications	-.255	.514	.775	.360	1.669
Health Literacy ∞	.258	.233	1.294	.847	1.978
Patient population \geq 65 years	-1.029	.226	.357	.067	1.891
HCP category****	-.178	.852	.837	.130	5.390
Chronic Diseases	.701	.467	2.016	.305	13.319
Constant	-2.982	.149	.051		

The model was significant (F = 160.8; P <0.001, Adjusted R² = 65.9%).

*DSCA Diet= Diabetes Self-Care Activities (DSCA) Diet was assessed by HCP counseling their patients for dietary changes.

**DSCA PA= Diabetes Self-Care Activities (DSCA) Exercise was assessed by HCP counseling their patients for physical activity.

***DSCA BG= Diabetes Self-Care Activities (DSCA) Blood Glucose (BG) monitoring was assessed by HCP counseling their patients for monitoring blood glucose.

****DSCA Medications= Diabetes Self-Care Activities (DSCA) Medication was assessed by HCP counseling their patients for adhering to their prescribed medications.

*****HCP category = health care provider category – Physicians vs Advanced practice professionals
 ∞ Health literacy included provider's assessment of their patients' health literacy level; 3-items. Higher mean indicates higher Health Literacy assessment.

TABLE 4. Association between perception of diabetes distress and HCP counseling for diabetes self-care during the pandemic.



While this study assessed HCP perceptions of diabetes distress in patients that impacted their approach to counseling them about diabetes self-care, other studies report elevated diabetes distress among patients during the pandemic due to interruption in routine diabetes care.²⁵ A large US surveillance study reported that individuals rationed diabetes therapies and reduced medication adherence due to financial hardships that impacted paying for medications.²⁵ Diabetes distress could also be attributed to food insecurity or lack of access to healthy food, social isolation (especially in rural and underserved communities), and the Appalachian culture of pride and difficulty in seeking and accepting assistance, even during the pandemic.^{26,23} Therefore, HCP assessments to identify diabetes distress and provide support and tailored conversations should be prioritized as we learn more about the consequences of the pandemic on diabetes care. The P-PAE framework posits that HCPs can influence patient-centered outcomes by improving their engagement and shared decision-making for treatment and goal setting. Thus, the use of P-PAE strategies by HCPs for tailored diabetes self-care will not only improve patient empowerment and satisfaction but also reduce diabetes distress and poor outcomes.²⁷ The excessive burden of diabetes-related comorbid conditions (e.g., hypertension and obesity) in West Virginia also makes assessing diabetes distress critical among primary care providers.

Although we have learned some lessons from previous natural disasters regarding diabetes care provision, research findings must be shared and translated to develop implementation strategies to prepare HCPs for the future. HCP training is essential to improve knowledge of diabetes distress, relationship-building behaviors, and assessments to provide comprehensive diabetes care via telehealth or in-person during future public health emergencies.²⁴ Telehealth utilization was highest among Medicaid, Medicare, and low-income patients, who comprise many WV T2DM adults.²⁸ HCPs in the primary care settings should practice nonjudgmental communication, listen to patients, and respect Appalachian cultural traditions to provide routine diabetes care.¹⁸ This can ensure that patients receive diabetes education, counseling, and support to address the burden of living with chronic diseases.²⁹ Furthermore, understanding SDoH factors is critical

to assessing and mitigating distress related to adherence, as well as tailoring counseling to meet the needs of the patient.¹⁸

Our findings confirm that most HCPs and their team always or often assess patients' health literacy levels. However, among the relatively smaller number of HCPs (11.3 percent) who did not assess their patients' ability to learn about diabetes, it may be vital to match verbal instructions and the readability level of materials to a patient's health literacy skills, especially since 36.4 percent of HCPs were not confident that their patients could complete medical forms independently. Further data are required to confirm the extent of this problem, especially when there is a shift to telehealth and audio/virtual consultations. Natural disasters tend to exacerbate existing diabetes disparities²⁹ and allow PBRN providers to target resources and interventions for those with the greatest need to reduce diabetes disparities and improve outcomes.

Optimal counseling for diabetes self-management, especially for healthy diet and physical activity, was reported by 98 percent of PBRN providers. In rural states, primary care providers have wide-ranging responsibilities for their patients, as they are often the first contact for many people with acute and chronic medical conditions. Hence, HCPs' counseling for patient activation and adherence to self-care regimen concurs with existing literature.²⁹ Additionally, patients may see their primary care provider more frequently than their specialist if they have one. This suggests that provider counseling and reinforcement of patients during the pandemic becomes the cog for healthy outcomes.

We found a significant association between HCP perception of diabetes distress and the extent and type of counseling they provided. For example, providers were less likely to counsel patients with higher diabetes distress for dietary modifications during the pandemic. This is critical, as research shows that patients with higher diabetes distress have higher glycemic levels.³⁰ Additionally, the same research showed higher diabetes distress was associated with lower adherence to general and specific diets in patients over the prior 7 days. Less dietary counseling has ramifications for patients, as WV ranks the lowest in the nation in healthy eating



behavior. Based on these results, PBRN providers should address patients' perceptions about dietary behavior, health, and perceived barriers with shared decision-making for goals and tasks based on the P-PAE framework.³¹

Another noteworthy finding was a 4-fold increase in providers counseling patients to include physical activity in their daily lives to reduce their diabetes distress. The most common advice provided was to get a low level of exercise (such as walking) daily and make exercise work with their routine. While this may not meet the physical activity recommendations of 150 minutes of moderate-intensity exercise per week,³² individually tailored messages based on physical limitations are part of the trust and partnership necessary to make long-term improvements. Assessments using the SMART principle (specific, measurable, achievable, realistic, and time-based) and the five As (assess, advise, agree, assist, arrange) model can also help with tailored physical activity messages to patients.³³ This may be essential to making modest physical activity changes based on mutually agreed activity goals. In addition, providers' understanding of barriers, isolation, and exploitation during the pandemic or related isolation periods may also be helpful to problem-solve obstacles and counsel their patients to overcome barriers. Indeed, adequate physical activity is crucial to enhancing patients' physical functioning and quality of life.

In rural WV communities, patient education and counseling are often provided by APPs. The physicians and APPs were comparable in their perceptions and counseling provided to patients, indicating consistency in how diabetes care is addressed in West Virginia. It also validates that all PBRN providers support uniform clinical care in primary care settings. Engaging physicians and APPs in primary care settings could potentially deliver clinic-based interventions.

Although the results of this study are informative, there are several limitations worth noting. First, the small sample size limits the generalizability of findings. Secondly, we assessed provider perceptions of diabetes distress during the pandemic, which may differ from patients' self-reported distress. Hence, future studies should compare if providers' perceptions of patients' distress correlate with

actual diabetes distress reported by patients. In addition, diabetes distress and counseling were based on a few questions, plausibly introducing recall and social desirability bias. Thirdly, data for this study was collected from WV PBRN providers and, therefore, may not be generalizable to all rural providers in Appalachia. A larger and more heterogeneous provider population, more detailed assessments of diabetes distress and counseling, and getting both provider and patients' perspectives for a mixed methods analysis can provide a better understanding of the psychosocial determinants of diabetes.

CONCLUSION

Future research should determine whether greater counseling for exercise vs. diet reflects providers' comfort in counseling on specific self-care components (e.g., diabetic diet, exercise, and blood glucose) or if patients are more receptive to specific types of advice. Additionally, more research is needed to better understand providers' perceptions of patients' psychological factors, related support and counseling, and adherence to healthy behavior in patients. In summary, the results of this study fill a critical gap in understanding the high diabetes distress noted by PBRN providers that negatively impacted disease management and self-care challenges during the pandemic.

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