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Social support and diabetes distress among adults with type 2 diabetes covered by Alabama Medicaid

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Abstract

Aims: Diabetes distress affects approximately 36% of adults with diabetes and is associated with worse diabetes self-management and poor glycaemic control. We characterized participants' diabetes distress and studied the relationship between social support and diabetes distress.

Methods: In this cross-sectional study, we surveyed a population-based sample of adults with type 2 diabetes covered by Alabama Medicaid. We used the Diabetes Distress Scale assessing emotional burden, physician-related, regimen-related and interpersonal distress. We assessed participants' level of diabetes-specific social support and satisfaction with this support, categorized as low or moderate–high. We performed multivariable logistic regression of diabetes distress by level of and satisfaction with social support, adjusting for demographics, disease severity, self-efficacy and depressive symptoms.

Results: In all, 1147 individuals participated; 73% were women, 41% White, 58% Black and 3% Hispanic. Low level of or satisfaction with social support was reported by 11% of participants; 7% of participants had severe diabetes distress. Participants with low satisfaction with social support were statistically significantly more likely to have severe diabetes distress than those with moderate-high satisfaction, adjusted odds ratio 2.43 (95% CI 1.30, 4.54).

Conclusions: Interventions addressing diabetes distress in adults with type 2 diabetes may benefit from a focus on improving diabetes-specific social support.

Keywords

diabetes distress; social support; Medicaid; population-based

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

1 | BACKGROUND

Persons with diabetes face demanding and complex daily self-management activities including following recommendations for diet, physical activity, medication taking and blood glucose monitoring.[1] Effective diabetes self-management can prevent or delay the development of diabetes-related complications, but adopting recommended behaviours is challenging.[1,2] Emotional distress is common in persons with diabetes and negatively impacts disease self-management.[3] Depression or elevated depressive symptoms affect approximately 25% of adults with diabetes, and diabetes distress affects up to 36%.[4–6] Diabetes distress refers to the fears, worries and frustrations that persons with diabetes experience while living with and managing diabetes on a daily basis.[7] Depressive symptoms and diabetes distress are correlated, but distinct constructs.[8,9] Diabetes distress is associated with not following recommended diabetes self-management behaviours and with lower quality of life; additionally, diabetes distress has been shown to be more closely linked to poor glycaemic control in adults with type 2 diabetes than depressive symptoms.[10,11]

Other psychosocial factors, such as social support, may be associated with a person's diabetes distress. Social support is a multidimensional construct that can refer to emotional, instrumental or informational support.[12] Direct effects and indirect (buffering) effects models have been studied to explain the connection between social support and health.[13] The indirect effects model states that individuals with lower social support are disproportionally affected by stress compared with those with higher social support. In persons with diabetes, social support buffers the negative association of disease burden on diabetes distress and the negative association of diabetes distress on haemoglobin A1c.[14,15] Other studies have demonstrated potential direct effects of social support in diabetes; higher levels of social support are associated with lower diabetes distress, better adoption of diabetes self-management behaviours and better diabetes-related clinical outcomes, including glycaemic control.[16–19]

The relationship between social support and diabetes distress has not been extensively studied in low-income adults with type 2 diabetes in the southeastern United States, a region referred to by the Centers for Disease Control as the 'Diabetes Belt' of the United States.[20,21] Diabetes prevalence is high compared to other regions of the country as are rates of diabetes complications and mortality. Furthermore, Alabama is the 6th poorest state in the country, with 37% of the population living at or below 200% federal poverty level (FPL).[22] Lower socioeconomic status is associated with higher diabetes distress and worse diabetes self-management.[23,24] Given the high burden of disese combined with limited resources, understanding the relationships between psychosocial factors related to diabetes management could critically inform the development of effective and contextually relevant interventions to improve diabetes self-management and outcomes in this high-risk population. The objectives of this study were (a) to characterize participants' diabetes distress in a population-based sample of adults with type 2 diabetes covered by Alabama Medicaid and (b) to evaluate the relationship between perceived level of and satisfaction with diabetes-specific social support and diabetes distress. We considered overall distress and domains (emotional burden, physician-related, regimen-related or interpersonal distress)

as previous studies have not evaluated the relationship between diabetes-specific social support and the separate domains of diabetes distress.

2 | METHODS

2.1 | Study design and population

We conducted a cross-sectional survey within the Alabama Care Plan study, an observational study of the quality of care of adults with diabetes covered by Alabama Medicaid. The Alabama Care Plan study enrolled a population-based sample of adults with type 1 or 2 diabetes who were covered by Alabama Medicaid between March 2017 and April 2019. Medicaid eligibility for adults in Alabama includes parents of minor children with incomes at or below 18% of Federal Poverty Level (FPL) and adults with disability eligible for the Supplemental Security Income (SSI) program.[25] For the current study, adults were eligible if they met the following criteria: age 19–64 years old, covered by Medicaid for the prior 12 months and were diagnosed with type 2 diabetes defined by the presence of at least one inpatient or two outpatient International Classification of Diseases (ICD-9 or ICD-10) codes in the preceding 2 years. Potential participants were excluded if they were non-English speaking, were mentally or physically incapable of completing the survey per caregiver report, or had type 1 diabetes. All procedures performed in studies involving human participants were in accordance with the ethical standards of the Institutional Review Board and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. All study data were HIPAA-compliant and secured with additional password protection.

2.2 | Data collection

From Alabama Medicaid enrolment and claims data files, we generated a list of potential participants who met the age, Medicaid enrolment and diabetes diagnosis inclusion criteria. We contacted potential participants by letter, which provided information about the study and an option to decline participation by contacting a toll-free number or by mail. Subsequently, study interviewers contacted potential participants who did not decline by phone to invite them to participate and schedule a time to complete the survey. Study interviewers called participants multiple times at different times and days, including evenings and weekends, with a maximum of 15 call attempts. For eligible participants who agreed to participate, informed consent was obtained by phone. Study interviewers used a computer-assisted telephone interview system to complete a 125-item survey which included measures detailed below.

2.3 | Measures

Participants' perceived diabetes-specific level of social support was assessed using the following question, 'How much support do you get for dealing with your diabetes?'.[19,26,27] Responses were on a 5-point Likert scale from 1 (no support) to 5 (a great deal of support). We classified responses of 1 and 2 as 'low level of social support'; 3 or higher as 'moderate to high level of social support'. Participants' satisfaction with diabetes-specific social support was assessed with the following question, 'How satisfied are you with the support you get for dealing with your diabetes?'. Responses were on a 5-point Likert scale from 1

(not at all satisfied) to 5 (extremely satisfied). We classified responses of 1 and 2 as ‘low satisfaction with social support’; 3 or higher as ‘moderate to high satisfaction with social support’.

Diabetes distress was measured using the 17-item Diabetes Distress Scale (DDS).[7] The scale evaluates distress—the degree to which an item may be bothering a participant in their daily life—over the past month. The DDS has four validated subscales assessing emotional burden (5 items), physician-related distress (4 items), regimen-related distress (5 items) and interpersonal distress (3 items). Participants respond on a 6-point Likert scale from 1 (not a problem) to 6 (a very serious problem). The mean item score is obtained, which yields a possible score range of 1–6. For the total scale and each subscale, a score of <2 indicates low diabetes distress, 2 to <3 moderate diabetes distress and ≥3 severe diabetes distress.[28] Prior studies have shown DDS to be a highly reliable measure with Cronbach’s alpha ranging from 0.8 to 0.9, which is consistent with our sample.[7]

2.4 | Covariates

During the survey, participants reported age, sex, race, ethnicity, education level, income, marital status and disease severity for diabetes including self-reported duration of diabetes and insulin use. Participants’ geographical status—rural or urban—was determined using a crosswalk of ZIP code and census tract data; participant ZIP codes were categorized as rural if more than 50% of residents live in a designated non-metropolitan area based on census tract.[29]

Additional individual-level psychosocial factors were assessed including depressive symptoms and participant self-efficacy. We measured depressive symptoms using the 8-item Patient Health Questionnaire (PHQ-8).[30] The PHQ-8 assesses frequency of depressive symptoms, including somatic and cognitive-affective symptoms, experienced during the preceding 2 weeks with responses ranging from ‘not at all’ (0) to ‘nearly every day’ (3). Self-efficacy was measured using the 8-item Perceived Diabetes Self-Management Scale (PDSMS).[31] Participants respond on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree), resulting in a possible score of 8 to 40—a higher score indicates more confidence in managing one’s diabetes. We assessed general stress using the short form Perceived Stress Scale (PSS-4). On this four-item measure participants responded to questions about their experience and response to stressful situations in the previous one month on a 5-point Likert scale from ‘never’ (0) to ‘very often’ (4).[32]

2.5 | Statistical analysis

Descriptive statistics were used to characterize the study participants. We performed analyses of participant characteristics, indicators of disease severity and psychosocial factors by social support status using Wilcoxon and Mantel–Haenszel Chi-squared tests to compare continuous and categorical variables, respectively. We performed multivariable logistic regression of the association of level of diabetes-specific social support (low level vs reference of moderate to high level), satisfaction with diabetes-specific social support (low satisfaction vs reference of moderate to high satisfaction) and diabetes distress (severe [DDS ≥3] diabetes distress vs reference of low to moderate distress [DDS <3]). We conducted

separate models with overall diabetes distress and each diabetes distress domains as dependent variables. The models were adjusted for participant demographics (age sex, race/ethnicity, education level and marital status), disease severity (duration of diabetes, insulin use) and psychosocial factors (depressive symptoms, self-efficacy). The dataset with imputed values for missing covariate data was generated using the chained equations method in SAS for five imputations using SAS standard multiple imputation process. To evaluate for differences in the relationship between social support and diabetes distress by demographic groups including age, sex, race/ethnicity, we tested an interaction terms of age, sex, race/ethnicity by social support added to the full models for the diabetes distress scale and subscales. Statistical analyses were completed using SAS version 9.3.1. A 5% significance level was used throughout without allowance for multiplicity of statistical tests.

3 | RESULTS

Of the 1661 participants who responded to the survey as part of the Alabama Care Plan study, 282 were excluded due to age 65 years or older (N = 11) or type 1 diabetes or missing data for diabetes type (N = 271). Of the 1379 participants who met inclusion criteria for this study, an additional 232 were excluded from the analysis due to missing or incomplete data for diabetes distress or social support. In total, 1147 individuals were included in this study (see Appendix Table 1 for characteristics of included and excluded participants). The average age of participants was 52.9 years (Standard deviation 9.7); 73% were women (Table 1). It was a diverse sample; 41% of participants were White, 58% Black and 3.2% Hispanic. The majority of participants reported moderate to high level of and satisfaction with diabetes-specific social support. Participant demographic and health status characteristics were similar across the social support groups (by level of support and satisfaction with support, Table 1).

In our sample, 184 (16%) participants had moderate diabetes distress (DDS 2–2.9) and 88 (7.7%) had severe diabetes distress (DDS ≥3); 328 (31%) had moderate or severe depressive symptoms (PHQ-8 ≥ 10, Table 2). Emotional burden and regimen-related distress subscales had the highest mean scores in the overall study sample (1.9 [1.1] and 1.7 [0.9], respectively). In unadjusted analyses, participants with low levels of and satisfaction with diabetes-specific social support reported higher average levels of diabetes distress, higher average depressive symptoms and higher average perceived stress, than participants with moderate to high social support (Table 2). Participants with low levels of and satisfaction with diabetes-specific social support had higher average scores than participants with moderate to high social support across each of the diabetes distress subscales—emotional burden, physician-related distress, regimen-related distress and interpersonal distress (Table 2).

The results of our adjusted analyses are shown in Table 3. Participants with low satisfaction with diabetes-specific social support had significantly higher odds of having severe diabetes distress compared to those with moderate to high satisfaction, with odds ratio (OR) of 2.43 (95% confidence interval [CI] 1.30, 4.54). Participants with low satisfaction with social support had significantly higher odds of having severe distress across each of the diabetes distress subscales, except for regimen-related distress compared with those with moderate to

high satisfaction. Participants with low levels of diabetes-specific social support had significantly higher odds of having severe physician-related and interpersonal diabetes distress; but, level of social support was not significantly associated with overall diabetes distress or the other domains. Tests of age, sex and race/ethnicity as potential moderators were non-significant ($p > 0.05$).

4 | DISCUSSION

In our population of low-income adults with type 2 diabetes, 7.7% had severe diabetes distress; highest scores for domains of diabetes distress were seen for emotional burden and regimen-related distress. Additionally, participants with low satisfaction with diabetes-specific social support were significantly more likely to have severe diabetes distress than those with moderate to high satisfaction. These results are comparable to findings in different studies and populations.[16,18,19] Because diabetes distress negatively influences diabetes self-management and diabetes-related outcomes, it is necessary to understand how other psychosocial factors, including social support, relate to diabetes distress to more effectively manage it.[10,11] Our study builds upon existing literature by evaluating the relationship between social support and diabetes distress in a diverse sample of low-income adults covered by Alabama Medicaid. The focus of our study on a population with low socioeconomic status is important as this group is at risk of experiencing disparities in their diabetes care and outcomes.[33]

We are not aware of other studies that have examined the relationship of level of or satisfaction with diabetes-specific social support with the separate domains of diabetes distress—emotional burden, physician-related distress, regimen-related distress and interpersonal distress. We found low satisfaction with diabetes-specific social support to be significantly associated with higher odds of having severe diabetes distress for each domain, except regimen-related distress; level of support was significantly associated with two domains of diabetes distress.

A strength of the current study is the use of a population-based sample that was racially diverse (58% Black, 41% White) from urban and rural areas across the state of Alabama. Many prior studies of social support and diabetes distress have included clinic-based samples or participants from a specific community.[18,19] In our sample, race was not significantly associated with diabetes distress, and the relationship between social support and diabetes distress was similar between Black and White participants. Other participant demographic factors including gender, geographical status (rural vs urban), marital status and education level did not differ by level of social support and were not independently associated with diabetes distress. This has implications for practice in that we did not identify groups at increased risk for diabetes distress by demographic characteristics alone; thus, a person's satisfaction with and level of diabetes-specific social support may need to be considered as a pertinent factor when assessing diabetes distress across demographic groups.

In our sample, a higher proportion of participants had elevated depressive symptoms than diabetes distress. This differs from the pattern seen in other populations that were not limited to individuals with low socioeconomic status; although various measures to assess diabetes

distress and depressive symptoms were used in the studies.[3,5,34] Our study demonstrates a similar pattern to that seen in two other studies of low-income populations; Spencer *et al* and Miller *et al* reported a higher proportion of individuals had elevated depressive symptoms than elevated diabetes distress among African Americans in an underserved urban area and among rural African-American women receiving care at safety-net clinics, respectively.[20,35] However, in the population studied by Miller *et al*, the prevalence of elevated diabetes distress was 40%, which is a similar proportion to what has been shown in other populations.[35] It may be that because participants in our sample have low socioeconomic status and many are disabled and unable to work, they face a higher number of stressors than that seen in other populations. The presence of other stressors may overshadow participants' emotional distress specific to diabetes and, at the same time, may account for the elevated level of depressive symptoms. Social determinants of health are the social and economic conditions that influence health status. Prior research has shown that social determinants of health, including education level and income, are associated with self-care and outcomes in adults with diabetes.[36,37] Additional research is needed to better understand the relationship between diabetes distress, other stressors and other social determinants of health, particularly for low-income populations.

4.1 | Limitations

This is a cross-sectional study; thus, we are unable to infer causation or determine the directionality of the association between social support and diabetes distress. Our study sample includes adults with type 2 diabetes covered by Alabama Medicaid, which limits the generalizability of our findings to other populations. The self-reported measures used to assess diabetes distress and social support may be limited by social-desirability bias. We used single item measures focused on diabetes-related social support to assess perceived level of social support and satisfaction with social support. This is a limitation of our study because these measures do not fully reflect the multidimensionality or complexity of social support. Additionally, our measures did not assess other important aspects of social support, including the source of support. The source of support—spouse/significant other, family, friend or healthcare provider—has been shown to have different associations with self-management.[20,38] Additionally, we did not assess received or actual support or participants' perceptions regarding unsupportive behaviours of others. Perceived social support can differ from actual or received social support and other studies have demonstrated that social support is not universally helpful to adults with type 2 diabetes.[16,39]

4.2 | Conclusions

We found a high prevalence of both elevated diabetes distress and depressive symptoms in this low-income population of adults with type 2 diabetes. Moreover, low satisfaction with diabetes-specific social support was statistically significantly associated with elevated diabetes distress, which, in turn, is associated with poor diabetes self-management. Further investigation is needed to better characterize if the source and type of support are pertinent to the relationship between social support and diabetes distress and to elucidate factors that mediate or moderate this relationship. Additional study in this area may help to identify the characteristics of individuals who would benefit most from interventions focused on improving diabetes distress and social support. Our findings suggest that interventions

aiming to reduce diabetes distress in adults with type 2 diabetes may require focused attention on improving participants' diabetes-specific social support. Peer support or family-based interventions may be beneficial for individuals with elevated diabetes distress and low social support.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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DISCLOSURES

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TABLE 1

Participant characteristics by level of social support and satisfaction with social support

	All	Moderate–High Level of Social Support	Low Level of Social Support	*p* Value	Moderate–High Satisfaction with Social Support	Low Satisfaction with Social Support	*p* value
	N = 1147	**N = 1017**	**N = 130**		**N = 1022**	**N = 125**	
Age in years, mean (SD)	52.9 (9.7)	52.7 (9.8)	54.1 (9.0)	0.17	52.9 (9.7)	52.8 (9.7)	0.82
Sex, N (%)				0.03			0.012
Men	309 (27)	284 (28)	25 (19)		287 (28)	22 (18)	
Women	834 (73)	729 (72)	105 (81)		731 (72)	103 (82)	
Race, N (%)				0.06			0.003
White	466 (41)	403 (40)	63 (49)		402 (40)	64 (51)	
Black	655 (58)	592 (59)	63 (49)		598 (59)	57 (46)	
Other	14 (1.2)	11 (1.1)	3 (2.3)		10 (1.0)	4 (3.2)	
Hispanic, N (%)	36 (3.2)	32 (3.2)	4 (3.1)	0.95	33 (3.3)	3 (2.4)	0.60
Education level, N (%)				0.24			0.23
<High school	405 (36)	351 (35)	54 (42)		353 (35)	52 (42)	
≥High school	733 (64)	658 (65)	75 (58)		661 (65)	72 (58)	
Income, N (%)				0.11			0.66
<$10,000/year	279 (31)	254 (32)	25 (24)		250 (31)	29 (29)	
≥$10,000/year	615 (69)	537 (68)	78 (76)		545 (69)	70 (71)	
Employment, N (%)				0.14			0.12
Working/Studying	55 (4.8)	46 (4.6)	9 (7.0)		47 (4.6)	8 (6.5)	
Not working	85 (7.6)	80 (7.9)	5 (3.9)		81 (7.9)	4 (3.3)	
Cannot work	996 (88)	882 (88)	114 (89)		885 (87)	111 (90)	
Married, N (%)	226 (20)	208 (21)	18 (14)	0.08	208 (21)	18 (15)	0.16
Rural, N (%)	449 (39)	395 (39)	54 (42)	0.55	396 (39)	53 (42)	0.43

	All	Moderate–High Level of Social Support	Low Level of Social Support	*p* Value	Moderate–High Satisfaction with Social Support	Low Satisfaction with Social Support	*p* value
	N = 1147	**N = 1017**	**N = 130**		**N = 1022**	**N = 125**	
Duration of Diabetes in years, mean (SD)	11.9 (11.0)	11.8 (11.0)	12.5 (11.3)	0.52	11.9 (11.1)	12.3 (10.7)	0.56
Insulin Use, N (%)	481 (42)	430 (42)	51 (39)	0.51	419 (41)	62 (50)	0.07
Received Diabetes Education, N (%)	472 (42)	429 (43)	43 (33)	0.05	422 (42)	50 (40)	0.72

TABLE 2

Psychosocial characteristics of participants by level of and satisfaction with social support

	All	Moderate–High Level of Social Support	Low Level of Social Support	*p* value	Moderate–High Satisfaction with Social Support	Low Satisfaction with Social Support	*p* value
	N = 1147	N = 1017	N = 130		N = 1022	N = 125	
Number of participants (%)							
Diabetes Distress (DDS)				<0.001			<0.001
Low (<2)	875 (76)	814 (80)	61 (47)		825 (81)	50 (40)	
Moderate (2–2.9)	184 (16)	152 (15)	32 (25)		146 (14)	38 (30)	
Severe (≥3)	88 (7.7)	51 (5.0)	37 (28)		51 (5.0)	37 (30)	
Depressive symptoms (PHQ8)				<0.001			<0.001
Low–mild (<10)	742 (69)	691 (73)	51 (41)		700 (74)	42 (35)	
Moderate–severe (≥10)	328 (31)	256 (27)	72 (59)		251 (26)	77 (65)	
Mean (Standard Deviation)							
Diabetes Distress (DDS)*	1.6 (0.8)	1.5 (0.7)	2.4 (1.2)	<0.001	1.5 (0.7)	2.5 (1.1)	<0.001
Emotional Burden	1.9 (1.1)	1.8 (1.0)	2.6 (1.4)	<0.001	1.7 (1.0)	2.7 (1.4)	<0.001
Physician-Related Distress	1.4 (1.0)	1.3 (0.8)	2.0 (1.4)	<0.001	1.3 (0.8)	2.1 (1.4)	<0.001
Regimen-Related Distress	1.7 (0.9)	1.6 (0.8)	2.4 (1.3)	<0.001	1.6 (0.8)	2.5 (1.3)	<0.001
Interpersonal Distress	1.5 (1.0)	1.3 (0.7)	2.6 (1.6)	<0.001	1.3 (0.7)	2.8 (1.6)	<0.001
Depressive symptoms (PHQ–8)**	7.3 (5.9)	6.7 (5.6)	11.5 (6.1)	<0.001	6.7 (5.6)	12.2 (5.9)	<0.001
Self-efficacy (PDSMS)***	27.7 (4.7)	28.0 (4.5)	25.4 (5.1)	<0.001	28.1 (4.5)	24.8 (5.1)	<0.001
Perceived stress (PSS–4)****	5.5 (3.7)	5.2 (3.6)	7.7 (3.7)	<0.001	5.2 (3.6)	8.1 (3.6)	<0.001

For DDS total score and subscales, possible scores range from 0 to 6; a higher score indicates higher levels of distress.

** For depressive symptoms/Patient Health Questionnaire-8 (PHQ-8), possible scores range from 0 to 24; a higher scores indicates presence of greater depressive symptoms.

*** For self-efficacy/Perceived Diabetes Self-Management Scale (PDSMS), possible scores range from 8 to 40; a higher score indicates higher self-efficacy.

**** For perceived stress/Perceived Stress Scale (PSS-4), possible scores range from 0 to 16; a higher score indicates higher perceived stress.

TABLE 3

Results of multivariable logistic regression of the association of level of social support and satisfaction with social support with severe diabetes distress (overall and domains)

	Odds Ratio (95% Confidence Interval) of severe distress (REF: Low-moderate distress)				
	Overall diabetes distress	**Emotional burden**	**Physician-related distress**	**Regimen-related distress**	**Interpersonal distress**
Low level of social support (REF: Moderate–high level of social support)	1.48 (0.79, 2.75)	0.96 (0.55, 1.66)	2.04 ** (1.20, 3.47)	1.70 (0.98, 2.93)	2.57 ** (1.53, 4.33)
Low satisfaction with social support (REF: Moderate–high satisfaction with social support)	2.43 ** (1.30, 4.54)	1.99 * (1.12, 3.53)	1.87 * (1.08, 3.24)	1.31 (0.74, 2.31)	3.53 ** (2.10, 5.94)

Note: Model adjusted for age sex, race/ethnicity, education level, income, and marital status, duration of diabetes, insulin use, depressive symptoms and self-efficacy.

* p value < 0.05.

** p value < 0.01.