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The Role of Family/Friend Social Support in Diabetes Self-Management for Minorities with Type 2 Diabetes

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Abstract This study investigated how ethnicity, perceived family/friend social support (FSS), and health behaviors are associated with diabetes self-management (DSM) in minorities. The participants were recruited by community outreach methods and included 174 Cuban-, 121 Haitian- and 110 African-Americans with type 2 diabetes. The results indicated that ethnicity and FSS were associated with DSM. Higher FSS scores were associated with higher DSM scores, independent of ethnicity. There were ethnic differences in several elements of FSS. DSM was highest in Haitian- as compared to African-Americans; yet Haitian Americans had poorer glycemic control. The findings suggest FSS together with ethnicity may influence critical health practices. Studies are needed that further investigate the relationships among minorities with diabetes, their intimate network (family and friends) and the diabetes care process.

Keywords: *family and friend social support, diabetes self-management, ethnicity, minorities, type 2 diabetes*

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1. Introduction

Diabetes leads to complications such as heart disease and stroke, high blood pressure, blindness, kidney disease and nervous system disease; moreover, the risk of death for persons with diabetes is twice that of persons without diabetes [1]. Type 2 diabetes, the most common form (90-95% of all cases) has increased among the general population [1] and disproportionately among minorities (particularly Blacks, Hispanics and Asians) [2,3]. The mean percent increase of individuals with diabetes from 2005 to 2050 was projected to be 174% for men and 220% for women with a disproportionate number of minorities having the fastest growth: 481% among Hispanics, 208% among Blacks and 113% among Whites [4]. Diabetes-related complications can be minimized and prevented by glycemic control and other diabetes self-management practices.

1.1. Diabetes Care Management

Diabetes care requires medical management in the context of the individual's health beliefs. It is essential for persons with diabetes to acquire and practice adequate diabetes self-management skills in order to reduce the risk factors that lead to morbidity and mortality associated with diabetes-related complications. Diabetes self-management (DSM) includes achieving adequate glycemic control, blood lipids and blood pressure as well as weight management through diet and exercise [5,6]. Ongoing diabetes self-management education (DSME) that teaches problem solving skills and coping mechanisms in accordance with the National Standards for DSME, referred to as diabetes self-management (DSM), has been established as beneficial in helping patients achieve optimal metabolic control, prevent and manage diabetes-related complications and maximize their quality of life [5]. Successful DSM requires patient education to achieve proper eye and foot care, schedule and follow meal plans, modify diet, overcome barriers preventing adequate physical activity, monitor their blood glucose and have their glycated hemoglobin (A1C) checked as recommended [5].

1.2. The Role of Family/Friend Social Support in Diabetes Care and DSM

Family and friend social support (FSS) is another area that has been associated with DSM. Several studies of social support on chronic disease have found social support vital to self-management [7,8,9,10]. Diabetes self-management is a complex social phenomenon [11] and type 2 diabetes is a multifaceted disease [12]. Understanding the role social support plays with self-care behavior is essential in the development of medical standards of care practices, yet this is not an easy task for numerous reasons. It may be difficult to attribute the degree of behavior change to social support in consideration of individual factors (motivation, self-efficacy, health beliefs), and other social factors (access to healthcare and resources).

Perceived social support can be either functional (qualitative) or structural (quantitative) [13]. Functional

social support may be defined as to the degree to which interpersonal relationships serve the purpose of providing emotional, informational or instrumental quality for the individual [14]. Structural support refers to the types and numbers of social relationships (marital status, number of friends) and the degree of connection among these relationships (social network) (Gamarra, et al, 2009). Social network, an objective measure of the number of relationships, does not take into account the quality or the relationships [15].

The availability of functional social support (interpersonal relationships with family, friends, and healthcare providers that provide emotional or instrumental support) as well as social networks play vital roles in following and maintaining recommended health behavior including self-management of diabetes [14]. DiMatteo [16] found that tangible social support from family members was associated with adherence to medical treatment for adults with diabetes.

The types and sources of social support most effective for specific populations with type 2 diabetes have not been characterized. Most often social support for persons with chronic disease includes aspects of emotional encouragement and instrumental help with monitoring blood glucose, taking medications, foot and eye care, following meal plans, and increasing physical activity [7,8,9,10,11].

Distinction of the source of social support commonly made in the literature has been between health providers and the intimate network (family and friends) and other environmental influences such as the media and neighborhood. While some studies of social support measure family and friends separately, others make no distinction. Family and friends, measured together, was the most widely addressed type of social support related to health outcomes [17]. 'Friends and family' was considered a single category for a chronic illness self-management and social support instrument [18].

Studies of social support and diabetes care by adults' family or combine family and friends; albeit, there have been studies that measure effectiveness of peer support (community leaders trained in coaching health management) [19,20]. Despite advances in theory concerning social support and self-care, many patient treatment plans do not routinely involve the family and other support networks.

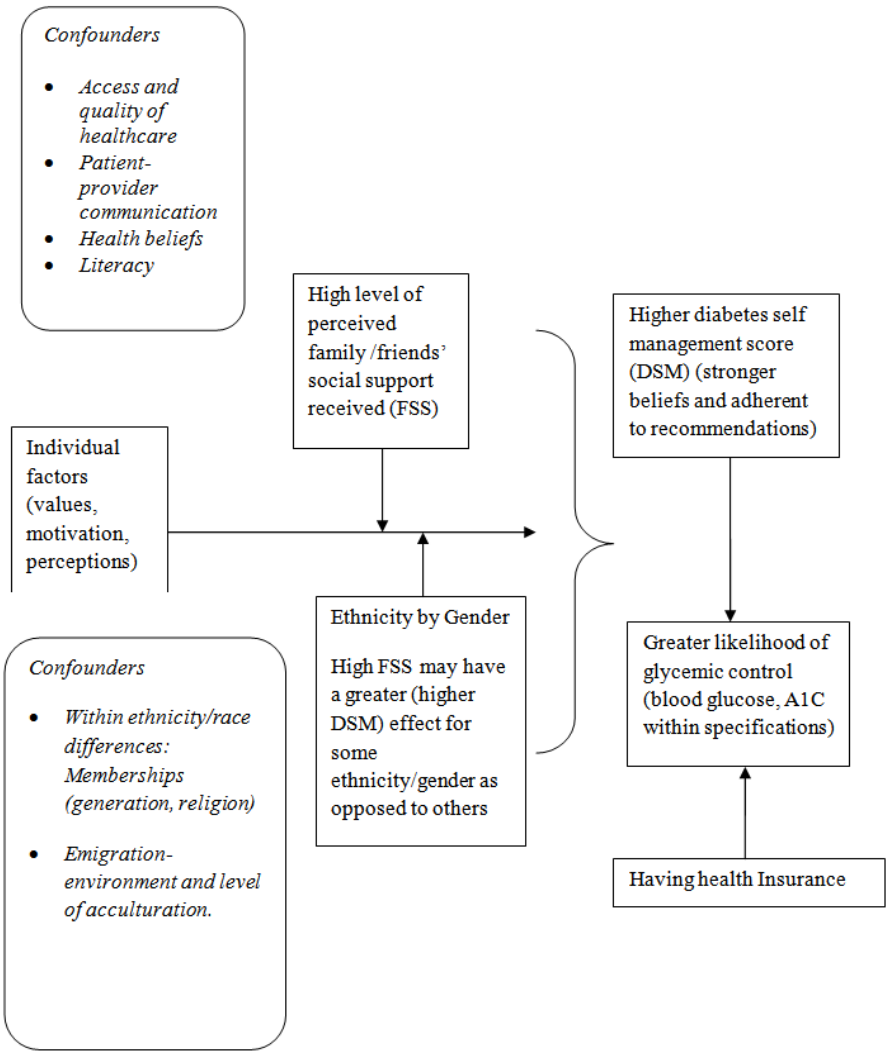

Figure 1. Conceptual relationships among the individual, ethnicity/race, perceived social support received from family and/or friends and diabetes management

1.3. Health Beliefs, Ethnicity and Diabetes Self-Management

Another aspect that may affect DSM is health beliefs. Oster et al [21] found significant ethnic differences in use of preventive services and DSM behaviors. Haitian-

Americans' high rate of noncompliance has been attributed, in part, to their health beliefs [22]. Haitian-Americans rely on folk and/or spiritual explanations and treatments for illness [22]. Yet, Haitians have extended family support system and increasing neighborhood-based social services [23].

On the other hand, Cubans who have illnesses would rather rely on the physician to direct their care than to learn and practice self-care skills [22]. Cubans' weight management and dietary compliance may be in direct contradiction with their health beliefs. Many Cubans believe that obesity is indicative of good health and leanness is indicative of poor health [22,24]. Not only does their traditional diet (fried foods, beans, sweets) contribute to obesity, but the affordability of meat, sweets and fast food in this country further promotes obesity and other health-related diseases such as diabetes and hypertension [22].

Health beliefs and adherence of African-Americans suggest multiple influences, including religion, spirituality and folklore. African-Americans were more than twice as likely to use home-remedies as Whites [25,26]. Spirituality was reported as an influence of hypertension management in African-Americans [27,28]. Health beliefs, compliance and guidelines for spiritual assessment addressed by *The National Medical Association* and the *Joint Commission on Accreditation of Healthcare Organizations* are of particular importance for African-American patients [29]. Nwasuruba et al [30] found significant differences among Blacks, Hispanics and White non-Hispanics in DSM behaviors, based on data from the 2003 Behavioral Risk Factor Surveillance Survey (BRFSS); however, they did not take into account different origins of persons classified as "Black" or "Hispanic". Moreover, there are no reported findings of the relationships among health behavior, health beliefs, DSM, and glycemic control with respect to ethnicity. The purpose of this study was to assess the relationships among participants' perception of receiving family and/or friend social support (FSS), DSM, and glycemic control patterns for Cuban (CA)-, African (AA)- and Haitian (HA) - Americans with type 2 diabetes. The conceptual framework was adapted from Fischer and colleagues' [31] ecological approach to disease self-management. Applying the model to this study, the individual's behavior is influenced by their family and friends as well as from their cultural background measured as ethnicity. FSS should be positively associated with DSM and glycemic control. Therefore, we hypothesize that (1) FSS (measured by the FSS scale), will be positively associated with DSM (measured by the DSM scale); and (2) FSS, will be associated with glycemic control (as measured by hemoglobin A1C). The hypothetical model is represented by Figure 1.

2. Methods

2.1. Setting, Design and Target Population

Data were part of a cross-sectional study to generate hypotheses for a tri-ethnic population in South Florida communities (of the United States) with and without type 2 diabetes. The participants included 174 Cuban-, 121 Haitian- and 110 African-Americans (CA, HA and AA, respectively). This research included only those participants with type 2 diabetes for whom all variables were available and for the purpose of assessing the interrelationship among FSS, DSM (behavior and beliefs) as modified by ethnicity and gender (male/female). All aspects of the study were approved by the university's Institutional Review Board.

Respondents were recruited by the following methods: (a) purchased mailing comprised of postal zip code and attained from multiple-databases (Knowledge Base Marketing, Inc.: Richardson, TX); (b) letters of invitation outlining the study distributed to diabetes educators, university faculty and health professionals in Miami-Dade and Broward counties; and (c) advertisement in community newspapers, shops and radio broadcasts. All participants were eligible respondents who understood, agreed and signed an IRB informed consent form. Eligibility was based on interviewers' screening of age (≥ 35 years), self-reported ethnicity and diabetes status. Inquiry of ethnicity included questions of cultural identification and place of birth. Diabetes status was determined by reported year of diagnosis and then confirmed by laboratory report of fasted blood glucose ≥ 126 mg/dl or A1C ≥ 6.5% [5].

2.2. Data Collection Procedures

The protocol was explained in the participants' choice of language (English, Creole, or Spanish) and the IRB approved, informed consent was signed by each participant. Appointments were made for groups of participant bi-weekly until a quota, based on a pre-determined sample size, was reached. The demographics were collected in consecutive group settings by trained interviewers. Bilingual interviewers help with the translation of questionnaires that were available in English, only. Biometric measures were performed by trained personnel in the Principal Investigator's laboratory. Venous blood was collected from each participant after an overnight fast (at least 8 hours) by a certified phlebotomist in the principal investigator's laboratory using standard laboratory techniques. The analysis was performed by LabCorp®.

2.3. Measures

The major independent and dependent variables constructed as composite scales based on the major subscales from a validated questionnaire, from the Michigan Diabetes Research and Training Center (MDRTC) *Diabetes Care Profile* questionnaire [32]. This questionnaire has been widely used and validated and tested for reliability for Caucasians and African-Americans by several studies conducted by Fitzgerald and colleagues. Participants' perception of receiving two forms of functional social support: emotional and tangible by family and or friends (aimed at facilitating the individual's diabetes care) were measured in a composite scale (FSS). The FSS questionnaire measures the degree to which the respondent perceives their family and or friends provide support. The scale was constructed by combining variables with Likert scale questions that measured the reported level of personal, tangible and emotional support received from either family or friends.

A higher score reflected greater support. Three items: *My family or friends (a) feel uncomfortable about me because of my diabetes; (b) discourage or upset me about my diabetes; and, (c) nag me about diabetes* were reverse coded to measure greater support. Reliability measured for the 12 items yielded a Crombach's alpha of 0.815.

Table 1. Reliability of the DSM Composite Scale

Sub-Scale	Number of Items	Crombach's alpha
DSM Care adherence	4	0.813
DSM Dietary patterns	4	0.800
Exercise for DSM	5	0.721
DSM health beliefs	5	0.854

Abbreviation: DSM = diabetes self-management

Table 2. Participants' characteristics[a]

Variable	Ethnicity	Measure	Statistic
		Mean ± SD	
Age	CA	65 ± 12.0	
	HA	58.4 ± 9.9	
	AA	54.1 ± 10.4	F (2, 405) = 35.0 $p < 0.001$
Gender		**N (%)**	
Male	CA	66 (38)	
Female		108 (62)	
Male	HA	51 (42)	
Female		70 (58)	
Male	AA	47 (43)	
Female		63 (57)	
Currently married	CA	75 (43.1)	
	HA	76 (62.8)	
	AA	28 (25.4)	χ^2 (N = 405, 2) = 19.2 $p < 0.001$
No health	CA	26 (14.9)	
insurance in past 12	HA	56 (46.3)	
months	AA	22 (20.0)	χ^2 (N = 405, 2) = 39.3 $p < 0.001$
> 15 Years in USA	CA	132 (75.9)	
(binary)	HA	71 (58.7)	
	AA	110 (100)	χ^2 (N = 405, 2) = 56.4 $p < 0.001$
Income[b]	CA	102 (64.2)	
< $20,000 per yr.	HA	65 (73.0)	
	AA	56 (62.9)	χ^2 (N = 337, 2) = 2.58 $p = 0.275$
Education	CA	90 (50.8)	
8th grade or less	HA	67 (37.9)	
	AA	20 (11.3)	χ^2 (N = 405, 4) = 45.6 $p < 0.001$
Current smoker (yes)	CA	26 (14.9)	
	HA	7 (5.8)	
	AA	39 (35.4)	χ^2 (N = 405, 2) = 36.4 $p < 0.001$
Self-reported health	CA	90 (51.7)	
Fair or poor[d]	HA	65 (53.7)	
	AA	48 (43.7)	χ^2 (N = 405, 8) = 13.3 $p = 0.102$

Abbreviations: CA = Cuban American; HA = Haitian American; AA = African-American

[a]Analysis of Variance (ANOVA) was performed for continuous variable and reported as mean ± SD. Chi-square was the test statistic for categorical data. Nominal variables were reported as N (%)

[b]Income was reported for N = 337 (83%) [CA (n = 159), HA (n = 89), and AA (n = 91)]. Of the combined sample, 66.2% reported income < $20,000 per year. A disproportional number of Blacks (HA and AA) chose not to report income (26.0%, 19.1%) as compared to CA (9.1%)

[c]Education was collapsed to 3 categories (8th grade or less, HS, at least some college or more) to ensure at least 10% in each level. Eighth grade or less was reported for brevity.

[d]Self-rated health was measured on a 5-point scale (1=excellent, 2=very good, 3=good, 4=fair, 5=poor). Percents are reported for the " fair and poor" categories combined.

Similarly, items forming the composite scale for DSM were a shortened version of the subscales available from the *Diabetes Care Profile* from MDRTC was validated in our laboratory for a Cuban-American population. A composite score for DSM was constructed from the Likert sub-scale variables. Variables where higher scores indicated clinically appropriate DSM were added directly to the composite score. Exercise barriers were reverse-coded so that *rarely having trouble getting exercise responses* reflected a higher DSM. The following subscales were combined to form the DSM composite score: (a) DSM care adherence (I keep my blood sugar in good control; I keep my glycated hemoglobin (A1C) in good control; I keep my weight under control; I do the things I need to do for my diabetes (diet, medicine, exercise, etc.); (b) dietary patterns (following a meal plan; scheduling meals and snacks; weighing or measuring food; meal planning (by you or the person who cooks) such as exchange list or food groups); (c) exercise barrier scale: *How often do you have trouble getting enough exercise*

because: it takes too much effort? you don't believe it is useful? you don't like to do it? you have a health problem? it makes diabetes more difficult to control? and, (d) health beliefs: *Taking the best possible care of diabetes will delay or prevent: 1. eye problems; 2. kidney problems; 3. foot problems; 4. hardening of the arteries; 5. heart disease*. The DSM composite scale score followed a normal distribution. Reliability was measured for the sub-scales using Crombach's alpha (Table 1). Cronbach's alpha value of 0.70 to 0.79 is considered to be acceptable, 0.80 to 0.89 to be very good and 0.90 and higher to be excellent. All items fell in the 'very good' range except the DSM-exercise subscale was considered marginal (alpha = 0.721) and removing an item did not raise the value. By subtracting the health belief sub-scale from the DSM composite score, two scales were formed: DSM behavior (DSM-B) and DSM health beliefs (DSM-HB) and used for additional analyses. Glycated hemoglobin (A1C) (log-transformed) was used as an indicator of adequate DSM. Controlling A1C through diet and exercise is a critical skill of DSM for persons with type 2 diabetes. A 1% in A1C is associated with an 18% increased risk for stroke and other cardiovascular diseases [5,33].

Diabetes education and health insurance were measured as yes/no. Having diabetes education was considered a 'yes response' to "Have you ever received diabetes education? (For example: attended a series of classes or series of meetings with a diabetes educator)". "I have not had an insurance plan in the past 12 months" was considered as not having health insurance. Self-rated health (SRH) was measured with a single question "In general, would you say your health is (check one box)" with 5-point scale where 1 = excellent and 5 = poor. The question was developed by the World Health Organization (WHO) [34] and has been validated against morbidity across ethnicities [35] and analyzed with sociodemographics by several studies [36,37]. All potential confounders (age, currently married, current smoker, health insurance, SRH, and diabetes education) were tested.

2.4. Data Analysis

Prior to analysis, variables were tested for normality and when needed, transformed. The general characteristics were performed with descriptive statistics. To test the hypotheses full multiple regression models were conducted with the covariates, FSS, ethnicity and gender, and all potential confounders including age, currently married (yes/no), having health insurance (yes/no) received diabetes education (yes/no), current smoker (yes/no), years with diabetes and SRH (5-point scale). Final models included only those interactions that were significant and those covariates that affected ethnicity and gender. All statistical analyses were computed with IBM SPSS® Statistic version 19.0. A p-value of < .05 was considered significant.

3. Results

3.1. Study Variables and Covariates by Ethnicity

The participants' characteristics are compared by ethnicity in Table 2. There were significant differences in age, years in the United States, marital status, tobacco use and education level by ethnicities. There was a higher percent of unreported income levels for HA and AA than for CA; therefore the reported income may not accurately reflect the mean income by ethnicity. There were no significant differences in self-reported health among ethnicities.

Spearman's rho correlations were performed on key variables and are shown in Table 3. Reporting receiving diabetes education (N = 405) was positively correlated with the DSM scale (r = 0.208, p < 0.001). Since education (N = 405) was collinear with income (N = 337) (r = 0.358, p < 0.001) education was used due to fewer missing values. The Wilks' Lambda multivariate test for overall differences among groups was significant (p < 0.001). There were differences between ethnic groups (F (2, 381) for DSM [14.4, p < 0.001] and A1C [4.65, p < 0.001] but not FSS [2.64, p = 0.073].

Table 3. Spearman's rho correlations of FSS, DSM, A1C, SRH and sociodemographics

	Educ	Income	Insur.	Smoke	SRH	DSM	Married	D-Ed	FSS
Educ									
Income	0.358**								
Insur.	0.101*	0.095							
Smoke	-0.008	-0.040	-0.052						
SRH	-0.117*	-0.229**	-0.090	0.124*					
DSM	0.008	0.063	-0.015	-0.206**	-0.301**				
Married	0.022	0.179*	-0.046	-0.180**	-0.094	0.129*			
D-Ed	0.041	-0.007	-0.045	-0.004	-0.030	0.187**	0.002		
FSS	0.022	0.011	0.067	-0.065	-0.089	0.205**	0.099*	0.036	
A1C	0.019	0.016	-0.176**	0.046	0.080	-0.109*	0.116*	0.023	-0.030

*p < 0.05 level, **p < 0.01 level

Abbreviations: Educ = education level; Insur. = health insurance (0 = no, 1 = yes); smoke = current smoker (0 = no, 1 = yes); SRH = self-rated health (5 point, 1 = excellent, 5 = poor); DSM = diabetes self-management score (higher = greater level of adherence to diabetes care activities); married = currently married (0 = no, 1 = yes); D-Ed = reporting receiving diabetes education (0 = no, 1 = yes); FSS = perceived family and/or friend social support received; A1C = hemoglobin A1C (natural log transformed)

The results are presented in Table 4. HA had a higher composite score for DSM than either AA or CA; yet, they had the highest A1C, representing poorer glycemic control, as compared to CA (p = 0.027) and AA (p = 0.027).

Table 4. MANOVA and post hoc analyses perceived family and/or friends social support received, DSM composite scale, and glycemic control* across ethnicities

Dependent Variables	Ethnicity	Mean ± SD	Mean Difference	*p value*
FSS	CA	45.0 ± 7.8	CA-HA 2.53	0.080
F (2) = 2.63 *p* = 0.73	HA	42.4 ± 9.2	HA-AA -0.827	0.999
	AA	43.3 ± 11.3	CA-AA 1.17	0.441
DSM	CA	59.1 ± 9.8	CA-HA -5.61	< 0.001
F(2) = 14.4 *p* < 0.001	HA	64.7 ± 8.5	HA-AA 5.21	< 0.001
	AA	59.5 ± 9.1	CA-AA -.400	0.999
Ln_A1C	CA	2.01 ± .20	CA-HA -0.078	0.022
F (2) = 4.65 *p* = 0.010	HA	2.09 ± .28	HA-AA .083	0.027
	AA	2.00 ± .23	CA-AA -0.005	0.999

Percent A1C Median Values

CA (170)	7.30
HA (120)	7.70
AA (108)	6.95

Abbreviations: FSS = Family/friends social support received; DSM = diabetes self management; CA = Cuban Americans; HA = Haitian Americans; AA = African-Americans; Ln_A1C = hemoglobin A1C (glycated hemoglobin) transformed as the natural logarithm

Notes: * mean differences of glycemic control were measured as the natural log of hemoglobin A1C (Ln_A1C). The variable was transformed to achieve linearity (an assumption for parametric tests such as ANOVA and regressions). The median for A1C across ethnicities was reported for clinical meaning. *N* = 384 for the combined sample (158, CA, 120 HA, 108 AA). Missing values for the major variables are as follows: FSS, none, DSM (CA = 14), A1C (CA = 4, AA = 2)

Table 5. Hierarchical General Linear Model Regression of Diabetes Self Management

Independent Variables	Model 1 *F* (5, 385)		Model 2 *F* (9, 381)		Model 3 *F* (10, 380)	
	F (df)	*p*	*F (df)*	*p*	*F (df)*	*p*
Ethnicity	20.2 (2)	< 0.001	21.3	< 0.001	17.4 (2)	< 0.001
FSS	30.3 (1)	< 0.001	26.2	< 0.001	25.0 (1)	< 0.001
Gender	0.14 (2)	0.706	0.052	0.820	0.24 (1)	0.877
Age (yrs)	3.74 (1)	0.054	0.59	0.442	0.18 (2)	0.674
Self-rated health (SRH)			9.02	< 0.001	7.98 (1)	< 0.001
Tobacco use					3.22	0.074
Model	13.3	< 0.001	12.0	< 0.001	11.2	< 0.001
R^2 (adj.)		0.136		0.203		0.207

Abbreviations: B (SE) = coefficient (standard error); df = degrees of freedom; DSM = Diabetes self-management; FSS = perceived family and/or friends social support received; ethnicity: Cuban-, African- and Haitian-Americans

Notes: Diabetes self-management is a composite score from the *Diabetes Care Profile Questionnaire* (MDRTC, 2011). Models 1-3: HA had higher DSM scores as compared to AA [B = 5.05 (1.18), *p* < 0.001], [B = 5.77 (1.15), *p* < 0.001], [B =.5.14 (1.2), *p* < 0.001], respectively. Higher SRH was associated with a higher DSM score

Table 6. Hierarchical General Linear Model Regression of Glycemic Control (Hemoglobin A1C)

Independent Variables	Model 1		Model 2	
	F (df)	*p*	*F (df)*	*p*
Ethnicity	4.59 (2)	0.011	1.85 (2)	0.159
FSS	0.83 (1)	0.362	0.18 (1)	0.672
Gender	1.29 (1)	0.257	0.36 (1)	0.546
Age (yrs)	7.69 (1)	0.006	3.05 (1)	0.082
Health Insurance (no)			8.64 (1)	0.003
Currently Married			3.25 (1)	0.072
DSM			4.48 (1)	0.035
Model	*F* (5, 378) 3.92	0.002	*F* (8, 375) 4.58	< 0.001
R^2 (adj.)	0.037		0.069	

Abbreviations: B (SE) = coefficient (standard error); df = degrees of freedom; FSS = perceived family and/or friends social support received; ethnicity: Cuban-, African- and Haitian-Americans

Note: The dependent variable, hemoglobin A1C, was natural-log transformed to achieve linearity and normality conditions for linear regression

For model 1, HA had higher A1C; however, health insurance negated ethnic differences in A1C. Not having health insurance was associated with higher A1C (B = 0.87, SE = 0.03, *p* =0.003). A higher diabetes self-management score was associated with lower A1C. 2-way or 3-way interactions were not significant. The estimated power with interactions was not sufficient to determine a difference (< 60%)

3.2. Hypothesis Test

Hypothesis 1 was supported with and without adjustments (**Models 1-3**, Table 5) since higher FSS was associated with higher DSM. Ethnicity, but not gender, differed for DSM. HA had higher DSM with and without adjustments; whereas this relationship was not significant for CA and AA. SRH was positively associated with DSM.

The models for *hypothesis 2*, the effect of FSS, ethnicity and gender on glycemic control (A1C) are shown in Table 6. Hypothesis 2 was not supported, since FSS was not associated with A1C. Ethnicity was associated with A1C, adjusting only for age and ethnicity (**Model 1**); however, adjusting for health insurance and marital status negated ethnic differences in A1C (**Model 2**). Not having health insurance was associated with higher A1C.

3.3. Additional Analysis

Individual components of FSS with DSM were assessed by ethnicity. In response to "my family or friends feel uncomfortable about me because of my diabetes, 46.2% HA strongly agreed as compared to 25.6% of CA and 28.2% of AA [χ^2 (8) N = 405 = 24.3, p = 0.002]. Yet, HA also perceived that their families 'encouraged or reassured them about their diabetes' (36.1% strongly agreed) as compared to 31.7% of CA and 32.2% of AA [χ^2 (8) N = 405 = 38.1, $p < 0.001$]. Both CA (50.0%) and AA (40.0%) strongly agreed that their family or friends 'nags them about diabetes' as compared to 10.0% of HA [χ^2 (8) N = 405 = 51.6, $p < 0.001$]. HA (35.3%) and AA (35.3%) strongly agreed that their family 'listens to them when they want to talk about their diabetes' as compared to CA (29.4%) [χ^2 (8) N = 405 = 42.4, $p < 0.001$]. There were no differences in FSS relationships by gender.

4. Discussion

This study aimed to investigate the role of perceived, received family social support (FSS) in diabetes-related behaviors among three ethnicities in the context of Fischer and colleagues [31] ecological theory. Higher FSS was associated with higher DSM even with ethnicity and gender in the mode, confirming hypothesis 1. The second hypothesis, predicting a positive association of FSS on glycemic control (hypothesis 2) was not supported. Our hypothetical model (Figure 1) was partially supported by the results of this study; but FSS was not directly associated with diabetes control (A1C). A recent randomized-control intervention targeting adults with poorly controlled type 2 diabetes reported the family-based intervention was associated with improvements in adherence to dietary and exercise recommendations as well as A1C levels [38]. It is an assumption that FSS is beneficial to diabetes control. FSS has been found to either facilitate or threaten DSM [39,40].

Wide variations in intimate social support structures (family and friends) [41 and differences in DSM [42] among ethnic groups concur with our findings. HA had scored higher in diabetes care than CA and AA, yet they had poorer glycemic control as compared to CA. Differences in DSM among ethnicities may be attributed to patient-provider communication, which has been shown to influence patients' adherence to medical recommendations throughout the literature since the late 1960's [43]. Although this study did not measure patient-provider relationships, these relationships may have affected how individuals perceived support from family members. We found FSS had ethnically distinctive patterns. Both HA and AA reported their family listened to them; however, both CA and AA were inclined to report their family nagged them about their diabetes. In contrast, HA disagreed that their family nagged them, agreed that their family encouraged them. Yet, HA also agreed that their family felt uncomfortable about them because of their diabetes.

We did not find gender differences to be associated with DSM. Misraa and Lagerb [42] reported that significant ethnic and gender differences in DSM behavior and social support; while, glycemic control varied by ethnicity, but not gender. On the other hand, Toljamo and Hentinen [44] suggested gender was not associated with diabetes care with a Finnish adult population. Gender differences in FSS influenced DSM based on a systematic review [45]. Gender differences were found in DSM by Bai, Chiou and Chang [8] and Lin, et al [46] with Asian populations and by Albright, Parchman and Burge [7] for diet and exercise DSM components with predominately Mexican-American adults. Variations in the operational constructs of DSM and social support make it difficult to establish whether specific ethnic-gender combinations have an influence on the effectiveness of social support on DSM.

It is evident from the current literature that little work has been done examining the role of FSS across ethnicities and its effect on DSM. The data from this study provide evidence that perceived social support from family and or friends (FSS) was associated with better DSM across these combined ethnicities. There is lack of agreement in the literature as to the role of family support for chronic diseases. Warren-Findlow and Prohaska [47] who performed an in-depth, qualitative analysis of African-American women, family social support, and self-care of heart disease, found instrumental and emotional support given by multigenerational family members was not always beneficial to these patients' care. Several studies reviewed by Gleeson-Kreig [17] concurred that family encouragement for physical activity was associated with increased exercise in Asian populations with diabetes. Differences across minorities with respect to components of FSS, in our study and the literature, suggest relationships with significant others has an impact on minority adults understanding and caring for their diabetes.

We believe the present results contribute to an understanding of perceived social support from family and or friends and diabetes care for minorities; however, the present study had several limitations. First, as a cross-sectional design, our study could not assess cause and effect. Second, due to limited geographic sampling (south Florida) our study may not be representative of all Cuban, African and Haitian Americans. Third, there is a potential sample bias of those who chose and were eligible to participate. Therefore, due to geography and potential sample bias, the triethnic samples may not represent the target populations. Fourth, our study was limited to FSS and did not measure social support obtained through access to healthcare practitioners, patient support groups

and worksite programs. Finally, health belief differences may have influenced the relationships of FSS and DSM.

Based on the literature, it is suggested that future studies include randomized intervention studies with and without families included in DSM treatment plans, similar to the study by Keogh and colleagues [38], in non-White populations. Further studies are needed that investigate health belief differences across gender and ethnic groups and how it affects DSM [43,48,49,50]. Another area that should be investigated in conjunction with FSS and DSM is stress. Stress within the family, whether a result of coping with diabetes or other life events, may adversely affect health and result in poor glycemic control as well as interfere with DSM routines such as regular meals and blood glucose testing [40]. Qualitative interviews of minorities with respect to actual social support received by family and friends are highly recommended. In order to better understand the social relationships involved in diabetes care, it is further suggested that these studies include social support from all sources (family, friends, employers, and healthcare provider), as well as personal factors such as motivation, self-efficacy and health beliefs and their relationship to diabetes self-management.

5. Conclusions

Despite the limitations, the present findings add to the literature by demonstrating patterns of perceived family and or friend social support (FSS) associated with diabetes care among three ethnicities. An ecological theoretical framework was supported by these findings since DSM practices and beliefs were associated with modifiable environmental influences such as FSS and non-modifiable influences such as ethnicity. Several ordinal components of FSS, such as the degree of agreement concerning perceived family listening, nagging, and feeling uncomfortable about diabetes, differed by ethnicity. This study implies that perceived family support for persons with diabetes may be of benefit to their self-care, independent of ethnicity. Studies are needed to confirm these results.

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Statement of Competing Interests

We declare that we have no competing interests.

List of Abbreviations

AA–African American.
A1C–glycated hemoglobin.
CA–Cuban American.
DSM–diabetes self-management.
FSS–friends and family social support.
HA–Haitian American.
MDRTC–Michigan Diabetes Research and Training Center.

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