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Family Self-Efficacy for Diabetes Management: Psychometric Testing

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Abstract

Background and Purpose—Type 2 diabetes mellitus (T2DM) self-management among Hispanic adults occurs in a family context. Self-efficacy (SE) affects T2DM self-management behaviors; however, no instruments are available to measure family diabetes self-efficacy. The study's purpose was to test the psychometric properties of the Family Self-Efficacy for Diabetes Scale (FSE).

Methods—Family members ($n = 113$) of adults with T2DM participated. Psychometric analysis included internal consistency reliability and concurrent and construct validity.

Results—Internal consistency reliability was .86. Items loaded on 2 factors, Family SE for Supporting Healthy Behaviors and Family SE for Supporting General Health, accounting for 71% of the variance. FSE correlated significantly with 3 diabetes-related instruments.

Conclusions—The FSE is a reliable and valid instrument. Further testing is needed in diverse populations and geographic areas.

Keywords

family self-efficacy; Type 2 diabetes mellitus; Hispanic; Mexican American

Engagement in self-management behaviors such as daily blood glucose monitoring, healthy eating, regular physical activity, and foot exams are critical to successful diabetes management (American Diabetes Association, 2013). However, diabetes self-management does not occur in a vacuum but in a social context of family, friends, and community (Fortmann, Gallo, & Philis-Tsimikas, 2011). This social environment can be facilitative in Hispanics whose cultural norms emphasize family loyalty (*familialism*) in which the family plays a central role in the health of individual members, is a primary source of care and support, and has both direct and indirect effects on the management of symptoms of chronic illness (Miranda, Bilot, Peluso, Berman, & Van Meek, 2006; Perez & Cruess, 2014). Therefore, it is essential to include family members in any education or intervention with persons of Mexican origin who have diabetes. Involving family members in educational

interventions may provide the emotional and psychological support needed in managing diabetes, reduce the isolation felt by persons with diabetes, and improve family cohesion.

In addition to knowledge and skills, family members need to believe they are able to support the individual in their diabetes self-management. Family self-efficacy, defined as family members' confidence in supporting and/or performing specific behaviors to support self-management behaviors in an individual with a chronic illness regimen, is a critical concept to measure. Currently, no known instruments are available to measure family self-efficacy. The purpose of this study was to test the psychometric properties of the Family Self-Efficacy for Diabetes Scale (FSE).

BACKGROUND AND CONCEPTUAL FRAMEWORK

Social cognitive theory (SCT), an interpersonal theory, underpins the concept of self-efficacy (Bandura, 1977). SCT emphasizes the dynamic interaction between personal factors, behavioral factors, and environmental factors. SCT posits that an individual's actions are based on the concept of human agency or self-efficacy. Self-efficacy is derived from behavioral capabilities (e.g., knowledge, beliefs, and skills) as well as environmental influences (e.g., social, economic, and political) in which the person is situated. Three modes differentiate the concept of self-efficacy: (a) direct personal agency that is expressed individually, (b) proxy agency that relies on others to act on their behalf, and (c) collective agency in which people work together to influence their future (Bandura, 1997). Because the adoption and adherence of multiple, complex Type 2 diabetes mellitus (T2DM) self-care behaviors require motivation and self-regulation, individuals need to monitor their behaviors, motivate themselves, create incentives, and enlist social support as needed to enhance their agency and maintain their efforts (Bandura, 2004). To the extent that people are influenced by their environment, personal and collective efficacy is required for successful T2DM self-management.

Research on the concept of human agency has focused almost exclusively on personal efficacy and the cognitive, affective, motivational, and selection processes that underpin personal efficacy (Beverly, Wray, & Miller, 2008). Personal efficacy affects behavior directly as well as indirectly by impacting other determinants such as goals, outcome expectations, perceived barriers, and facilitators in the social environment (Bandura, 2001). However, for many, the family is the environment in which T2DM management occurs. Family support has been associated with successful T2DM self-management behaviors (Rintala, Jaatinen, Paavilainen, & Astedt-Kurki, 2013; Rosland et al., 2008). Family environmental factors can also interfere with the T2DM treatment regimen (McEwen & Murdaugh, 2014; Wen, Shepherd, & Parchman, 2004). Nurses who engage in family systems nursing (Bell, 2009) are well prepared to assess the competencies, strengths, and interrelationships among the family members within the environmental context in which diabetes management occurs. These assessment data are critical to informing the development of interventions that target the appropriate family systems level to optimize T2DM self-management. For example, in chronic illnesses, such as T2DM, all members of the family must work together to produce the outcomes they desire, which are achievable only through interdependent effort. In SCT, the concept of human agency has been extended to include the collective efficacy of family

members. Collective efficacy refers to a group's shared perception of its capability to successfully perform a behavior (Bandura, 1997). Within a family's collective efficacy, the shared knowledge, beliefs, competencies, and resources about T2DM management influences the actions taken, the level of engagement, and the collective perseverance to achieve successful T2DM management for their family member. In forming these beliefs, individuals with T2DM assess their own capabilities as well as other family members' capabilities for T2DM management. Nursing is well prepared to facilitate assessment of individual and collective knowledge, beliefs, and competencies related to T2DM management. Perceived collective efficacy is defined as a group's shared belief in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainments (Bandura, 1997). Collective efficacy is therefore developed from observed behaviors and interactions between persons with T2DM and their family members.

Diabetes self-management is supported when members play a collaborative role in managing the disease. No instruments are available that address the perspective of the family member about their confidence in supporting T2DM self-management behaviors.

PROCEDURES FOR INSTRUMENT DEVELOPMENT

The Family Self-Efficacy for Diabetes Scale (FSE) was developed from the Self-Efficacy for Diabetes Scale (Stanford Education Patient Research Center, 2016). The Self-Efficacy for Diabetes Scale is a self-report instrument containing eight items that ask individuals how confident they feel in doing specific activities related to their diabetes. This instrument is designed to be completed by the individual diagnosed with diabetes. The items ask about diet, exercise, blood sugar, and illness management specific to diabetes. The scale item responses range from 1 (*not at all confident*) to 10 (*totally confident*). The numbers correspond to one's confidence in performing the tasks regularly. The descriptors only anchor the beginning (1) and end of the scale (10). Internal consistency reliability coefficients reported were .83 for 186 subjects with diabetes and .85 for 189 Spanish-speaking subjects with T2DM. Validity testing has not been reported.

Two revisions were made to the Self-Efficacy for Diabetes Scale by the first author (MM) in a preliminary study. First, because of the low education level and predominantly Spanish-speaking target population, the number of response options was decreased from a 10-point scale to a 5-point scale with the anchors remaining the same: *not at all confident* (1) and *totally confident* (5).

Second, wording of the items was changed to reflect a focus on family members of persons with T2DM. The items are worded to ask family members to respond to how confident they feel in supporting the person with T2DM in managing their diabetes in relation to diet, exercise, blood sugar, and illness management. For example, the original scale asked, "How confident do you feel that you can" This was changed to "How confident do you feel you can support your family member" Only the stem of the items changed, the remainder of the item is the same.

The original individual focused scale had been translated into Spanish. The new stems in the family scale were also translated into Spanish to reflect the focus on the family member.

DESCRIPTION, ADMINISTRATION, AND SCORING OF THE INSTRUMENT

Baseline data were collected as part of a community-based clinical trial with Mexican American adults with T2DM and a family member. The purpose of the original study was to (a) test the effects of a 3-month family-member intervention on person's with T2DM eating habits, physical activity, stress, hemoglobin A1c, body mass index, and hip and waist measures; and (b) test how the intervention effects family social support, health literacy, and the family member's self-efficacy to support their family member to manage their diabetes. Participants were recruited in an urban community in the Arizona–Mexico border region. Spanish-speaking *promotoras* (lay health workers) recruited potential participants from local clinics, emergency departments, neighborhood centers, and community events. All paper and pencil questionnaires were completed by participants in either English or Spanish. Participants could choose to have the questionnaires read to them by a bilingual research assistant.

A mean score was calculated for the Family Self-Efficacy Scale, with scores ranging from 1 to 5, based on scoring of the individual diabetes self-efficacy scale. Higher scores reflect greater family self-efficacy. The mean was calculated based on the items that were completed; there was no substitution of scores for missing items.

METHODS

Sample

Approval to conduct the study was obtained from the institutional review board of the participating institution. Eligibility criteria for family members of participants with T2DM included at least 18 years old, able to speak and read English or Spanish, and willing to participate in the intervention.

Procedures

Five self-report questionnaires were used in the psychometric study: the FSE, Social Integration Scale, Family Support and Behavior Checklist, Family Support for Physical Activity, and Family Support for Healthy Eating. If a Spanish version of the scale was not available, the scale was translated into Spanish and then back-translated to English to ensure the accuracy of the translation.

The Social Integration Scale (Gorman & Sivaganesan, 2007), a 14-item scale developed for the 2001 wave of the National Health Insurance Survey (NHIS), asks respondents to indicate if in the past 2 weeks they talked to the person listed (10 persons listed) and participated in specific activities outside the home (4 activities listed). Persons listed included family: spouse, parents, in-laws, and other family members; friends/neighbors: friends, workmates, and neighbors; participation in community activities included getting together with relatives, friends or neighbors, and group events. If respondents never talked to the person, they were instructed to check “not in network.” Total scores were computed for Talked to Family

Members subscale (5 items), Talked to Friends/Neighbors subscale (5 items), Participation in Community Activities subscale (4 items), and the Engagement in Network (total scale, 14 items), with higher scores indicating greater social integration. In this study, theta reliability coefficient (for heterogeneous items) was .60 for Talked to Family Members subscale, .54 for Talked to Friends and Neighbors subscale, .50 for Participation in Community Activities subscale, and .66 for Total Engagement in Network. Engagement with family and friends reflects connection with individuals, whereas participation in community activities measures community engagement. Higher Family Self-Efficacy scores were predicted to be positively associated with higher Social Integration Scale total scale and subscales scores.

The Family Support and Behavior Checklist (Procidano & Heller, 1983), a 20-item Likert-type scale, asks about feelings and experiences in relationships with family. A total score is computed with higher scores indicating more positive relationships with family. Internal consistency and construct validity have been reported (Lyons, Perrotta, & Hancher-Kvam, 1988; Procidano & Heller, 1983). In a sample of 222 undergraduate students, Cronbach's alpha was .90 (Procidano & Heller, 1983), and in a sample of 53 individuals with diabetes, Cronbach's alpha was .89 (Lyons et al., 1988). In this study, Cronbach's alpha was .91. The family environment, specifically the feelings and relationships within the family, is expected to support family self-efficacy in managing T2DM. Higher Family Self-Efficacy was predicted to be positively associated with higher Family Support and Behavior Checklist scores.

The Family Support for Physical Activity (Sallis, Grossman, Pinski, Patterson, & Nader, 1987) is a 13-item Likert-type scale that assesses perceived support received from family members specific to being physically active. Based on reliability analysis, 2 items from the original 15-item scale were eliminated, and a total score was calculated with a higher score reflecting greater family support for physical activity. In this study, Cronbach's alpha was .94. As an important component of diabetes management, support from the family and the efficacy of the family in providing the support for physical activity is imperative. Higher Family Self-Efficacy was predicted to be positively associated with higher Family Support for Physical Activity scores.

The Family Support for Healthy Eating (Sallis et al., 1987), a 13-item Likert-type scale measuring perceived support received from family members related to healthy eating, has two subscales: Encouragement for Healthy Eating (six items) and Sabotage for Healthy Eating (seven items). A total score is computed for each subscale with a higher score representing greater encouragement for healthy eating and greater sabotage for healthy eating. A total scale score is not computed. For the subscales, Cronbach's alpha ranged from .83 to .87. Construct validity was established by correlations with reported eating behaviors (Sallis et al., 1987). In this study, Cronbach's alpha was .92 for the Encouragement subscale and .73 for the Sabotage subscale. Healthy eating is a cornerstone of diabetes self-management so family support for healthy food choices and meals is essential for persons with T2DM. Nonsupportive behaviors, such as preparing "off limit" foods or choosing places to dine that only serve unhealthy foods can undermine the efforts of the person with T2DM. Therefore, higher Family Self-Efficacy was predicted to be positively associated with higher Encouragement for Healthy Eating subscale scores and

lower Sabotage for Healthy Eating subscale scores. Scale and subscale reliabilities in this study are presented in Table 1.

Data analysis was conducted using SPSS Version 22.0. Descriptive statistics were used to describe the sample. Internal consistency of the FSE items was estimated using Cronbach's alpha. Item-to-item and item-to-total correlations were obtained from the reliability analysis. Cronbach's alpha was expected to be .80 or greater with item-to-item and item-to-total correlations between .30 and .70. Factor analysis was used to estimate construct validity of the instrument using principal components with oblimin rotation. To define the factors and the items within each factor, a factor score of .4 or greater and at least .2 between factor loadings for that item was considered significant. Concurrent validity was analyzed with Pearson correlation coefficients. The FSE was expected to positively correlate with the Social Integration Scale, Family Support and Behavior Checklist, Family Support for Physical Activity, and Family Encouragement for Support for Healthy Eating and to negatively correlate with Family Sabotage for Healthy Eating. A p value $< .05$ was considered significant.

RESULTS

Sample

One hundred thirteen ($N = 113$) family members of persons with T2DM completed baseline data collection. Participants ranged in age from 18 to 88 years ($M = 46.73$, $SD = 15.9$) and consisted of 85 females and 28 males. More than half were married (58%), had less than a high school education (56%), with an annual family income of \$25,000 or less (83%; Table 2). The mean family self-efficacy score was 4.21 ($SD = 0.9$, range = 1–5).

Reliability

Two participants did not complete all items resulting in 111 questionnaires included in the analysis. Cronbach's alpha was .86. The item-to-item correlations ranged from .11 to .73 with eight of the correlations less than .30 (29%). Item-to-total correlations ranged from .42 to .72.

Construct Validity

Factor analysis was conducted using principal components analysis with an oblimin rotation. A two-factor solution was obtained, accounting for 71.1% of the variance in FSE. The factor loadings ranged from .70 to .89 (Table 3). The first factor (Items 1–5) represents self-efficacy for supporting healthy behaviors (eating and physical activity), and the second factor (Items 6–8) represents self-efficacy for supporting general health.

Concurrent Validity

The Pearson correlation coefficients between all of the scales and subscales (Social Integration, Family Support and Behavior Checklist, Family Support for Physical Activity, Encouragement for Healthy Eating subscale, Sabotage for Healthy Eating subscale and Family Self-Efficacy total scale, Self-Efficacy for Supporting Healthy Behaviors subscale, Self-Efficacy for General Health Support subscale) are presented in Table 4. The Family

Self-Efficacy (total scale) and Self-Efficacy for Supporting Healthy Behaviors (subscale) were significantly positively correlated with Talking with Friends and Neighbors ($r = .23$, $p = .01$; $r = .24$, $p = .01$, respectively), the Family Support and Behavior Checklist ($r = .22$, $p = .02$; $r = .27$, $p = .004$, respectively), and Family Support for Physical Activity ($r = .26$, $p = .01$; $r = .20$, $p = .03$, respectively). In addition, there was a significant positive correlation between Family Self-Efficacy (total scale) and Encourage Healthy Eating subscale ($r = .21$, $p = .03$). The Self-Efficacy for Supporting General Health subscale was significantly positively correlated with Family Support for Physical Activity ($r = .25$, $p = .01$).

DISCUSSION

The results of psychometric testing demonstrated acceptable reliability as reflected in a Cronbach's alpha coefficient greater than .80 for the total scale and acceptable item-to-total correlations. Factor analysis indicated two domains or subscales of family self-efficacy: Family Self-Efficacy for Supporting Healthy Behaviors and Family Self-Efficacy for Supporting General Health. Because results of factor analysis have not been reported previously, additional testing of the instrument is needed to see if the results are consistent across samples. Preliminary support for concurrent validity was established with other diabetes-related instruments. Although all of the correlations were low, they were in the predicted direction, providing additional evidence for construct validity of the scale. Measurement error in the self-report scales may have contributed to the low correlations. The Social Integration Scale and subscale reliabilities were less than expected and may have contributed to the low scale correlations for concurrent validity. Although theta coefficients were higher than alpha reliability coefficients, a more appropriate reliability test for this scale may be test-retest.

Habits are hard to change. Although individuals with T2DM are faced with a potentially devastating disease, making lifestyle changes on a daily basis are challenging and difficult. Family and friends are needed to accomplish the demanding regimen for successful T2DM management. Family can alter the course of a chronic illness by influencing health behaviors important in managing T2DM (Perez & Cruess, 2014). Including family members in diabetes education to empower them to become collaborative partners is critical in T2DM, as well as other chronic illnesses. Both family members and individuals with T2DM need to acquire the knowledge and skills to gain the confidence needed to collaboratively manage the disease and prevent complications. Current models for T2DM education do not meet the educational needs of families. Family members, when educated, may be able to evaluate changes in the health status of their family member with T2DM and advocate for their subsequent care (Orvik, Ribu, & Johansen, 2010), provide emotional and psychological support for T2DM management (Hu, Wallace, McCoy, & Amirehsani, 2014), enhance physical and emotional functioning for their family member with T2DM, and decrease negative coping style that could potentially contribute to diabetes-related distress (Karlsen, Oftedal, & Bru, 2012).

Engaging the family in T2DM education has the potential of creating the contagion effect in which the family members also adopt healthy behaviors such as healthy eating and decreased sedentary behaviors (Hu et al., 2014; Wen et al., 2004). The potential for family

members adopting healthy eating and physical activity behaviors cannot be understated for Hispanics of Mexican origin. In a study conducted in the United States–Mexico border region with persons of Mexican origin diagnosed with T2DM, 61% had at least one blood relative that also had been diagnosed with diabetes (Cerqueira, 2010).

Familism is vital to enabling the self-care regimens required for successful diabetes self-management. Increasing evidence supports the relationship between *familism* values and important health practices central to maintaining the physical and emotional well-being of Hispanics (Perez & Cruess, 2014; Wen et al., 2004). However, *familism* may also engender negative health behaviors that undermine successful diabetes management when self-care requirements are in conflict with family obligations (Pineda Olvera, Stewart, Galindo, & Stephens, 2007). The Hispanic family and *familism* values exert critical influence on health status, decision making about individual health care, and the procurement of health services made by the family (Perez & Cruess, 2014; Wen et al., 2004). A growing body of research elucidates the necessity of considering family values and the integration of family into treatment regimens (Perez & Cruess, 2014) and design of diabetes educational interventions (Denham, Ware, Raffle, & Leach, 2011; Hu et al., 2014; Wen et al., 2004). Building family self-efficacy for T2DM management can yield significant behavior change in the family environment that influences T2DM disease management.

Because T2DM management does not occur in a vacuum, family members are drawn into complex situational and long-term care considerations to promote their family member's daily diabetes management. Nursing interventions aimed at strengthening the capacity of the family system to promote daily T2DM management are essential. Family self-efficacy, or the family members' confidence in supporting and/or performing specific behaviors to support self-management behaviors in an individual with a chronic illness regimen, is a critical concept that underpins a family nursing systems approach to T2DM management and one that requires measurement. Nursing interventions that build on the Hispanic value of *familism* to educate and support family members strengthens collective efficacy, thus optimizing family engagement in the recommended health behaviors required to minimize disease progression.

This study was conducted in the southwestern region of the country, the United States–Mexico border region, with Hispanics of Mexican origin. The sample included primarily individuals with low income thus limited resources for diabetes management. Additional testing of the FSE is needed in other geographic areas with diverse populations and varying socioeconomic status.

CONCLUSION

The FSE is a reliable and valid instrument to measure family self-efficacy for diabetes management in Mexican American adults in the southwest. Given the high prevalence of T2DM among Hispanics and the value placed on the family, nurses including diabetes educators and other health care providers need to emphasize family self-efficacy for diabetes management to positively affect diabetes outcomes (Denham et al., 2011). Future testing of

the FSE with this population is needed to elucidate the influence of family self-efficacy on behavior changes for successful diabetes management.

The Family Self-Efficacy Scale is a potentially useful instrument that has implications for research, practice, and education. Use of the scale can provide valuable data for testing the effects of nursing interventions at the family level, especially among families who have a member with a chronic disease requiring daily self-management. The scale can also be administered to measure self-efficacy in the practice setting prior to family educational sessions. Assessment of the family member's belief in their ability to provide support for T2DM self-management will produce valuable data for tailoring the educational sessions and acknowledge the significance of including family members. Nursing curriculum must situate chronic illness management in a family context, especially for collectivist cultures who value *familism*. A focus on the role of families in successful self-management of chronic illness will likely lead to more effective educational and lifestyle change programs.

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TABLE 1

Reliability of Scales and Subscales

Scale and Subscales	Reliability
Family Self-Efficacy (Cronbach's alpha)	.86
Social Integration	
Talked to Family Members Subscale (theta)	.60
Talked to Friends and Neighbors Subscale (theta)	.54
Participation in Community Activities Subscale (theta)	.50
Engagement in Network (theta)	.66
Family Support and Behavior Checklist (Cronbach's alpha)	.91
Family Support for Physical Activity (Cronbach's alpha)	.94
Family Support for Healthy Eating	
Encouragement for Healthy Eating Subscale (Cronbach's alpha)	.92
Sabotage for Healthy Eating Subscale (Cronbach's alpha)	.73

TABLE 2Sample Characteristics (*N* = 113, Frequencies and Percentage)

Characteristic	<i>N</i> (%)
Gender	
Female	85 (75.2)
Male	28 (24.8)
Ethnicity	
Hispanic	110 (97.3)
Non-Hispanic	1 (0.9)
Missing	2 (1.8)
Marital status	
Single	30 (26.5)
Married	66 (58.4)
Divorced or separated	12 (10.6)
Widowed	5 (4.4)
Level of education	
Never attended school	2 (1.8)
Grade school	43 (38.1)
Some high school	18 (15.9)
High school graduate	18 (15.9)
Some college	21 (18.6)
College graduate	8 (7.1)
Graduate school	2 (1.8)
Missing	1 (0.9)
Currently employed	
No	57 (50.4)
Yes	45 (39.8)
Retired	11 (9.7)
Annual income	
More than \$25,000	19 (16.8)
\$20, 000–\$25,000	17 (15.0)
\$15,000–\$20,000	16 (14.2)
\$10,000–\$15,000	18 (15.9)
Less than \$10,000	32 (28.3)
Did not know or chose not to answer	11 (9.7)

TABLE 3

Results of Factor Analysis for Family Self-Efficacy

Item	Self-Efficacy for Supporting Healthy Behaviors	Self-Efficacy for Supporting General Health
	Factor Loadings	Factor Loadings
Eat their meals every 4–5 hours, including breakfast every day?	.88	–.06
Follow their diet when they have to prepare or share food with other people who do not have diabetes?	.86	–.03
Choose the appropriate foods to eat when they are hungry (e.g., snacks)?	.71	.20
Exercise 15–20 minutes, 4–5 times a week?	.89	–.11
Do something to prevent their blood sugar level from dropping when they exercise?	.70	.15
Know what to do when your family member's blood sugar level goes higher or lower than it should be?	–.13	.89
Judge when the changes in your family member's illness mean he or she should visit the doctor?	.05	.85
Control their diabetes so that it does not interfere with the things he or she wants to do?	.30	.72

Bold indicates primary factor loading for each item.

TABLE 4

Results for Concurrent Validity Testing (Scale and Subscale Pearson Correlations)

Scale-Subscales	Family Self-Efficacy Total Scale	Self-Efficacy for Supporting Healthy Behaviors Subscale	Self-Efficacy for Supporting General Health Subscale
	<i>r</i> <i>p</i>	<i>r</i> <i>p</i>	<i>r</i> <i>p</i>
Talked to Family Members	.07 .46	.09 .37	.03 .78
Talked to Friends and Neighbors	.23 [*] .01	.24 [*] .01	.15 .11
Participated in Community Activities subscale	-.03 .74	-.04 .70	-.01 .90
Engagement in Network	.16 .09	.17 .07	.10 .31
Family Support and Behavior Checklist	.22 [*] .02	.27 [*] .004	.08 .42
Family Support for Physical Activity	.26 [*] .01	.20 [*] .03	.25 [*] .01
Family Encouragement for Healthy Eating subscale	.21 [*] .03	.18 .06	.18 .06
Sabotage for Healthy Eating subscale	-.13 .18	-.13 .18	-.09 .35

Note. *N* = 113.^{*}
p < .05.