SOJNR
Southern Online Journal of Nursing Research

Volume 10 – Number 4 www.snrs.org

Socio-Demographic Variables and Self-Efficacy in Caucasian and African American Adults with Type 2 Diabetes

December 2010

Diane Orr Chlebowy, PhD, RN
Assistant Professor
School of Nursing
University of Louisville
Louisville, Kentucky
dochle01@louisville.edu

John Myers, PhD, MSPH
Assistant Professor
School of Public Health and Information Sciences
University of Louisville
Louisville, Kentucky

Adell N. Mendes, MPH
Women's Health Sciences Division (116B-3)
National Center for PTSD

VA Boston Healthcare System
Boston, MA 02130

Abstract

The purpose of this study was to examine relationships between socio-demographic characteristics and self-efficacy (SE) of diabetes-related behaviors in Caucasians and African Americans with type 2 diabetes. Adults (N=91) were recruited from 1 of 3 clinic sites in the southeastern United States. Socio-demographic data were obtained from medical records. Participants completed the SE Questionnaire to assess confidence in performing diabetes-related behaviors. Chi-square was used to detect differences between groups for categorical variables; independent-samples t-test techniques tested for differences in continuous variables. A two-way analysis of variance model was developed, and hierarchical multiple linear regression was employed to determine if SE might be predicted from the socio-demographic variables. Mean SE scores were high for both racial groups. No significant differences in SE were found based on either race or gender. Age, race and gender were not significantly related to SE. Education was the only significant predictor of SE. Education was a significant predictor of SE. Although African Americans experience higher rates of diabetes-related complications than do Caucasians, this may be due to other factors, such as financial barriers, lack of diabetes education opportunities. Additional investigations to examine the relationship of these variables to diabetes management are warranted.

Keywords: self-efficacy, type 2 diabetes, socio-demographic characteristics, African Americans

Socio-Demographic Variables and Self-Efficacy in Caucasian and African American Adults with Type 2 Diabetes

In 2007, approximately 23.6 million persons in the United States (7.8% of the population) had diabetes mellitus,[1] with 90% to 95% of the cases being type 2 diabetes mellitus (T2DM).[2] T2DM is associated with relative insulin deficiency and/or insulin resistance rather than a total deficit of insulin which occurs in T1DM.[3] T2DM is more common among certain racial groups (African Americans, Asian Americans/Pacific Islanders, Latinos, Native Americans) than among Caucasions.[4] African Americans experience higher rates of the following five diabetes-related complications: blindness, kidney disease, amputations, heart disease, and stroke than other racial groups.[5] Despite medical advances and health care availability, Caucasians and African Americans with T2DM continue to experience preventable life-threatening diabetes-related complications.

Adults with T2DM are confronted with the challenges of managing daily health-behavior regimens to prevent or minimize diabetes-related complications. These regimens include: (1) engaging in physical activity; (2) administering oral medications and/or insulin; (3) adhering to a prescribed dietary plan; (4) determining ways to manage daily life stressors; and (5) performing blood glucose monitoring. The role of the health care provider is to help adults with T2DM adhere to these regimens to prevent life-threatening diabetes-related complications.

The concept of self-efficacy (SE), derived from Bandura's Social Cognitive Theory, provides a link between self-perceptions and individual actions.[6] Bandura[6,7] described SE as a cognitive process involving judgment of one's ability to perform specific behaviors required to produce certain outcomes. SE theory has served as a framework to help investigators understand diabetes-related behaviors and facilitate behavioral change.[8-15] Although existing studies suggest that SE may positively affect the initiation and performance of appropriate diabetes self-care behaviors,[16-18] there is little known about the applicability of this research to individuals with diverse socio-demographic characteristics.

Few existing studies have examined the relationships of specific socio-demographic characteristics with SE of diabetes-related behaviors. Cherrington, Wallston, and Rothman[19] found that men of diverse racial backgrounds had higher income levels and higher levels of SE than women. Similarly, Padgett[8] found that higher SE beliefs were significantly correlated with male gender. Sarkar, Fisher, Schillinger[20] found that among an ethnically diverse population, the association between SE and T2DM self-management was consistent across race/ethnicity and health literacy levels. In a recent study, no significant differences in SE were found among African American women of different age groups.[21]

Study Purpose

The purpose of this study was to examine the relationships of some socio-demographic characteristics with SE of diabetes-related behaviors in Caucasian and African American adults with T2DM. The specific aims of this study were the following:

1. To determine if SE differs by race, while controlling for age and duration of T2DM.
2. To investigate whether SE differs by gender, while controlling age and duration of T2DM.
3. To evaluate the potential interaction and/or variance of socio-demographic variables and duration of T2DM in predicting self-efficacy.

Research Design and Methods

Setting

A two-group, descriptive comparative design was used in this study.[22] Three different clinic sites in a southeastern United States metropolitan area were utilized as data collection sites to maximize the number of participants for the study. At Site 1, all participants attended 2 all-day diabetes education sessions taught by a multidisciplinary health care team. Participants were scheduled for outpatient follow-up clinic visits at Site 2 and outpatient educational sessions at Site 3. The research team accessed participants at each of these sites through face-to-face contact. All local Institutional Review Boards and Human Subjects Protection programs approved the current study protocol.

Sample

The volunteer sample consisted of 91 adult participants with T2DM registered for outpatient clinic visits or diabetes educational sessions at one of the clinical sites. Other inclusion criteria were: (1) over 18 years of age; (2) diagnosed with T2DM; and (3) registered for an outpatient clinic visit or a diabetes educational session. Of the participants, 64 (70%) were Caucasian and 27 (30%) were African American. The sample was composed of 51 women and 40 men ranging in age from 19 to 83, with a mean of 55 years (*SD* = 12.5). The majority of participants were married (65%) and 36% were employed (see Table 1). The sample was well educated, with over 48.3% having some college or technical school experience, although 17% only had some high school education or less. The duration of time the participants reported being treated for diabetes ranged from 4 weeks to 28 years, with a mean of 7 years (*SD* = 6.48). The majority of participants (60%) reported taking oral agents for diabetes management, 21% were taking oral agents and insulin, and the remaining 19% were not taking diabetes medications. Glycosylated hemoglobin levels obtained from participants' medical records ranged from 5% to 16% with a mean of 8% (*SD* = 0.02).

Instrumentation

In this study, SE was measured with the use of the Self-Efficacy Questionnaire (SEQ).[23] The original SEQ was a 29-item instrument that measured participants' confidence in their abilities to perform a graded series of regimen behaviors (e.g., test blood glucose level at least once a day, test blood glucose level at least twice a day) in 4 areas: glucose testing (8 items), exercise (8 items), eating habits (9 items), and medication taking (4 items).[23]

The scaling of the SEQ was modified for use in this study to simplify scoring of responses. Also, items were rewritten using simpler terminology to make completion easier for participants. Participants rated each SEQ item according to their perceived ability to perform the behavior on a scale from 1 (strongly disagree) to 4 (strongly agree) to simplify the scaling procedure. A subscale score was produced for each of the four regimen areas: (1) glucose testing; (2) exercise; (3) eating habits; and (4) medication-taking. The total self-efficacy score (SEQ overall score) was a summation of the four subscale scores (maximum 116). A high subscale score reflected high-perceived ability to perform diabetes-related behaviors in a specific area. Similarly, a high SEQ overall score reflected high-perceived ability to perform diabetes-related behaviors. Cronbach's alpha coefficients for the SEQ subscales in the modified instrument ranged from .83 to .92. The alpha coefficient for the overall SEQ score in this study was .92.

Procedure

The process for participant recruitment varied according to the data collection site. After consent was obtained, packets containing the questionnaire were mailed to participants at Site 1 and participants were asked to return completed questionnaires in self-addressed envelopes prior to the first class session. At Sites 2 and 3, participants were asked to complete the questionnaires at the time of their outpatient clinic visits or educational sessions. Participants received thank-you letters and $5 gift certificates or checks in appreciation for their time and effort. Socio-demographic data (e.g., age, race, gender, duration of diabetes) and other data were obtained by the research team from the participants' medical records.

Analysis

Data were analyzed using SAS software (Cary, NC). Traditional demographics were calculated for all participants enrolled in the study. Gender, marital status, education attainment, occupation and current diabetes medications were stratified by race (Caucasians vs. African Americans). Chi-square techniques were used to test for differences between Caucasians and African Americans for categorical variables, while independent-samples t-test techniques were used to test for differences in continuous variables. A two-way analysis of variance (ANOVA) model was developed in which SE was made a function of race and gender, while adjusting for the covariates (age and duration of T2DM). In addition, hierarchical multiple linear regression techniques were employed to test whether SE could be predicted from the socio-demographic, or explanatory, variables collected via the study (gender, marital status, education attainment, occupation,

diabetes medications, age, and race). Only main effects in the model were tested. That is, no tests for interaction effects were performed. The stepwise method was used to determine the final, parsimonious model.

Results

Descriptive Statistics

The results from the descriptive analysis of the demographic data stratified by race are presented in Table 1. The mean SE scores for both Caucasians and African Americans suggest that SE was high among both groups (94 vs. 91, p =0.782).

A two-way ANOVA determined that there was no difference between a female's average SE *(M = 97.08, SD = 10.674)* and a male's SE *(M = 93.06, SD = 13.02) (F =1.327, p = 0.253).* African American SE (*M = 92.58, SD = 12.110)* did not differ significantly from Caucasian SE *(M = 95.75, SD = 12.142) (F =.564, p = 0.455).* Therefore, no significant differences in SE based on either race or gender. A small effect size (*d = 0.041)* was also obtained for this study. See Table 2.

Multiple Linear Regression

There appears to be no multi-collinearity among the explanatory variables studied. While some correlations were positive, they were meaningless, ranging from .07 (education and gender) to .385 (marital status and age). Some correlations were negative -.008 (race and age) and -.359 (education and gender). This indicates that multi-collinearity may not pose a threat to the assumptions of analytical techniques. To confirm, a test for collinearity was performed which had no significant p-values.

First, age, race and gender were entered into the model using the force entry method. The three variables produced an adjusted *R2* of 0.013 *(F =1.408, p = 0.246)* for the model, which indicates that these three variables do not significantly predict SE. The remaining four variables were entered into the model using the stepwise method. This model produced an adjusted *R2* of 0.112 *(F =10.054, p =0.002)* which appears to be a better model for the data, although higher order models were developed with no improvement in goodness-of-fit measures. The only significant predictor of SE was education *(b =.334, t = 3.171, p = 0.002)*. Education accounts for 10.1% of variability in SE scores (when a simple linear regression

model in which SE was predicted from education was developed). Normality of residuals against observed values was established with a coefficient correlation (r = 0.9851). See Table 3.

Discussion

The investigation of the relationships of socio-demographic characteristics and duration of diabetes with SE of diabetes-related management behaviors in this study's sample has provided relevant information for future research. In previous studies,[8-15] SE theory has served as an important framework to help health care providers understand diabetes-related behaviors and facilitate behavior change. In addition, SE has been found to positively affect the initiation and performance of diabetes self-care behaviors.[16-18] This study's findings are important in understanding the predictors of SE of diabetes-related behaviors among Caucasians and African Americans with T2DM.

In this study, analyses revealed no significant differences in SE based on either race or gender. The mean SE scores for both Caucasians and African Americans suggested that SE was high among both groups. According to SE theory, high SE scores would positively affect the initiation and performance of diabetes self-care behaviors among the study participants. In contrast to this study's findings, previous studies suggested that higher SE beliefs were significantly correlated with male gender.8,19 Few published studies have investigated the differences in SE based on either race or gender.

No significant relationships were found among age, race, and gender and SE. Similar to this study's findings, Montague, Nicols, and Dutta[21] found no significant differences in SE among African American women of different age groups. In contrast to this study's findings, Weijman et al.[24] found that older age was positively related to frequency of adhering to the recommended nutritional guidelines and regular eating in participants with T1DM. In addition, Padgett[8] found that SE beliefs were moderately but significantly associated with younger age of participants with T1DM. In this study, however, SE was high among the 2 racial groups with a mean age of 55 years for the total group.

In this study, education was a significant predictor of SE. The sample was generally well educated, with over 48.3% having some college or technical school experience, although 17% only had some high school education or less. The mean SE scores were high among Caucasians and African Americans perhaps due to the fact that over 48.3% had some college or technical school experience. Additional investigations to study the relationships of these variables are warranted. In addition, studies examining the relationship of diabetes education with SE of diabetes-related behaviors

among these populations would contribute to the body of scientific knowledge. An understanding of the relationships of these variables would assist the health care provider in predicting health-related behaviors and diabetes-related outcomes among Caucasians and African Americans with T2DM.

Conclusions

The results of this study have implications for health care providers caring for people with T2DM. Education was found to be a significant predictor of SE. Since SE has been found to positively affect the initiation and performance of diabetes self-care behaviors, this knowledge is important as health care providers work with clients from diverse educational backgrounds. Knowledge of clients' educational backgrounds can assist health care providers to help clients acquire higher levels of self-efficacy and the confidence to perform necessary diabetes self-care behaviors.

The small sample size in this study underscores the importance of further research to examine the relationships of socio-demographic characteristics with SE of diabetes-related behaviors in Caucasians and African Americans with T2DM. This study does, however, yield new knowledge for health care providers and suggests areas for future research. The mean SE scores were high for both Caucasians and African Americans. Although African Americans experience higher rates of diabetes-related complications than Caucasians do, this may be due to other factors (e.g., availability of health care services, financial barriers, lack of diabetes education opportunities). Additional investigations to study the relationship of these variables to diabetes management are warranted.

References

1. American Diabetes Association (2009a). *Diabetes statistics.* Retrieved: December 27, 2009, www.diabetes.org/diabetes-basics/diabetes-statistics.
2. National Institute of Diabetes, Digestive, and Kidney Diseases (2009). *National diabetes statistics, 2007*. Retrieved: December 30, 2009, www.diabetes.niddk.nih.gov/dm/pubs/statistics/index.htm.
3. Chlebowy, D. O., & Wagner, K. D. (2005). Altered glucose metabolism. In K.D. Wagner & K. Johnson (Eds.), *High acuity nursing*(4th ed). Upper Saddle River, NJ: Prentice Hall.
4. American Diabetes Association (2008a). *Type 2 diabetes.* Retrieved: June 16, 2008, www.diabetes.org/type-2-diabetes.jsp.

5. American Diabetes Association. (2009b). *African Americans and complications.* Retrieved: December 29, 2009, www.diabetes.org/living-with-diabetes/complications/african-americans-and-complications.html.
6. Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84,* 191-215.
7. Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist, 37,* 122-147.
8. Padgett, D. K. (1991). Correlates of self-efficacy beliefs among patients with non-insulin dependent diabetes mellitus in Zagreb, Yugoslavia. *Patient Education and Counseling*, *18,* 139-147.
9. Hurley, C. C., & Shea, C. A. (1992). Self-efficacy: strategy for enhancing diabetes self-care. *Diabetes Educator, 18,* 146-150.
10. Kavanagh, D. J., Gooley, S., & Wilson, P. H. (1993). Prediction of adherence and control in diabetes. *Journal of Behavioral Medicine,16,* 509-522.
11. Skelly, A. H., Marshall, J. R., Haughey, B. P., Davis, P. J., & Dunford, R. G. (1995). Self-efficacy and confidence in outcomes as determinants of self-care practices in inner-city, African-American women with non-insulin-dependent diabetes. *Diabetes Educator, 21,* 38-46.
12. Miller, C. K., Edwards, L., Kissling, G., & Sanville, L. (2002). Evaluation of a theory-based nutrition intervention for older adults with diabetes mellitus. *Journal of the American Dietetic Association, 102,* 1069-1081.
13. Miller, C. K., Edwards, L., Kissling, G., & Sanville, L. (2002). Nutrition education improves metabolic outcomes among older adults with diabetes mellitus: results from a randomized control trial. *Preventive Medicine, 34,* 252-259.
14. Williams, K. E., Bond, M. J. (2002). The roles of self-efficacy, outcome expectancies and social support in the self-care behaviours of diabetics. *Psychology Health and Medicine, 7,* 127-141.
15. Chlebowy, D. O., & Garvin B. J. (2006). Social support, self-efficacy, and outcome expectations: Impact on self-care behaviors and glycemic control in Caucasian and African-American adults with type 2 diabetes. *Diabetes Educator, 32,* 777-786.
16. Aljasem, L. I., Peyrot, M., Wissow, L., & Rubin, R. R. (2001). The impact of barriers and self-efficacy on self-care behaviors in type 2 diabetes. *Diabetes Educator, 27,* 393-404.
17. Johnston-Brooks, C. H., Lewis, M. A., & Garg, S. (2002). Self-efficacy impacts self-care and HbA1c in young adults with type 1 diabetes. *Psychosomatic Medicine, 64,* 43-51.
18. Krichbaum, K., Aarestad, V., & Buethe, M. (2003). Exploring the connection between self-efficacy and effective diabetes self-management. *Diabetes Educator, 29,* 653-662.

19. Cherrington, A., Wallston, K. A., & Rothman, R. L. (2010). Exploring the relationship between diabetes self-efficacy, depressive symptoms, and glycemic control among men and women with type 2 diabetes. *Journal of Behavioral Medicine*, *33,* 81-89.
20. Sarkar, U., Fisher, L., & Schillinger, D. (2006). Is self-efficacy associated with diabetes self-management across race/ethnicity and health literacy? *Diabetes Care, 29,* 823-829.
21. Montague, M. C., Nicols, S. A., & Dutta, A. P. (2005). Self-management in African American women with diabetes. *Diabetes Educator, 31,* 700-711.
22. Cook, T. D., & Campbell, D. J. (1963). *Quasi-experimentation: Design and analysis issues for field settings.* Chicago, IL: Rand McNally.
23. Glasgow, R., Toobert, D. J , & Riddle, M., Donnelly, J., Mitchell, D. L., & Calder, D. (1989). Diabetes-specific social learning variables and self-care behaviors among persons with Type II diabetes. *Health Psychology, 8,* 285-303.
24. Weijman, I., Ros, W. J., Rutten, G. E., Schaufeli, W. B., Schabracqu, M. J., & Winnubst, J. A. (2005). The role of work-related and personal factors in diabetes self-management. *Patient Education and Counseling, 59,* 87-96.

Table 1. Select Demographic and Diabetes Characteristics of Participants

	Characteristic	All N %	Caucasians n %	African Americans n %
Gender				
	Male	40 (44.0)	33 (51.6)	7 (25.9)
	Female	51 (56.0)	31 (48.4)	20 (74.1)
Marital Status				
	Never married	11 (12.4)	5 (7.8)	6 (24.0)
	Married	58 (65.2)	50 (78.1)	8 (32.0)
	Separated/ Divorced	10 (11.2)	5 (7.8)	5 (20.0)

	Widowed	10 (11.2)	4 (6.3)	6 (24.0)
Education				
	Less than 8th grade	5 (5.8)	2 (3.3)	3 (11.1)
	Some high school	10 (11.5)	6 (10.0)	4 (14.8)
	High school graduate	30 (34.5)	19 (31.7)	11 (40.7)
	Some college or technical school	18 (20.7)	12 (20.0)	6 (22.2)
	College graduate	24 (27.6)	21 (35.0)	3 (11.1)
Occupation				
	Employed	32 (36.0)	27 (42.9)	5 (19.2)
	Homemaker	12 (13.5)	8 (12.7)	4 (15.4)
	Disabled	14 (15.7)	9 (14.3)	5 (19.2)
	Unemployed	12 (13.5)	7 (11.1)	5 (19.2)
	Retired	19 (21.3)	12 (19.0)	7 (26.9)
Medications				
	None	7 (7.7)	5 (7.8)	2 (7.4)
	Oral agents	55 (60.4)	40 (62.5)	15 (55.6)
	Oral agents and insulin	19 (20.9)	12 (18.8)	7 (25.9)
	Insulin	10 (11.0)	7 (10.9)	3 (11.1)

Table 2. Two-Factor Analysis of Variance: SE and Gender and Race

Two-factor ANOVA model in which SE was made a function of gender and race (Caucasian, African American), while adjusting for age and duration of T2DM. The models suggest SE does not significantly differ between males and females (93.1 vs. 97.1) or Caucasians and African Americans (95.8 vs. 92.6).

Variable	F	p-value
Gender	1.327	0.253
Race	0.564	0.455

Table 3. Predicting SE from Explanatory Socio-Demographic Variables

The hierarchical multiple linear regression model predicting SE from the explanatory variables studied. The only significant predictor of SE was education attainment (β=0.334, p=0.002), suggesting that for each additional year of education an individual's SE increases by 0.334.

Variable	B	p-value
Female	0.125	0.321
Marital Status (married vs. others)	0.005	0.903
Educational Attainment	0.334	0.002***
Occupation	0.235	0.116
Medication	0.009	0.882
Age	0.092	0.558
Race	0.181	0.384