Self-Efficacy and Diabetes Self-Management in Middle-Aged and Older Adults in the United States: A Systematic Review

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OBJECTIVE | This study aimed to systematically review the existing literature on the relationship between self-efficacy and diabetes self-management in middle-aged and older adults in the United States and to determine whether the relationship applies across race and ethnicity.

METHODS | Study selection followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses method. Studies published between 1990 to 2018 that investigated self-efficacy and diabetes self-management in middle-aged and older adults were searched using eight search engines: PsycINFO, CINAHL, SocIndex, AgeLine, MedLine, Social Science Citation Index, Cochrane Library, and Academic Search Complete. Only quantitative studies were included.

RESULTS | Eleven studies met the inclusion criteria. Ten studies found significant association between self-efficacy and at least one self-management behavior, which included exercise, healthy diet, adherence to medication, blood glucose testing, and foot care. Findings were mixed regarding the role of self-efficacy in exercise and medication adherence. Higher self-efficacy in Mexican Americans predicted better self-management behaviors, whereas no relationship between self-efficacy and diabetes self-management was found in a sample of Black and White participants. The methodological quality of the studies was assessed. In general, the included studies demonstrated moderate methodological quality. Their limitations included inconsistency in the self-efficacy measures, a lack of longitudinal studies, and confounding bias.

CONCLUSION | Self-efficacy has significant effects on self-management in middle-aged and older adults, but the effects may differ by race. Efforts to improve self-efficacy and deliver culturally appropriate services could potentially promote self-management behaviors in middle-aged and older adults with diabetes.

Diabetes is a common and complex chronic disease among middle-aged and older adults. According to the Centers for Disease Control and Prevention, in 2015, 12 million adults ≥ 65 years of age (25.2%) and 14.3 million adults aged 45–64 years (17%) in the United States had diagnosed or undiagnosed diabetes (1). Older adults with diabetes have particularly high mortality rates, reduced functional status, and increased risk for other chronic complications such as high blood pressure and kidney disease (2). In 2012, it was estimated that the total direct medical costs attributed to diabetes in the United States were \$176 billion (1), and 92% of the health care expenditures on diabetes were spent on middle-aged and older adults (3). The onset of type 2 diabetes occurs most often among middle-aged adults (1). Given that individuals with middle-aged onset of diabetes tend to have greater disease burden and worse glycemic

control than those with older onset (4), older adults who are diagnosed with diabetes in middle age might have lower confidence in their diabetes self-management. In addition, population aging has been a driver for the increasing number of older adults living with diabetes (5) because many adults diagnosed with diabetes now live into their late adulthood as a result of medical advances. Therefore, it is crucial to develop strategies for successful diabetes self-management in middle-aged and older adults.

Self-management has been recognized as an effective way to help older adults cope with diabetes self-care, including diet, exercise, blood glucose testing, medicine adherence, foot care, and other self-care activities (6). In addition, prior research has demonstrated that increasing self-efficacy can help improve self-management behaviors in the general adult population (7,8). Given that middle-aged and older

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adults face distinct challenges in self-managing diabetes, this review aimed to assess the association between self-efficacy and diabetes self-management in middle-aged and older adults and to determine whether that association differs by race and ethnicity.

Key Concepts

The term “self-management” refers to “the individual’s ability, in conjunction with family, community, and health care professionals, to manage symptoms, treatments, lifestyle changes, and psychosocial, cultural, and spiritual consequences of health conditions” (9). Diabetes self-management includes gaining knowledge and skills related to treating the condition and applying those skills to daily life. Diabetes self-management skills often include the incorporation of a balanced diet, adequate exercise, stress management, blood glucose testing, medication adherence, and insulin-taking into daily life (10).

The concept of self-efficacy has been widely applied to the study of self-management behaviors in individuals with diabetes (7,8). As a fundamental component of social cognitive theory (11), the term “self-efficacy” refers to belief in one’s capabilities to organize and execute the courses of action that are required to produce a desirable outcome (12). In health research, self-efficacy specifically refers to patients’ judgment of their coping capabilities in designated areas of functioning (13). Self-efficacy has been found to be crucial in accomplishing diabetes self-management, especially performing recommended activities and maintaining psychosocial functioning (14,15).

Study Objectives

An earlier review examined the association between self-efficacy and diabetes self-management in the general adult population and concluded that self-efficacy was associated with self-management activities (16). However, research has also found that self-efficacy remains stable or decreases with age (17), which could render middle-aged and older adults, especially individuals with earlier onset of chronic conditions, less confident in their self-management of a chronic disease such as diabetes. Thus, it is important to examine whether the link between self-efficacy and diabetes self-management applies to middle-aged and older adults. In addition, some recent studies testing the association between self-efficacy and diabetes self-management within different racial groups have yielded mixed findings (8,18). Thus far, no review has examined the relationship between self-efficacy and diabetes self-management specifically among middle-aged and older adults or whether the relationship applies across races and ethnicities. This

systematic review aimed to bridge the gap and answers the following questions:

- Research question 1: What is the association between self-efficacy and diabetes self-management in middle-aged and older adults?
- Research question 2: Does the association between self-efficacy and diabetes self-management in middle-aged and older adults apply across races and ethnicities?

Exploring these two questions is important for two reasons. First, it would not only help health professionals better understand the role of self-efficacy in diabetes self-management activities, but also help to inform the development of diabetes education to meet the needs of middle-aged and older adults with diabetes. Second, given the significant racial disparities in the development of health complications among older adults with diabetes (5), studying self-efficacy across races and ethnicities in this age-group could inform culturally competent practice and help in tailoring diabetes education to specific racial or ethnic groups.

Research Design and Methods

Inclusion and Exclusion Criteria

Types of Studies

Quantitative studies using cross-sectional or longitudinal designs were included if their outcomes were diabetes self-management or self-care behaviors. Descriptive studies, correlational studies, case studies, and qualitative studies were excluded from the review because of the difficulty of quality assessment and lack of inferential implications.

Types of Participants With Diabetes

Studies were included if their participants were adults ≥ 50 years of age and diagnosed with diabetes. Additionally, only community-dwelling adults who were able to live independently in the United States were included. Adults living in nursing homes and assisted living facilities were excluded from the review because self-efficacy and self-management among older adults who are dependent can be very different from those of people who lived independently.

Types of Outcome Measures

Diabetes self-management outcomes included diet, exercise, smoking, medication adherence, foot care, blood glucose testing, and insulin management. Studies were included if they assessed one or more of these behaviors.

Additional outcomes were added as identified in the process of the review.

Search Strategy

The following eight electronic databases were used to search literature: PsycINFO, CINAHL, SocIndex, AgeLine, MedLine, Social Science Citation Index, Cochrane Library, and Academic Search Complete. Articles published from 1990 to 2018 were identified.

The term “diabetes self-care” has often been used interchangeably with “self-management” (17) and has been extensively used in diabetes research (7,18). Self-care refers to activities performed by healthy individuals as opposed to self-management, which is performed by those who are chronically ill (10). However, some researchers considered self-care as a broader concept of healthy lifestyle behaviors that include self-management (19). Because the scope of self-care largely overlaps with self-management (10,19), diabetes self-care was considered as equivalent to self-management if the activities were consistent with our focus on behaviors such as diet, exercise, blood glucose testing, and other daily activities important for diabetes management. The search string was: (diabetes OR diabetes mellitus) AND (self-management OR self-care OR self-management outcomes) AND self-efficacy AND (middle-aged adults OR older adults OR adults OR elderly). The search string was conducted in title and abstract, consistent across all databases.

Data Collection and Analysis Methods

Data Management

All identified articles were imported to the RefWorks citation tool and de-duplicated. A Microsoft Excel spreadsheet was created as a data extraction form for recording four parts: study information, initial screening, eligibility decisions, and basic study information. The de-duplicated citations in RefWorks were imported to the data extraction form for coding.

Selection of Studies

Two coders (W.Q. and M.Y.) independently screened the titles and abstracts of articles based on the inclusion and exclusion criteria. Full texts were retrieved if the information in the title and abstract was insufficient to determine whether the study should be included. Disagreements regarding selection decisions were resolved by a third coder. Reasons for excluding studies were documented.

Results

Search Results

The study selection process and reasons for exclusion followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) method (Figure 1). We identified 308 studies through searching the database. Eleven studies met the inclusion criteria and were included for the systematic review (8,18,20–28). The interrater reliability between the first and second coder, represented by the Cohen's κ coefficient, was 0.57, indicating moderate agreement (29).

Study Characteristics

Detailed study characteristics are presented in Table 1. Two studies used samples of middle-aged and older adults (26,28), whereas the rest of the included studies used samples of the general adult population consisting largely of adults ≥ 50 years of age. All 11 studies examined exercise. Other examined regimens included diet ($n = 10$), medication ($n = 7$), blood glucose testing ($n = 7$), foot care ($n = 5$), smoking ($n = 2$), and fat intake ($n = 1$). The most frequently used instrument to measure diabetes self-management was the Summary of Diabetes Self-Care Activities ($n = 7$). In terms of self-efficacy, seven studies used global measures, and four used regimen-specific measures that focused on different self-management behaviors.

Main Findings

Research Question 1

Overall, 10 of the 11 studies found self-efficacy to be an important predictor of at least one regimen behavior (8,18,20–23,25–28). Specifically, six out of 10 studies that examined dietary behaviors found self-efficacy to be a predictor for healthy diet. Similarly, six of the 11 studies that examined exercise indicated that exercise was related to higher self-efficacy. Also, four of the seven studies that examined medication adherence found significant associations, and three of the seven studies that examined blood glucose testing found that self-efficacy predicted testing. In addition, two of the five studies that explored the relationship between self-efficacy and foot care found significant relationships in this area. Because three studies measured overall diabetes self-management (21,25,28), the relationship between self-efficacy and behavior-specific self-management was unknown. Nevertheless, all three of those studies reported significant associations between self-efficacy and diabetes self-management.

One study found that self-efficacy was not a significant predictor for any measured self-management behaviors (diet, exercise, or blood glucose testing) (24). This study

FIGURE 1 PRISMA flow diagram.

further indicated that exercise appeared to be the most difficult self-care activity to maintain (24), which echoed a previous study's finding of no relationship between self-efficacy and exercise (18). In addition, contrary to the findings of other studies, one study found no relationship between self-efficacy and medication adherence (8).

Research Question 2

To a large degree, self-efficacy significantly predicted diabetes self-management across white, African-American,

and Hispanic participants. One study focusing solely on Hispanics found that self-efficacy predicted diabetes self-management in diet and exercise (26). In addition, in a sample of participants including whites, African Americans, Hispanics, and Native Americans, a moderation analysis found no significant interaction between self-efficacy and race in predicting diabetes self-management (8), indicating that the relationship between self-efficacy and diabetes self-management was maintained across races and ethnicities and that self-efficacy could be important to

TABLE 1 Characteristics of Included Studies

Author*	<i>n</i>	Location	Sample Age, years	Sample Race/Ethnicity	Self-Efficacy Measure	Diabetes Self-Management Measure and Behaviors Examined	Findings
Aljaseem et al. (18)	309	Johns Hopkins Hospital, Baltimore, MD	Range: 24–88; median range: 50–59	African American, 49.3%; White American (50.4%)	Grossman Self-Efficacy for Diabetes Scale (regimen-specific)	Questionnaire developed by the authors: diet, exercise, medication, blood glucose testing, and insulin taking	Higher self-efficacy predicted better diet, medication adherence, blood glucose testing, and taking insulin. No significant relationships were found between self-efficacy and exercise.
Hahn et al. (20)	295	General medicine clinic of the John H. Stroger, Jr., Hospital of Cook County, IL	Range: ≥ 18 ; mean: 55	Hispanic/Latino, 57.6%; African American, 31.9%; other, 10.5%	Eight-item scale developed by Sarker et al. (8) (regimen-specific)	Summary of Diabetes Self-Care Activities–Revised: diet, exercise, medication, blood glucose testing, foot care, and smoking	Higher self-efficacy predicted better diet, exercise, blood glucose testing, foot care, and medication adherence. A relationship between self-efficacy and smoking was not reported.
Hunt et al. (21)	50	Three primary care offices in two rural Alabama counties	Range: 26–81; majority ≥ 51	African American, 60%; White American, 40%	Diabetes Management Self-Efficacy Scale (global)	Summary of Diabetes Self-Care Activities–Revised: diet, exercise, blood glucose testing, and foot care	Higher self-efficacy was associated with better performance of overall diabetes self-management. Regimen-specific relationships were not examined.
King et al. (22)	463	Five Kaiser Permanente primary care clinics in the Denver, CO, metropolitan area	Range: 25–75; mean: 60	Latino, 21%; proportions of other races/ethnicities not reported	Lorig's eight-item Diabetes Self-Efficacy Scale (6) (regimen-specific)	National Cancer Institute's Percent Energy from Fat, Starting the Conversation Scale, Community Healthy Activities Model Program for Seniors, and the medication-taking items of the Hill-Bone Compliance Scale: diet, fat intake, exercise, and medication	Higher self-efficacy predicted fat intake, diet, exercise, and medication adherence.
Nelson et al. (23)	717	Two Veterans Affairs clinics in Washington state	Range: ≥ 30 ; majority ≥ 55	Veterans; proportions of races/ethnicities not reported	Perceived Competence in Diabetes Scale (global)	Summary of Diabetes Self-Care Activities, Physical Activity Scale for the Elderly, and Diet Habits Questionnaire: diet, exercise, medication, and smoking	Higher self-efficacy predicted better medication adherence, exercise, and nutritious diet. A relationship between self-efficacy and smoking was not reported.

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TABLE 1 Characteristics of Included Studies

Author*	n	Location	Sample Age, years	Sample Race/Ethnicity	Self-Efficacy Measure	Diabetes Self-Management Measure and Behaviors Examined	Findings
Sarkar et al. (8)	408	Two primary care clinics at San Francisco General Hospital in San Francisco, CA	Range: ≥ 30 ; mean: 58.1	Asian American, 18%; African American, 25%; Hispanic/Latino, 40%; White American, 12%; Native American, 0.5%; multiethnic, 1.5%; other, 3%	Diabetes Self-Efficacy Scale-Revised (global)	Summary of Diabetes Self-Care Activities Questionnaire: diet, exercise, medication, blood glucose testing, and foot care	Higher self-efficacy predicted more optimal diet, exercise, blood glucose testing, and foot care. No significant relationship was found between self-efficacy and medication adherence. No significant interaction was found between self-efficacy and race.
Shigaki et al. (24)	77	Two university family medicine clinics in Missouri	Range: ≥ 18 ; mean: 63	White American, 77%; African American, 21%; other, 2%	Perceived Competence in Diabetes Scale (global)	Summary of Diabetes Self-Care Activities-Revised: diet, exercise, and blood glucose testing	Self-efficacy was not a significant predictor for any measured self-care behaviors. Exercise appeared to be the most difficult self-care activity to maintain.
Walker et al. (25)	615	Two primary care clinics in the southeastern United States	Range: ≥ 18 ; mean: 61.3	African American, 64.9%; White American, 33%; Hispanic/Latino, 2.1%	Perceived Diabetes Self-Management Scale (global)	Morisky Medication Adherence Scale and Summary of Diabetes Self-Care Activities: diet, exercise, medication, blood glucose testing, and foot care	Higher self-efficacy significantly predicted better overall self-management. Regimen-specific relationships were not examined.
Wen et al. (26)	138	Outpatient clinics (adult and geriatric) of a university clinic in San Antonio, TX	Range: ≥ 55 ; mean: 64.06	Mexican American	Multidimensional Diabetes Questionnaire-Revised (regimen-specific)	Summary of Diabetes Self-Care Activities-Revised: diet and exercise	Higher self-efficacy predicted better diet and exercise behaviors.
Williams-Piehot et al. (27)	622	Urban and rural settings across the United States	Range: < 50 to ≥ 70 ; majority ≥ 50	Native American, 12%; African American, 10%; White American, 51%; other, 27%	Single question: "How confident are you that you can solve problems related to your diabetes?" (global)	Seven items from the 2005 Behavioral Risk Factor Surveillance System: exercise	Higher self-efficacy predicted higher odds of sufficient exercise versus insufficient exercise and inactivity.
Zulman et al. (28)	1,834	National data (from the Health Retirement Study)	Range: ≥ 50 ; mean: 70	White American, 76%; African American, 19%; other, 5%	Participants reported confidence in their ability to perform six key diabetes care activities (global)	Participants were asked to rate their difficulty with and ability to complete tasks in five regimens: diet, exercise, medication, blood glucose testing, and foot care	Self-efficacy was the strongest diabetes-specific psychosocial attribute predictor for self-management. Regimen-specific relationships were not examined.

diabetes self-management regardless of a person's race or ethnicity.

However, only one study included Asian Americans in the sample; thus, the association of self-efficacy and diabetes self-management among Asian Americans remains unclear (8). One study with a sample of veterans did not report participants race or ethnicity but still provided important information for practice with veterans by indicating that higher self-efficacy predicted better diet, exercise, and medication adherence (23).

Assessment of Methodological Quality

The overall quality of the included studies was moderate. First, all included studies adopted a cross-sectional design; thus, causal relationships between self-efficacy and diabetes self-management could not be determined. However, the consistent pattern of effects of self-efficacy on self-management still provided strong evidence of the relationship and important information for future research and practice. Second, eight studies reported psychometric properties of study measures for their samples (8,18,20,21,23–26); the remaining three studies, although using validated scales, failed to report the reliability and validity specific to their samples (22,27,28), rendering their findings less convincing. Third, in terms of confounders, all included studies controlled for demographic variables, eight controlled for duration of diabetes, and six controlled for the comorbid conditions. Nevertheless, only one study controlled for the severity of diabetes, and none controlled for health care–related information, such as health insurance status and communication with health care professionals (HCPs), which could potentially affect self-efficacy in middle-aged and older adults.

Discussion

This systematic review sought to explore the connection between self-efficacy and diabetes self-management behaviors among middle-aged and older adults and how the connection applies across races and ethnicities.

Self-Efficacy and Diabetes Self-Management

There is strong evidence that self-efficacy is highly predictive of improved behaviors in diet and blood glucose testing, regardless of whether a regimen-specific or global measure of self-efficacy was used. Nevertheless, the role of self-efficacy in exercise and medication adherence remains ambiguous. For example, although some studies found significant effects of regimen-specific self-efficacy (20,22) or global self-efficacy (8,23) on exercise, others found no association of self-efficacy with exercise, whether self-efficacy was a regimen-specific (18) or a

global measure (24). These mixed findings suggest that consistent measures of self-efficacy should be used to assess individuals' confidence in exercise to manage diabetes.

In addition, no study focused solely on older adults ≥ 65 years of age. One study using a sample of adults ≥ 50 years of age found that self-efficacy was the strongest psychosocial predictor for diabetes self-management (28), indicating that self-efficacy may be a more important factor in diabetes self-management for older adults than for individuals in younger age-groups. Further studies could explore the role of self-efficacy in diabetes self-management specifically among older adults to inform diabetes education effects for the aging population.

Self-Efficacy and Diabetes Self-Management by Race

One study found that self-efficacy predicted diabetes self-management in a sample of Mexican Americans (26), indicating that self-efficacy could be important for Mexican Americans in self-managing diabetes. Thus, it is worthwhile to consider focusing on improving self-efficacy in developing diabetes education programs for the Mexican-American population.

However, studies with white and African-American samples had mixed findings regarding the relationships between self-efficacy and diabetes self-management. Whereas one study found self-efficacy to be a significant predictor of self-management (18), another found no relationship in any areas for whites or African Americans (24). One possible explanation is that factors other than self-efficacy may be more influential on diabetes self-management for African Americans and whites. Given that African Americans have a higher prevalence of diabetes-related complications than the white population (18), future research needs to explore factors other than self-efficacy, such as social support, financial issues, and access to health care, which may be more salient predictors of self-management for this population.

Additionally, Native Americans and Asian Americans were consistently understudied across the included studies; thus, relationships between self-efficacy and diabetes self-management in these two populations remain unclear. The lack of inclusion of Asian Americans may be the result of the significantly lower percentage of Asian Americans (9.0%) than African Americans (13.2%) and Hispanics (12.8%) with diabetes diagnoses (30). However, given that 50.9% of diabetes in Asian Americans is undiagnosed, which is higher than in any other racial or ethnic group (31), it is imperative to include more Asian Americans in diabetes research. In addition, more research is needed in

self-efficacy and diabetes self-management in Native Americans because the prevalence of diabetes has reached 15.9% for this population—higher than in any other racial or ethnic group (30). Overall, future research could study self-efficacy and diabetes management using samples that include more racial and ethnic minorities and learn how to better support individuals in these populations in coping with diabetes-related conditions.

Limitations

These review findings should be interpreted in light of some limitations. First, no longitudinal study was identified; thus, how self-efficacy is associated with diabetes self-management in the long term remains unknown. Given that self-efficacy can change over time in middle-aged and older adults, understanding such longitudinal associations would be important to inform diabetes education programs. Second, there was a lack of consistency in the self-efficacy measures used across included studies, which may explain the mixed findings on self-management behaviors. Although some studies used regimen-specific measures, few examined whether these measures have acceptable reliability and validity for minority racial and ethnic groups.

Implications

Practice Implications

HCPs could focus efforts on increasing self-efficacy in middle-aged and older adults with diabetes, and especially older Mexican Americans, to help them self-manage diet, medication, and glucose testing. However, the present review found that self-efficacy might not be a strong factor in diabetes self-management among whites and African Americans. One possible explanation is that other factors, such as emotional support and social networks, could be more important in influencing the self-management for these two populations. Therefore, HCPs working with middle-aged and older adults with diabetes need to consider the specific needs of particular racial and ethnic groups.

Research Implications

The effects of self-efficacy on diabetes self-management by race and ethnicity are less conclusive given the mixed findings of the included studies. More studies are needed to determine the role of self-efficacy across races and ethnicities. Specifically, our review has revealed a lack of within-group studies of self-efficacy and diabetes self-management among different races and ethnicities. We identified one study focusing solely on Mexican Americans (26), whereas we found no studies conducted specifically in African Americans, Asian Americans, or other racial or ethnic groups in the United States. Understanding

the effects of self-efficacy across races and ethnicities would be important to help HCPs become more culturally competent in helping patients from diverse populations.

Additionally, many other socioeconomic and health factors might also affect the relationship between self-efficacy and diabetes self-management in middle-aged and older adults. For example, barriers to self-efficacy might differentially affect older adults with lower income and worse health status, which could further limit their ability to engage in diabetes self-management behaviors. Given that educational programs are fundamental elements of diabetes care and HCPs delivering diabetes education will continue to promote self-management, it is important to understand the additional barriers to self-efficacy and self-management to better help middle-aged and older adults cope with diabetes.

There is also a need for consensus on a clear definition of the theoretical concept of self-efficacy regarding diabetes self-management among middle-aged and older adults. Global measures of self-efficacy provide limited information on specific types of self-management. Therefore, it is important for future research to focus on regimen-specific measures that will improve understanding of self-efficacy with regard to each specific self-management behavior.

DUALITY OF INTEREST

No potential conflicts of interest relevant to this article were reported.

AUTHOR CONTRIBUTIONS

W.Q. conceptualized the study, searched and coded articles, and wrote the manuscript. J.E.B. contributed to the introduction and discussion of the manuscript. M.Y. coded articles and contributed to the Research Design and Methods section. W.Q. is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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