The Diabetes Disparity and Puerto Rican Identified Individuals

A Systematic Literature Review

Purpose

The purpose of this systematic review was to describe what is known about the diabetes disparity affecting Puerto Rican identified adults living in the continental United States as well as illuminate areas that merit further investigation.

Methods

The CINAHL and PubMed databases were searched using the keywords *Hispanic, Puerto Rican*, and *type 2 diabetes*. Search limits included < 10-year-old, peer-reviewed, systematic reviews, available in the English language. The abstracts of 124 articles were reviewed, and 7 articles were reviewed in depth.

Results

The Puerto Rican identified Hispanic subgroup is disproportionately affected by diabetes—the diabetes disparity. Puerto Rican identified Hispanic adults are less affected by citizenship status, may be less affected by English proficiency, use health care services differently, and have contextually different fatalistic views of diabetes compared with other Hispanic identified people. Spiritual/religious influences, associated mental health problems, and general cultural practices related to diabetes self-care are understudied in this group.

Jalil A. Johnson, MS, ANP-BC

Stephen Cavanagh, PhD, MS, MPA, RN

Cynthia S. Jacelon, PhD, RN-BC, CRRN

Lisa Chasan-Taber, MPH, ScD

From College of Nursing, University of Massachusetts, Amherst, MA, USA (Mr Johnson, Dr Cavanagh, Dr Jacelon, Dr Chasan-Taber).

Correspondence to Jalil A. Johnson, MS, ANP-BC, College of Nursing, University of Massachusetts, Amherst, Skinner Hall 651 North Pleasant Street, Amherst, MA 01003-9299, USA (jalil@nursing.umass.edu).

Acknowledgments: The author has declared no conflicts of interest. This work was supported by an unrestricted grant from Hluchyj Fellowship through a collaboration of the University of Massachusetts, Amherst Graduate School of Engineering and College of Nursing. The opinions, results, and conclusions are those of the author, and no endorsement from the fellowship is intended or should be inferred. Finally, the author extends special gratitude to the coauthors and dissertation committee members Dean Stephen Cavanagh, Dr Cynthia S. Jacelon, and Dr Lisa Chasan-Taber.

DOI: 10.1177/0145721716687662

meta-analysis, systematic reviews, and integrative reviews

Conclusion

Ambiguous use of the term *Hispanic* should be avoided when describing Hispanic subgroups. Stronger, more robust studies are needed to understand the unique cultural forces influencing the poor diabetes outcomes and individual behaviors that contribute to generally suboptimal diabetes self-care for Puerto Rican adults with type 2 diabetes.

Type 2 diabetes mellitus (T2DM) is a growing problem in the United States. Racial and ethnic minorities are disproportionately affected by diabetes.[1] Puerto Rican identified Hispanic (PRiH) adults are inexplicably affected by T2DM and have poorer health outcomes than their white counterparts as well as other Hispanic subgroups.[1] The American Association of Diabetes Educators[2] recommends that culturally competent interventions for diabetes care meet the target population where they are and reflect an understanding of the cultural, social, historical, environmental, and psychological forces that influence health behaviors and outcomes. The focus of this systematic literature review is to illuminate what is unknown regarding our understanding of cultural factors influencing the diabetes disparity that affects the PRiH subgroup. This discussion will be limited to PRiH adults (45–65 years old), as this is an expanding population with various challenges for individuals, families, communities, and health care providers.

Background

Hispanic Population and Diabetes

The Hispanic community, numbering more than 50 million, is the fastest growing of any demographic group in the country,[1] representing 14.8% of the US population, and is projected to increase to almost 25% by the year 2050.[3] Hispanic subgroups are often combined in health research, and this practice likely conceals important differences between the subgroups.[4–7] There are differences between subgroups with respect to the prevalence of T2DM and associated risk factors.[4] In addition, there is significant variability in socioeconomic status, language, and culture among the various subgroups.[8]

Type 2 diabetes mellitus is an upward trending national problem and the seventh leading cause of death in the United States.[1] The age-adjusted prevalence of diabetes among Hispanic identified persons (11.8%) is almost twice as high as non-Hispanic whites (7.1%).[1,9–11] Medication nonadherence is higher among Hispanic identified persons with diabetes compared with non-Hispanic whites with diabetes.[10] The majority of research and literature on the Hispanic diabetes disparity has been targeted at the largest Hispanic subgroup, Hispanics of Mexican ancestry, who primarily live in the western, central, and southern regions of the United States.[8]

Puerto Rican Adults and Diabetes

Puerto Rican identified Hispanic individuals make up the second largest Hispanic subgroup, representing 9.6% of Hispanics in the United States.[12] Puerto Rican identified Hispanic individuals have slightly higher rates of diagnosed diabetes (13.8%) compared with the more frequently studied Hispanics of Mexican ancestry (13.3%).[7] Puerto Rican identified Hispanic individuals in the United States experience considerable health disparities, including cognitive disability, T2DM, obesity, depressive symptomatology, hypertension, and self-reported heart disease, that exceed those reported for non-Hispanic whites or other Hispanic subgroups, including the more commonly studied Mexican identified Hispanics.[13–16] Similar to other ethnic minority groups, the PRiH population may suffer from higher rates of poverty and subsequent psychosocial stress than their white counterparts.[15,17] Studies found that PRiH adults may have a tendency to frequent emergency rooms and urgent care rather than primary care.[18]

Aim

The aim of this systematic literature review is to highlight what is known and unknown regarding the unique sociocultural factors related to PRiH adults with T2DM. These factors are important considerations for culturally competent clinicians and diabetes educators. It is important that this information is useful for researchers designing culturally tailored T2DM interventions targeting the PRiH subgroup.

Methods

Data Sources and Search Criteria

A search of the literature was conducted using the following search engines: Cumulative Index to Nursing and Allied Health Literature (CINAHL) and PubMed.

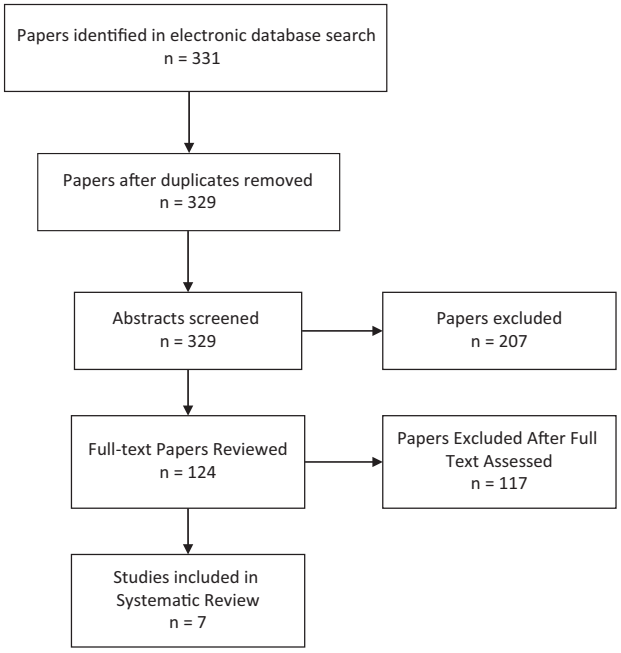

Figure 1. Flow chart: study selection.

Keywords included *Hispanic, Puerto Rican*, and *type 2 diabetes*. Search limits included available in English language, adults 45 to 64 years old, publish dates 2004 to 2015, and peer reviewed. Inclusion criteria included any article with a defined sample of PRiH adults with T2DM ages 45 to 64 years.

Search Outcome

The CINAHL and PubMed searches yielded 124 publications (Figure 1). Abstracts from these studies were reviewed and 116 were excluded for one or more of the following reasons: gestational diabetes studies, studies of adolescents, comparative drug effectiveness studies, type 1 diabetes studies, non-Hispanic/Asian/African American studies, general population studies not including Hispanic adults or diabetes, studies of Caucasian women, diabetes pathology studies, studies involving participants without established diabetes, and studies without a diabetes focus. It is important that 44 articles were excluded as they did not identify, discuss, or distinguish the Hispanic subgroup (ie, Mexican American, Cuban American, Puerto Rican). The remaining 7 articles were included in the review and reviewed in depth. The primary publications used for this review included 2 systematic reviews, 1 literature review, 3 population surveys, and 1 secondary data analysis.

Data Abstraction

Each study was deconstructed and organized into a matrix. Refer to Table 1 for narrative descriptions of the primary articles used for this review as well as associated level of evidence. Seven studies were reviewed and analyzed categorically as follows: level of evidence, study design, purpose/research question, sample, and relevant findings. This review differs from others in that the aim was to specifically summarize culturally relevant factors related to PRiH adults with T2DM.

Quality Appraisal

Melnyk and Fineout-Overholt's[24] guideline was used to assess the level of evidence for the articles included in the review. In this model, evidence is assigned a score ascending from 7 to 1, with 1 being the highest level of evidence. Refer to Table 2 for Melnyk and Fineout-Overholt's descriptions of levels of evidence.

Results

T2DM Prevalence

A population survey to estimate the prevalence of self-reported T2DM in Hispanic subgroups (N = 272 041 records of adults with diabetes, age > 20 years, where 46 749 individuals self-identified as Puerto Rican, Mexican, Mexican American, Cuban, Dominican, Central and South American, other Hispanic, non-Hispanic black, and non-Hispanic white) found that Mexican American, Mexican, Puerto Rican, other Hispanic, and non-Hispanic black respondents had greater odds of reporting T2DM.[12] In addition, PRiH respondents with less than a high school education had greater odds of reporting T2DM.[12] In this study, the sample sizes were unweighted; however, all other estimates (proportions, standard errors, and odds ratios with their 95% confidence intervals [CIs]) were weighted.

A secondary data analysis to examine T2DM-related risk factors as variables between and among three Hispanic subgroups (N = 246 841 adults with diabetes, self-identified as Mexican American, Puerto Rican, and/or Cuban American) found that there is significant and objective variance in T2DM risk factors between the

Table 1

Considerations for Puerto Rican Identified Adults With Type 2 Diabetes[a]

Cultural Consideration	Author(s), Year Published	Level of Evidence	Design	Purpose/ Research Question	Sample Size & Description	Relevant Findings
Psychosocial/ prevalence	Borrell, Crawford, Dallo, & Baquero, 2009[12]	Level 6	Population survey	Estimation of the prevalence of self-reported T2DM in Hispanic subgroups	N = 272 041 records of adults, including 46 749 records of Hispanic respondents. Individuals with T2DM who self-identified as Puerto Rican, Mexican, Mexican American, Cuban, Dominican, Central and South American, and other Hispanic, non-Hispanic black, and non-Hispanic white populations ages 20 years and older	Puerto Rican respondents with less than a high school education had greater odds of reporting T2DM. Mexican American, Mexican, Puerto Rican, other Hispanic, and non-Hispanic black respondents had greater odds of reporting T2DM.
Prevalence	Whitman, Silva, & Shah, 2006[19]	Level 6	Population survey	To assess the effect of diabetes in a large Puerto Rican community of Chicago	N = 603. Large Puerto Rican population in Chicago (595 people were eligible for study and 104 identified themselves as Puerto Rican)	Prevalence of diabetes was significantly higher among the obese, those with a family history of diabetes, older people, females, those with fewer years of education, those born in the United States, and those with insurance. Puerto Rican residents tended to be young, be female, have more than an eighth-grade education, and be born in Puerto Rico. T2DM risk was high: 33.2% of the residents were found to be obese and 43.2% had a family history of diabetes. The majority of the sample had health insurance. Puerto Ricans in this community reported a prevalence (20.8%; 95% confidence interval, 10.1%–38.0%) of diabetes nearly twice as high as Puerto Ricans living in New York City (11.3%) or Puerto Rico (9.3%–9.6%).

(continued)

Table 1

(continued)

Cultural Consideration	Author(s), Year Published	Level of Evidence	Design	Purpose/ Research Question	Sample Size & Description	Relevant Findings
Health care access	Hosler & Melnik, 2005[20]	Level 6	Random-digit-dialing telephone survey	Assessment of diabetes care and self-management among Puerto Rican adults in New York City	N = 838. Adults with T2DM, 18–64 years old. Sample included adult (> 18 years) Puerto Rican (N = 606) versus non-Hispanic control group (N = 232)	Puerto Ricans were not significantly disadvantaged regarding access to health care, had adequate health insurance coverage, had a particular place for medical care, and had a high frequency of seeing a provider for diabetes. Puerto Rican adults were less likely to receive annual A1C testing, cholesterol testing, blood pressure medication, and pneumococcal vaccinations and to take aspirin to prevent cardiovascular complications, were younger, and were more likely to have lower education attainment and lower income than the general population in New York State.
Beliefs	Caban & Walker, 2006[21]	Level 5	Systematic review	How do cultural factors influence Hispanics' approaches to diabetes self-management?	N = 27 articles. Four articles defined all or a portion of the sample as Puerto Rican. Published research studies were reviewed if they were conducted in the United States, were available in English, and focused primarily on Hispanics with diabetes.	Puerto Ricans did not identify susto as a cause of diabetes. Hispanic patients' thoughts about God and diabetes differed, and little is known about how these thoughts affect diabetes self-management. There is limited research on Hispanics' use of folk healers for diabetes-related care and limited evidence that fatalistic thinking is unique to Hispanic culture, and its relationship to diabetes self-management remains unclear.

(continued)

Table 1

(continued)

Cultural Consideration	Author(s), Year Published	Level of Evidence	Design	Purpose/ Research Question	Sample Size & Description	Relevant Findings
Cultural variation	Hatcher & Whittemore, 2007[22]	Level 5	Integrative literature review	Investigation of Hispanic adults' beliefs about T2DM	N = 15. Published research reports on Hispanic adults' beliefs about T2DM. Countries of origin included Mexico (n = 8), Puerto Rico (n = 2), and Cuba (n = 1).	There is variance among Hispanic subgroups in general; Hispanic adults' understanding of the etiology of T2DM was an integration of biomedical causes such as heredity and traditional or folk beliefs. The belief in susto was not observed in Puerto Rican communities. Hispanic adults from Puerto Rico were more likely to report a religious etiology as the cause of diabetes. Hispanic adults believed that T2DM is a serious illness and that they could identify many of the symptoms of diabetes. They identified both biomedical and herbal treatments for diabetes. Negative attitudes toward insulin were common. Religious beliefs also factored into Hispanic adults' explanatory models of T2DM.
Cultural variation	Aponte, 2009[4]	Level 4	Secondary data analysis	Examination of T2DM-related risk factors as variables between and among three Hispanic subgroups	N = 246 841 adults with T2DM, 20–74 years old, self-identified as Hispanic (Mexican American 85%, Puerto Rican 15%, and/or Cuban American < 1%)	There is significant and objective variance in T2DM risk factors between the Hispanic subgroups.
Culturally tailored interventions	Whittemore, 2007[23]	Level 5	Systematic review	Synthesis of the research on culturally specific interventions for Hispanic adults with T2DM	N = 11 articles discussing Hispanic adults with T2DM (7 studies were focused on people of Mexican ancestry, 2 studies were of Puerto Rican identified people, and 3 studies did not delineate between subgroups)	Most culturally specific interventions were efficacious. Culturally specific interventions included linguistic strategies, constituent-involving strategies, sociocultural strategies, and peripheral and evidential strategies.

Abbreviation: T2DM, type 2 diabetes mellitus.
[a]Data adapted from Melnyk and Fineout-Overholt.[24]

Table 2

Levels of Evidence[a]

Level	Description
Level 1	Systematic review and meta-analysis of randomized controlled trials; clinical guidelines based on systematic reviews or meta-analyses
Level 2	One or more randomized controlled trials
Level 3	Controlled trial (no randomization)
Level 4	Case-control or cohort study
Level 5	Systematic review of descriptive and qualitative studies
Level 6	Single descriptive or qualitative study
Level 7	Expert opinion

[a]Data adapted from Melnyk and Fineout-Overholt.[24]

Hispanic subgroups.[4] In this study, risk factors between Hispanic subgroups as well as levels within each variable were compared with referent normal levels for significant differences ($P < .05$) and odds ratio (95% CI).[4] These findings are congruent with the known, significantly higher prevalence of diagnosed T2DM for PRiH adults compared with non-Hispanic whites.[8]

Access and Barriers to Care

A random-digital-dialing telephone survey to assess T2DM care and self-management among adults (N = 838) in New York City found that, compared with the general population (N = 232 ethnically unidentified adults), self-identified Puerto Rican adults (N = 606) were not significantly disadvantaged regarding access to health care, had adequate health insurance coverage, had a particular place for medical care, and had a high frequency of seeing a provider for diabetes ($P < .01$).[20] In addition, PRiH adults tend to have comparable rates of health insurance coverage to the general population[25] and generally have a particular place for receiving medical care.[20]

A survey to assess the effect of diabetes in a large PRiH community of Chicago (N = 603 participants; 104 participants self-identified as Puerto Rican) found that PRiHs tended to be young, to be female, to have more than an eighth-grade education, and to have been born in Puerto Rico.[19] In this sample, T2DM risk was high; 33.2% of the residents were found to be obese and 43.2% had a family history of diabetes.[19] The majority of the sample had health insurance.[19] Puerto Rican identified Hispanics in this community reported a high prevalence of diabetes (20.8%; 95% CI, 10.1%−38.0%)—nearly twice as high as PRiHs living in New York City (11.3%) or in Puerto Rico (9.3%−9.6%).[19] The prevalence of T2DM was significantly higher among the obese, those with a family history of diabetes, older people, females, those with fewer years of education, those born in the United States, and those with insurance.[19]

Puerto Rican identified Hispanic adults tend to have the highest proportion of native English speakers among Hispanic subgroups, and they are less likely than other Hispanic subgroups to report difficulty communicating with health care providers because of language barriers.[20] Although language barriers are an important factor to consider when working with Hispanic communities, the literature suggests that this factor is less important when working with PRiH adults.

Beliefs and Psychosocial Factors

In some Hispanic subgroups, there is a common belief that *susto*, described as negative emotions, stress, or emotional trauma, can cause diabetes.[26] A systematic review to determine cultural influences on Hispanics' approaches to diabetes self-management (n = 27 research articles) found that PRiH adults did not identify susto as a cause of diabetes.[21]

An integrative literature review investigated Hispanic adults' beliefs about T2DM (n = 15 research reports; 2 studies focused on PRiHs) and found that there is variance in beliefs among Hispanic subgroups in general, and Hispanic adults' understanding of the etiology of T2DM was an integration of biomedical causes such as heredity and traditional or folk beliefs.[22] In this study, PRiH adults were more likely to report a religious/spiritual etiology as the cause of diabetes.[22] Puerto Rican identified Hispanic individuals in this study also tended to believe that T2DM is a serious illness and could identify many of the symptoms of diabetes.[22] Finally, the PRiH adults in this study were able to identify both biomedical and herbal treatments for T2DM; however, negative attitudes toward insulin were common.[22]

When contrasted with Hispanic individuals of Mexican ancestry, PRiH individuals tend to prefer standard or alternative therapies recommended by a health care provider (nurse or physician) rather than traditional or folk

remedies.[22] However, some PRiH individuals have health care perspectives that are incongruent with regard to etiology of diabetes, association of obesity with diabetes, acceptable T2DM diet modifications, appropriate exercise, insulin use, herbal remedies, and influence of spirituality or religion.[22]

The relationship between diabetes and mental health has been well studied.[27,28] In the process of this review, no studies were found that compared the prevalence of T2DM and comorbid mental health conditions as they affect the PRiH subgroup. In addition, although fatalistic views regarding T2DM are common in PRiH communities,[21] evidence is limited regarding the relationships between fatalism, diabetes self-management, and PRiH adults.[21]

Culturally Tailored Care

Cultural factors are important when designing culturally appropriate clinical and behavior interventions for Hispanic identified people.[22] Specifically, culturally distinct interventions, when modified for the PRiH subgroup, have been effective in producing clinically significant improvements in average A1C and glycemic control.[7] A systematic review evaluated the research on culturally specific interventions for Hispanic adults with T2DM (n = 11 articles; 2 articles specifically discussed PRiHs) and found that most culturally specific interventions were efficacious in terms of clinical outcomes (reduction in A1C), behavioral outcomes (improved dietary and exercise behaviors), or knowledge (increase in diabetes-related knowledge).[23] Culturally specific interventions included linguistic strategies (addressing linguistic barriers to care), constituent-involving strategies (community health workers), sociocultural strategies (ie, including family members in diabetes education), and peripheral and evidential strategies (not explicitly defined in this article).[23] In addition, culturally specific education strategies have also been effective at improving diabetes self-care (ie, increased knowledge, improved lipid profiles, reduction in A1C) for PRiH adults.[23]

Research suggests that Hispanic subgroups are not homogeneous. Culturally tailored care improves outcomes when working with minority populations. It is important that sociocultural adaptations to T2DM interventions have been efficacious in decreasing A1C in PRiH populations.[23]

Discussion and Recommendations

Puerto Rican identified Hispanic adults living in the continental United States have higher rates of T2DM and poorer diabetes-related outcomes than their white counterparts and some other Hispanic subgroups. The reason for this is not fully understood. Our findings suggest that the diabetes disparity affecting PRiH adults is unique, considering that the individuals in this population are US citizens by birth[25] and, subsequently, when compared to other Hispanic subgroups (ie, Mexican, Cuban, etc), may have relatively adequate access to health care. For this reason, improving health care access should not be a high priority for programs targeting PRiH adults.

Factors contributing to the diabetes disparity affecting PRiH adults may include incongruent perceptions of health and illness compared with their health care providers.[22] Programs targeting health education and redirection of health care utilization/resources for PRiH communities may be beneficial for health care providers, institutions, and policy makers.

Puerto Rican identified Hispanic adults also tend to prefer standard or alternative therapies rather than traditional or folk remedies[22] as well as health care providers who are fluent in Spanish.[22] This combination of attitudes and beliefs may be specific to the PRiH community and should be investigated and clarified. These cultural beliefs and practices are important considerations when designing interventions targeting PRiH adults with T2DM.

In general, PRiH adults have higher English-speaking proficiencies compared with other Hispanic subgroups,[20] and language barriers are more likely to be present for individuals who are Spanish-dominant speakers, are older, and are less educated.[20] This should be considered when designing interventions for PRiHs with T2DM, as language barriers may not be a significant barrier to care for younger English-dominant speakers. However, studies and interventions tailored to older adult PRiHs with T2DM should consider incongruences in health perception as well as language barriers for Spanish-dominant speakers.

Puerto Rican identified Hispanic individuals, specifically those living on the east coast, generally believe that religion/spirituality plays a role in developing or controlling T2DM.[22] Although similar to beliefs held by other Hispanic subgroups such as susto (belief that negative emotions cause diabetes), this belief is contextually

different and should not be considered a synonymous cultural belief. In addition, studies, interventions, and education techniques should address the effect of religion/spirituality and beliefs on T2DM self-care in the PRiH population.

Fatalistic views about diabetes are common for PRiH adults.[21] Common perceptions may include diabetes being a chronic illness that results in complications over time that cannot be avoided.[21] Fatalistic thinking likely contributes to poor patient–provider concordance as well as T2DM treatment adherence observed in some PRiH communities and should be considered when designing studies in this population.

Psychosocial problems, specifically depression, have a confounding effect on a person's ability to provide adequate self-care. Investigating and addressing the effect of comorbid mental health problems and psychosocial stressors on self-care should be considered. In addition, further study is needed to evaluate and contrast the differences between PRiH men and women regarding the lived experience and perceptions of living with T2DM.

There is no consensus as to whether or not studies on Hispanic subpopulations are generalizable to other Hispanic subgroups.[21] There are differences among and between Hispanic subgroups regarding culture,[19] and use of health care services varies.[20] To create culturally specific diabetes self-care interventions and education, clinicians and researchers must understand the unique cultural/traditional beliefs, customs, food patterns, and health care practices of the PRiH subgroup. It is important that interventions and education techniques specifically address cultural differences between PRiH populations and other Hispanic subgroups.

Finally, the US Hispanic population is not a homogeneous group. Several studies investigating Hispanics in areas of the country where the predominant population is commonly known as PRiH were not included in this review, as the authors did not delineate any Hispanic subset when they described the sample(s). This provides further evidence of the need for study authors to define their sample when conducting research of Hispanic subgroups.

Review Limitations

Our methods were restricted to two search engines. This reduced the breadth and depth of the search. In addition, the search was limited to studies < 10 years old and thus may have excluded relevant studies.

Melnyk and Fineout-Overholt's[24] guideline for evidence appraisal assigns a score ascending from 7 to 1, with 1 (systematic review and meta-analysis of randomized controlled trials [RTCs]; clinical guidelines based on systematic reviews or meta-analyses) being the highest level of evidence and 7 (expert opinion) being the lowest level of evidence. None of the primary articles used in this review had a level of evidence greater than 4 (case-control or cohort study). The small number of studies and lack of higher quality studies (ie, meta-analysis of RTCs; RTCs; controlled trials) contribute to the limitations and suggest that PRiH adults with T2DM are understudied.

Conclusion and Implications for Diabetes Education

Culturally tailored interventions and patient education are needed to reduce the diabetes disparity affecting the PRiH population. Strategies should include community and family diabetes education, culture-specific diet, and activity recommendations. Understanding the subtle and overt differences between PRiH individuals with diabetes compared with other Hispanic subgroups will be essential when constructing innovative and culturally tailored T2DM interventions. Multiple factors may be attributed to driving the diabetes disparity affecting PRiH individuals including health care access and utilization as well as socioeconomic, sociocultural, psychosocial, psychological, biological, and cultural factors. Education techniques should be directed at addressing these factors. Authors are encouraged to identify the specific Hispanic subgroup in future studies. Higher quality, more robust research is needed in studies targeting the PRiH diabetes disparity. Religious/spiritual, mental health, and psychosocial factors should be considered when designing culturally tailored interventions for PRiHs with diabetes. Future research should aim to determine how these factors contribute to the diabetes disparity affecting the PRiH subgroup. Greater understanding of the effect of these factors will be instrumental in designing culturally specific interventions and diabetes education strategies for PRiH individuals.

References

1. Centers for Disease Control and Prevention. *National diabetes fact sheet*. Atlanta, GA: US Department of Health & Human Services. http://www.cdc.gov/diabetes/pubs/estimates11.htm. Published 2011. Accessed February 1, 2013.

2. American Association of Diabetes Educators. Cultural sensitivity: definition, application, and recommendations for diabetes educators. *Diabetes Educ*. 2002;28:922–927.
3. US Census Bureau. *Hispanic origin*. Washington, DC: US Census Bureau. http://www.census.gov/population/hispanic/. Published 2012. Accessed February 1, 2012.
4. Aponte J. Diabetes-related risk factors across Hispanic subgroups in the Hispanic health and nutritional examination survey (1982–1984). *Public Health Nurs*. 2009;26(1):23–38.
5. Barcelo A, Gregg E, Pastor-Valero M, Robles S. Waist circumference, BMI and the prevalence of self-reported diabetes among the elderly of the United States and six cities of Latin America and the Caribbean. *Diabetes Res Clin Pr*. 2007;8(3):418–427.
6. Mainous A, Diaz V, Saxena S, Geesey M. Heterogeneity in management of diabetes mellitus among Latino ethnic subgroups in the United States. *J Am Board Fam Med*. 2007;20(6):598–605.
7. Allison M, Budoff M, Wong N, Blumenthal R, Schreiner P, Criqui M. Prevalence of and risk factors for subclinical cardiovascular disease in selected US Hispanic ethnic groups: the Multi-Ethnic Study of Atherosclerosis. *Am J Epidemiol*. 2008;167(8):962–969.
8. Rosal M, Olendzki B, Reed G, Gumieniak O, Scacron J, Ockene I. Diabetes self-management among low-income Spanish-speaking patients: a pilot study. *Ann Behav Med*. 2005;29(3):225–235.
9. Ezzati T, Flegal K, Harris M, et al. Prevalence of diabetes in Mexican Americans, Cubans, and Puerto Ricans from Hispanic Health and Nutrition Survey, 1982–1984. *Diabetes Care*. 1991;14(7):628–638.
10. Black S, Markides K, Ray L. The prevalence and health burden of self-reported diabetes in older Mexican Americans; findings from the Hispanic established populations for epidemiologic studies of the elderly. *Am J Public Health*. 1999;89(4):546–552.
11. Compton S, Haack S, Phillips C. Identification of barriers to medication adherence in a Latino population. *Res Soc Adm Pharm*. 2010;6(4):365–371.
12. Borrell L, Crawford N, Dallo F, Baquero M. Self-reported diabetes in Hispanic subgroup, non-Hispanic black, and non-Hispanic white populations: National Health Interview Survey, 1997–2005. *Public Health Rep*. 2009;124(5):702–710.
13. Franzini L, Ribble J. Understanding the Hispanic paradox. *Ethnic Dis*. 2001;11(3):496–518.
14. Carroll M, Curtin L, Flegal K, McDowell M, Ogden C, Tabak C. Prevalence of overweight and obesity in the United States, 1999–2004. *JAMA*. 2006;295(13):1549–1555.
15. Tucker K, Mattei J, Noel S, et al. The Boston Puerto Rican Health Study, a longitudinal cohort study on health disparities in Puerto Rican adults: challenges and opportunities. *BMC Public Health*. 2010;10:107.
16. Mattei J, Demissie S, Falcon L, Ordovas J, Tucker K. Allostatic load is associated with chronic conditions in the Boston Puerto Rican Health Study. *Soc Sci Med*. 2010;70(12):1988–1996.
17. von Goeler D, Rosal M, Ockene J, Scavron J, De Torrijos F. Self-management of type 2 diabetes: a survey of low-income urban Puerto Ricans. *Diabetes Educ*. 2003;29(4):663–672.
18. Tripp-Reimer T, Choi E, Enslein J, Kelley L. Cultural barriers to care: inverting the problem. *Diabetes Spec*. 2001;14:13–22.
19. Whitman S, Silva A, Shah A. Disproportionate impact of diabetes in a Puerto Rican community of Chicago. *J Community Health*. 2006;31(6):521–531.
20. Hosler A, Melnik T. Population-based assessment of diabetes care and self-management among Puerto Rican adults in New York City. *Diabetes Educ*. 2005;31(3):418–426.
21. Caban A, Walker E. A systematic review of research on culturally relevant issues for Hispanics with diabetes. *Diabetes Educ*. 2006;32:584–595.
22. Hatcher E, Whittemore R. Hispanic adults' beliefs about type 2 diabetes: clinical implications. *J Am Acad Nurse Prac*. 2007;19:536–545.
23. Whittemore R. Culturally competent interventions for Hispanic adults with type 2 diabetes: a systematic review. *J Transcult Nurs*. 2007;18:157–166.
24. Melnyk B, Fineout-Overholt E. *Evidence-Based Practice in Nursing and Healthcare: A Guide to Best Practice*. Philadelphia, PA: Lippincott, Williams & Wilkins; 2011.
25. Family Foundation and Pew Hispanic Center. National survey of Latinos: summary of findings. http://www.pewhispanic.org/files/reports/15.pdf. Published 2002. Accessed February 2013.
26. Cherrington A, Ayala G, Sleath B, Corbie-Smith G. Examining knowledge, attitudes, and beliefs about depression among Latino adults with type 2 diabetes. *Diabetes Educ*. 2006;32:603–613.
27. Ali S, Stone M, Peters J, Davies M, Khunti K. The prevalence of co-morbid depression in adults with diabetes: a meta-analysis. *Diabetic Med*. 2006;23(11):1165–1173.
28. Li C, Ford E, Strine T, Mokdad A. Prevalence of depression among US adults with diabetes. *Diabetes Care*. 2007;31:105–107.