Journal of Immigrant and Minority Health
https://doi.org/10.1007/s10903-020-00995-7

ORIGINAL PAPER

Latinx with Type 2 Diabetes: Perceptions of Cognitive Health

Heather Cuevas[1] · **Julie Zuñiga**[1]

Abstract
Cognitive complaints indicate risk for dementia, but few studies have examined the perspective of cognitive complaints in Latinx with type 2 diabetes (T2DM). This study explored the meaning of cognitive health from the perspective of Latinx adults with T2DM to assist in detecting problems with diabetes self-management. This was an exploratory qualitative descriptive study using narrative interviews (n = 30) and content analysis. Participants' mean age was 66 years; mean time with diabetes, 8.7 years; mean A1C, 9.7%. Participants emphasized health as the absence of disease, memory issues as a cognitive compliant, use of cognitive strategies, and the negative effect of cognitive problems on self-management. An additional finding was the impact of ethnic/racial discrimination on health. This study provides insights into cognitive health for Latinxs as well as the negative impact of racism experienced in the US healthcare system and shows that cognitive health assessment and education can positively impact diabetes self-management.

Keywords Cognitive health · Latinx · Racism · Type 2 diabetes

Background and Framework

Cognitive complaints indicate a risk for dementia, and compared to cognitively healthy adults, those with subjective cognitive complaints have 4.5 times the risk of cognitive decline over 7 years [1]. Additionally, subjective complaints (e.g., memory difficulty, attention deficits) may be complex and difficult to assess with standard neuropsychological tests [1, 2]. Few studies have examined individuals' perspectives of cognitive complaints or cognitive health and fewer still in Latinx with type 2 diabetes mellitus (T2DM), who have a higher prevalence of cognitive impairment than non-Latinx whites (11.9% vs 4.9%) [3, 4]. The lack of racial/ethnic comparisons presents a substantial knowledge gap, given significant differences in mortality and morbidity in diabetes and diseases affecting cognition in underserved populations [5, 6].

Cognitively engaged lifestyles offer some protection against cognitive decline related to T2DM [7, 8]. Vance and Crowe's model of cognitive health describes factors influencing physiological functioning that increase the ability to compensate for declines in cognitive function [9]. The model hypothesizes that cognitive health will increase when influences such as positive affect, cognitive training, and novel experiences are included in daily life [10, 11]. Latinx persons, however, participate in fewer cognitively healthy activities such as computer use than non-Latinx whites [12]. Marquine et al. [13], who explored the frequency of cognitive activities and its association with cognitive function in a healthy sample of 1571 (n = 81 Latinx), found Latinx individuals reported a lower frequency of cognitive activities and less availability of cognitive resources (e.g., books, computers) than non-Latinx whites. The authors concluded that measures of cognitive activity might not fully capture Latinxs' experiences because questionnaire items may have different meanings or intensities of cognitive difficulty across ethnic groups [14–18]. Identifying relevant protective activities in the Latinx population is needed [19]. Therefore, the goal of this study was to explore the meaning of cognitive health from the perspectives of Latinx adults with T2DM. The results of this study may also point to areas to intervene and support healthy cognitive aging. The following questions guided this project:

1. How do Latinx with T2DM describe cognitive health?
2. What behaviors do Latinx with T2DM participate in to improve/maintain cognitive health?

✉ Heather Cuevas
hcuevas@mail.nur.utexas.edu

[1] School of Nursing, The University of Texas at Austin, 1710 Red River, Austin, TX 78701, USA

Published online: 12 March 2020

3. What cognitive strategies do Latinx with T2DM use in self-management?
4. What socio-cultural variables influence the idea of cognitive health?

Methods

This exploratory qualitative descriptive study consisted of one-on-one interviews and qualitative content analysis. All study activities were approved by the Institutional Review Board at The University of Texas at Austin. The consolidated criterion for reporting qualitative research (COREQ) checklist was used for reporting the data. The COREQ is a 32-item checklist used to improve rigor, comprehensiveness, dependability, and reproducibility in studies using qualitative methods [20]. The checklist includes criteria in three domains: (1) research team and reflexivity, (2) study design, and (3) analysis and findings.

Participants

From January 2019 through March 2019, interviews with 30 Latinx adults with T2DM were conducted. A purposive sample of participants was recruited from an endocrinology clinic in Texas. Inclusion criteria were: (1) identifying as Latinx; (2) having T2DM for at least 2 years; and (3) 50 to 70 years of age. Having diabetes for 2 years or longer provided participants with the experience of living with diabetes and self-management requirements [21, 22]. The age range was set at 50–70 due to the higher prevalence of T2DM in that age group [23]. Exclusion criteria were having type 1 diabetes or a significant co-morbidity that affected cognition (e.g., Alzheimer's).

Data Collection

Potential participants were given a description of the study, eligibility criteria and study purpose. Those who agreed to participate completed a demographic survey. Interviews were audio recorded and lasted 45 min to 1.5 h. Participants were compensated with a grocery store gift card.

Measures

The interview consisted of 11 open-ended questions guided by the research questions and informed by a review of research on perceptions of cognitive health [9, 24, 25]. The review provided concepts for phrasing the interview questions to elicit salient beliefs. The questions asked about terms for cognition; cognitive concerns; cognitively stimulating activities; modifiable health factors; terms, concerns, and knowledge specific to ethnicity; the effect of cognitive changes on diabetes self-management (Table 1).

Analysis

Transcripts of the interviews were analyzed, using Miles et al.'s recommendations [26]. First, data were read repeatedly for a sense of the whole; key concepts were highlighted; codes were derived from the concepts; and codes were categorized into meaningful clusters. To ensure dependability, a second reviewer separately coded the transcripts using the initial themes. Preliminary agreement between the coders was 80%. Total consensus was achieved by discussing disputed sections and generating agreed upon codes.

Results

Demographics

Participants' (N = 30) mean age was 66 years (SD = 4.3). Most had completed some college (90%) and had health insurance (90%). Mean time with diabetes was 8.7 years (SD = 2.1). Self-reported A1C ranged from, 6.4 to 10.9%. Participants were Mexican American (n = 17), Cuban American (n = 6), Puerto Rican (n = 4), El Salvadorian (n = 2), or Costa Rican (n = 1) (see Table 2).

Descriptions of Cognitive Health

Most participants described cognitive health as the absence of disease. More specifically, it was described as not having a diagnosis of Alzheimer's or another illness affecting memory. Cognitive health was also defined as being active: "not letting my brain get bored, being able to learn new things." Longevity was included in descriptions: "Most of the people I see who are really old…didn't start losing their brain until they were older. I think that's…what just happens. We're healthy until we're not." Finally, cognitive health was related to being able to work: "As long as I can keep working and not make mistakes…my brain will be healthy."

Participants described themselves as cognitively healthy even if they had to make adjustments for events like "memory changes." Difficulties with memory were the cognitive complaint mentioned most frequently, and participants related this to the natural course of aging. For example, "Sometimes I just have problems. It's not the worst. I feel like this is worse now that I'm older." or "everyone my age has some kind of problem" None of the complaints were felt to be "hazardous to health." Most were "common, everyday stuff," related to forgetting names, misplacing items, or difficulty retaining new information.

Table 1 Interview guide

Questions	Concepts from Vance and Crowe's [9] model	Research question (RQ)
What words do you use to describe seniors/older adults who *do* have a loss of memory of thinking ability?	Terms for cognition	RQ 1
What words do you use to describe seniors/older people who *do not* have a loss of memory or thinking ability?	Terms for cognition	RQ 1
Tell us about any concerns you may have about your ability to keep your memory or ability to think as you age. How does this make you feel?	Concerns about memory loss + affect	RQ 2, RQ 3
Describe things that we can do to keep our brain healthy and keep our memories or our ability to think as we age	Stimulating activities/novel experiences	RQ 3
What kind of changes in your life could you make to make to promote brain health?	Modifiable health factors	RQ 3
In the Hispanic community, how do people think about keeping their brains sharp and healthy?	Ethnicity-specific brain health terms, concerns, and knowledge	RQ 4
Cognitive function describes how we use memory and how we think about things. What, if any, problems have you noticed with your cognitive functioning since your diagnosis with diabetes?	Physiological health	RQ 3
What, if any, impact have these changes had on your: Work Activities Daily functioning Emotions	Effect on real world experience	RQ 3
What, if any, impact did these changes have on how you manage your diabetes?	Effect on real world experience	RQ 3
What, if anything, did your healthcare provider do to address your perceived problems with cognition?	Social support	RQ 2, RQ 3
Is there anything else you'd like to talk about?		

Table 2 Demographic characteristics (N = 30)

	Mean (SD)	n (%)
Age	66 (4.3)	
Education		
Some college		27 (90)
Completed college		3 (3)
Health insurance		
Yes		27 (90)
No		3 (3)
Marital status		
Single		1 (3)
Married or living with a partner		24 (82)
Separated, divorced, widowed		5 (15)
A1C	9.7 (3.2)	
Years with diabetes	8.7 (2.1)	
Ethnic subgroup		
Mexican American		17 (57)
Cuban American		6 (20)
Puerto Rican		4 (13)
El Salvadorian		2 (7)
Costa Rican		1 (3)

Behaviors to Enhance Cognitive Health

All participants agreed "brain health" was important. There was some disagreement regarding lifestyle activities to maintain brain health. Some thought physical activity "kept blood moving to the brain" was of primary importance; others thought reading versus watching TV would do more to keep cognition intact. When the topic of games was brought up by participants as something to "help my mind," the interviewer asked about computer games advertised to help strengthen memory and attention. Some had heard of them, but none had played them, due to cost or lack of perceived benefit.

Diet, social engagement, sleep, and "keeping stress down" were thought to help cognitive function. Seven said that vegan/vegetarian diets were "probably" healthier for cognition than red meat. Staying involved "with life" was also key. All participants thought social isolation led to dysfunction; For example, "I need to work hard to maintain the connections I have. If I don't, I'll forget how to act, how to do things."

Many participants said they did not "do a good job" of practicing behaviors that contributed to brain health. They knew what they needed to do, but wanted help in incorporating those things into everyday life. No participant reported help from healthcare providers in dealing with behaviors

related to cognition (e.g. "No one talks to me about my brain"). Some had talked with their physicians about diet and exercise in relation to diabetes but not to brain health. Instead of healthcare providers most said, for example, "I use the Internet more to find out information on how to keep my brain healthy."

Cognitive Strategies

Nineteen of the participants noted they used compensatory skills for shortfalls in memory, attention, and planning. Most common were calendars for lists and appointments. As one woman said, "I use a timer on my phone so I know I only have to pay attention for 25 min at work and then I can take a quick break." Another said, "I keep lists. Because if I don't write it down, I forget it." All of the participants who reported using cognitive strategies said they used them because of perceived cognitive difficulties. However, some did not label them explicitly as "cognitive strategies". Instead they noted, "these are just things I do to help me get work done."

Impact on Diabetes Self-management

Participants consistently stressed that cognitive problems affected diabetes self-management. Memory problems contributed to forgetting medications or as misremembering instructions (e.g., how to take a medication). Participants made comments such as "I need to plan better. I can't remember as well," or "I have problems thinking about what to do next because there are so many things in diabetes to take care of." The latter quote exemplified the "overwhelming" effect of diabetes on participants, which increased anxiety, inhibited memory, and altered self-management.

Socio-Cultural Variables

Family responsibilities and perceived societal roles were variables affecting how participants felt about cognitive issues. The concept of familismo, the importance of family loyalty, interactions, and support, has been well documented in the literature and was also reflected in participants' responses [27]. For example, one woman said, "I have to make sure I'm on top of everything. I have a family to take care of." One man spoke correspondingly: "My job is to work as hard as I can so I can support my family. If I can't think straight, I can't work." One woman spoke of "Hispanic people. You know. We like to have family parties and eat. If someone doesn't want to come over for a holiday. Something is wrong with their mind, no?".

Questions were not asked about racism and discrimination, but 24 out of 30 participants described discrimination in the health care system. Some said they received substandard treatment because of their ethnicity and it kept them from seeking help for cognitive problems. For example, one woman said, "I don't like my doctor. She's very condescending. I've heard she hates Mexicans." Another said, "Some of my friends are afraid to go to the doctor—especially for their diabetes. Not only do they get 'scolded' for eating Mexican foods, but they are afraid someone will ask them for immigration things and if they have brain problems? Forget it."

Social connections, such as a friend or family member who had health care experience or a health care provider who was Latinx, were perceived as mediating bias. Eight participants said a "connection" at an office or hospital was needed to get adequate care. One man, complaining of a rude healthcare provider, said when the provider met "my white wife" his attitude changed. Another said, "You get that kind of feeling. I'm not sure I can explain it, but someone who's brown can." Five people said they had trouble finding Spanish-speaking healthcare providers or ones who would accept "traditional" treatments. As one woman stated, "some of my family believe in curanderos. Maybe that stuff is good for your brain. Those are the things a lot of Latinos believe in … I don't think the regular doctors like that."

Discussion

Overall, the views of this sample of Latinx people with T2DM emphasized cognitive health as the absence of disease, memory problems as a significant complaint, use of cognitive strategies to cope with changes, and the negative effect of cognitive problems on diabetes self-management. Participants also spoke of the impact of ethnic/racial discrimination on their health care. These results provide insight into the influence of perceived cognitive health on diabetes self-management and suggest a need for healthcare providers to examine bias toward the Latinx population.

Descriptions of Cognitive Health

Previous descriptions of cognitive health from patients' perspective include having a good memory and being socially involved, both of which are in agreement with this study's findings [28, 29]. The Healthy Brain Study found that cognitive health was a component of successful aging [14] and in the present study, cognitive health was further described as the absence of diseases rather than a maximization of cognitive health [14, 28].

Participants knew of "brain health" from news segments, TV commercials, or Internet ads instead of from healthcare providers. In contrast, in Friedman et al.'s [30] study of older adults' media awareness of cognitive health maintenance (N = 177), participants from minority groups

had not heard about brain health in the media. It is possible social media are more pervasive now with approximately 75% of Latinx accessing YouTube and Facebook [31]. As social media usage changes, it offers additional platforms for accessing cognitive health education for Latinx communities.

Behaviors to Enhance Cognitive Health

Data from the Hispanic Community Health Study/Study of Latinos show that cognitive stimulation through education, occupation, and social interaction, is associated with cognitive protection [19]. Similarly, the participants in this project connected activities such as reading and social interaction with health and referred to their occupation as a way to "keep my mind going." However, they did not mention education, which is found in most neurocognitive literature as a factor highly connected with delay or prevention of dementia [32, 33].

Wilcox [34] found in a multiethnic sample, participants were more likely to include daily activities in their definition of what promotes brain health and Latinx participants made fewer comments about the benefits of diet and physical activity. This is in contrast to the present study, in which participants commonly mentioned things such as socializing, "reading books that are hard," and a healthy diet. Vance et al. [24] examined perceptions of cognitive health in older African Americans with HIV, another chronic condition. Focus group participants (N = 30) had few ideas about useful behaviors for maintaining cognitive function, leading the researchers to emphasize the need for interventions to help older adults protect brain health as they age. The present sample had some ideas about beneficial behaviors, but wanted guidance.

Cognitive Strategies

The cognitive strategies reported in this project are similar to strategies in other studies of cognitive health. For example, Stuifbergen et al. [35] found list making, minimizing distractions, and using verbal associations were helpful in increasing self-efficacy for women with multiple sclerosis. Instruction in cognitive strategies has been helpful for improving memory and processing speed in other chronic conditions such as heart failure and post-chemotherapy cognitive dysfunction [36–39]. Strategy-based cognitive training is one form of cognitive training and is based in teaching and practicing strategies e.g. mnemonic devices for memory to improve everyday function [40, 41]. Such interventions will need further testing since to date none have been examined for use with Latinx with T2DM [42].

Impact on Diabetes Self-management

Although the impact of cognitive problems on diabetes self-management has been discussed [42–45], researchers have focused on diabetes-specific education and medication management, with no in-depth analysis of cognitive issues in minority populations with T2DM. Even though screening for cognitive dysfunction is not recommended for all patients, healthcare providers need to be alert for signs of cognitive problems. This may manifest in T2DM as problems in adhering to self-management recommendations [46, 47]. As this project shows, patients may not mention cognitive problems until they are prompted, and taking those problems into account can support and validate coping with cognitive changes [42, 44].

Socio-Cultural Variables

The inclusion of culture is necessary in discussions of cognitive health. In Sharkey et al.'s [47] evaluation of cognitive aging in healthy, low-income, Spanish-only-speaking Mexican Americans and in the present sample, social involvement was important. But Sharkey's found more emphasis on curanderismo. Participants in this study did not report using traditional medicine, though they did mention it. Differences in education between the two samples may have played a part, and although income and acculturation were not measured here, they can contribute to variance.

The majority (80%) of participants reported interpersonal and structural bias. This is almost double the prevalence reported by The Pew Hispanic Center in a survey of U.S. Latinxs, of whom 41% responded having had personal experiences of racial/ethnic discrimination [31]. This is consistent with Campesino et al.'s study of discrimination, in which Latinxs disagreed more strongly than other ethnic groups with the statement that "most people in the United States receive the same quality of health care regardless of their racial background or language spoken" [48]. Citizenship status, primary language, and insurance status all contributed to discrimination–possibly because participants were aware of the anti-immigrant sentiment that predominates public discourse [49, 50].

Discrimination in the Latinx population is positively associated with depression, diabetes-related distress, and worse self-management [51]. Higher A1C levels and glucose variability are also positively associated with discrimination and racism [52, 53]. Understanding the health implications of discrimination linked with race/ethnicity can help identify mechanisms of how marginalized social statuses shape health [51, 54]. Healthcare providers can positively impact Latinx patients' health by receiving training on anti-discrimination and creating policies that address racism/discrimination.

The findings of this study are limited. Larger studies in other parts of the U.S. with different Latinx subgroups need to be done so within-group comparisons can be made. Since these participants volunteered, it is possible their thoughts on cognitive health were influenced by motivation to be healthy. The interviewer may have introduced bias, although to minimize this, a structured interview guide and reflective journals were used.

Contribution to the Literature

This qualitative study highlights the unique perceptions of cognitive health among Latinxs as well as the negative impact of discrimination experienced in the U.S. health system. Given the strengths and values of the Latinx community, cognitive health can positively impact diabetes self-management. Although the concept of cognitive health is evaluated mostly by neurological tests, which are certainly helpful, perceived cognitive health contributes individuals' views on health and can establish a common ground for further discussion. Implications for future research include attention to heterogeneity within ethnic groups and the creation of measurements that accurately reflect cultural and regional differences in cognitive activities.

References

1. Hill NL, Jaqueline M, Whitaker EB, et al. Sources of response bias in cognitive self-report items: "which memory are you talking about?". Gerontologist. 2019;59:912–24.
2. Illman NA, Moulin CJ, Kemp S. Assessment of everyday memory functioning in temporal lobe epilepsy and healthy adults using the multifactorial memory questionnaire (MMQ). Epilepsy Res. 2015;113:86–9. https://doi.org/10.1016/j.eplepsyres.2015.03.011.
3. Bancks MP, Alonso A, Gottesman RF, Mosley TH, Selvin E, Pankow JS. Brain function and structure risk for incident diabetes: the atherosclerosis risk in Communities Study. Alzheimers Dement. 2017;13(12):1345–54. https://doi.org/10.1016/j.jalz.2017.04.006.
4. Noble JM, Manly JJ, Schupf N, et al. Type 2 diabetes and ethnic disparities in cognitive impairment. Ethn Dis. 2012;22:38–44.
5. Santos T, Lovell J, Shiell K, Johnson M, Ibrahim JE. The impact of cognitive impairment in dementia on self-care domains in diabetes: a systematic search and narrative review. Diabetes Metab Res Rev. 2018;34(6):e3013. https://doi.org/10.1002/dmrr.3013.
6. Elfassy T, Aiello AE, Schneiderman N, et al. Relation of diabetes to cognitive function in Hispanics/Latinos of diverse backgrounds in the United States. J Aging Health. 2019;31(7):1155–71. https://doi.org/10.1177/0898264318759379.
7. Arfanakis K, Wilson RS, Barth CM, et al. Cognitive activity, cognitive function, and brain diffusion characteristics in old age. Brain Imaging Behav. 2016;10(2):455–63. https://doi.org/10.1007/s11682-015-9405-5.
8. Hughes TF, Sun Z, Chang CH, Ganguli M. Change in engagement in cognitive activity and risk for mild cognitive impairment in a cohort of older adults: the Monongahela-Youghiogheny Healthy Aging Team (MYHAT) study. Alzheimer Dis Assoc Disord. 2018;32(2):137–44. https://doi.org/10.1097/WAD.0000000000000214.
9. Vance DE, Crowe M. A proposed model of neuroplasticity and cognitive reserve in older adults. Act Adapt Aging. 2006;30(3):61–79. https://doi.org/10.1300/J016v30n03_04.
10. Vance D, Fazeli P, Shacka J, et al. Testing a computerized cognitive training protocol in adults aging with HIV-associated neurocognitive disorders: randomized controlled trial rationale and protocol. JMIR Res Protoc. 2017;6:e68.
11. Cody SL, Vance DE. The neurobiology of HIV and its impact on cognitive reserve: a review of interventions for an aging population. Neurobiol Dis. 2016;92:144–56.
12. Herrera AP, Mendez-Luck CA, Crist JD, et al. Psychosocial and cognitive health differences by caregiver status among older Mexican Americans. Community Ment Health J. 2013;49(1):61–72. https://doi.org/10.1007/s10597-012-9494-1.
13. Marquine MJ, Segawa E, Wilson RS, Bennett DA, Barnes LL. Association between cognitive activity and cognitive function in older Hispanics. J Int Neuropsychol Soc. 2012;18(6):1041–51. https://doi.org/10.1017/S135561771200080X.
14. Hilton JM, Gonzalez CA, Saleh M, Maitoza R, Anngela-Cole L. Perceptions of successful aging among older Latinos, in cross-cultural context. J Cross Cult Gerontol. 2012;27(3):183–99. https://doi.org/10.1007/s10823-012-9171-4.
15. Iwamasa GY, Iwasaki M. A new multidimensional model of successful aging: perceptions of Japanese American older adults. J Cross Cult Gerontol. 2011;26(3):261–78. https://doi.org/10.1007/s10823-011-9147-9.
16. Ng YH, Al Mawed S, Pankratz VS, et al. Cognitive assessment in a predominantly Hispanic and native American population in New Mexico and its association with kidney transplant waitlisting. Clin Transplant. 2019. https://doi.org/10.1111/ctr.13674.
17. Schinka JA, Raj A, Loewenstein DA, Small BJ, Duara R, Potter H. Cross-validation of the Florida Cognitive Activities Scale (FCAS) in an Alzheimer's disease research center sample. J Geriatr Psychiatry Neurol. 2010;23(1):9–14. https://doi.org/10.1177/0891988709342724.
18. Cuevas H, Stuifbergan A. Perceived cognitive deficits are associated with diabetes self-management in a multiethnic sample. J Diabetes Metab Disord. 2017;16:7. https://doi.org/10.1186/s40200-017-0289-3.
19. Vasquez PM, Tarraf W, Doza A, et al. The cross-sectional association of cognitive stimulation factors and cognitive function among Latino adults in Hispanic Community Health Study/Study of Latinos (HCHS/SOL). Alzheimers Dement. 2019;5:533–41.
20. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Health Care. 2007;19:349–57.
21. Adu MD, Malabu UH, Malau-Aduli AEO, Malau-Aduli BS. Enablers and barriers to effective diabetes self-management: a multinational investigation. PLoS ONE. 2019;5:e0217771.
22. Paterson BL, Sloan J. A phenomenological study of the decision making experience of individuals with long-standing diabetes. Can J Diabetes. 1994;18:10–9.
23. Centers for Disease Control and Prevention. National diabetes statistics report—2017. Atlanta: Centers for Disease Control and Prevention, US Dept of Health and Human Services; 2017.
24. Vance DE, Gakumo CA, Childs GD, Enah C, Fazeli PL. Perceptions of brain health and cognition in older African Americans and Caucasians with HIV: a focus group study. J Assoc Nurses AIDS Care. 2017;28(6):862–76. https://doi.org/10.1016/j.jana.2017.07.006.
25. Vance DE, Fazeli PL, Azuero A, Wadley VG, Jensen M, Raper JL. Can computerized cognitive training reverse the diagnosis of HIV-associated neurocognitive disorder? A research protocol. Res

Nurs Health. 2018;41(1):11–8. https://doi.org/10.1002/nur.21841.
26. Miles MB, Huberman AM, Saldaña J. Qualitative data analysis: a methods sourcebook. 4th ed. Thousand Oaks, CA: SAGE Publications; 2020.
27. McEwan MM, Pasvogel AP, Murdaugh C. Effects of a family-based diabetes intervention on family social capital outcomes for Mexican American adults. Diabetes Educ. 2019;45:272–86.
28. Anderson LA, Day KL, Beard RL, Reed PS, Wu B. The public's perceptions about cognitive health and Alzheimer's disease among the U.S. population: a national review. Gerontologist. 2009;49(suppl 1):S3–S11. https://doi.org/10.1093/geront/gnp088.
29. Rozanova J, Noulas P, Southwick SM, Pietrzak RH. Perceptions of determinants of successful aging among older U.S. veterans: results from the National Health and Resilience in Veterans Study. Am J Geratr Psychiatry. 2015;23:744–53.
30. Friedman DB, Becofsky K, Anderson LA, et al. Public perceptions about risk and protective factors for cognitive health and impairment: a review of the literature. Int Psychogeriatr. 2015;27(8):1263–75. https://doi.org/10.1017/S1041610214002877.
31. Pew Research Center. (2019) Social Media Fact Sheet. https://www.pewinternet.org/fact-sheet/social-media. Accessed 12 June 2019.
32. Yu F, Ryan LH, Schaie KW, Willis SL, Kolanowksi A. Factors associated with cognition in adults: the Seattle Longitudinal Study. Res Nurs Health. 2010;32:612–25.
33. Mungas D, Early DR, Maria-Glymour M, Al Hazzouri AZ, Haan MN. Education, bilingualism, and cognitive trajectories: Sacramento Area Latino Aging Study (SALSA). Neuropsychology. 2018;32:77–88.
34. Wilcox S, Sharkey JR, Mathews AE, et al. Perceptions and beliefs about the role of physical activity and nutrition on brain health in older adults. Gerontologist. 2009;49(suppl 1):S61–S71.
35. Stuifbergen A, Becker H, Morgan S, Morrison J, Perez F. Home-based computer-assisted cognitive training: feasibility and perceptions of people with multiple sclerosis. Int J MS Care. 2011;13(4):189–98.
36. Pressler SJ, Titler M, Koelling TM, et al. Nurse-enhanced computerized cognitive training increases serum brain-derived neurotropic factor levels and improves working memory in heart failure. J Card Fail. 2015;21(8):630–41.
37. Von Ah D, Carpenter JS, Saykin A, et al. Advanced cognitive training for breast cancer survivors: a randomized controlled trial. Breast Cancer Res Treat. 2012;135(3):799–809. https://doi.org/10.1007/s10549-012-2210-6.
38. Becker H, Henneghan AM, Volker DL, Mikan SQ. A pilot study of a cognitive-behavioral intervention for breast cancer survivors. Oncol Nurs Forum. 2017;44(2):255–64. https://doi.org/10.1188/17.ONF.255-264.
39. Park JH, Jung YS, Kim KS, Bae SH. Effects of compensatory cognitive training intervention for breast cancer patients undergoing chemotherapy: a pilot study. Support Care Cancer. 2017;25(6):1887–966. https://doi.org/10.1007/s00520-017-3589-8.
40. Sprague BN, Freed SA, Webb CE, Phillips CB, Hyun J, Ross LA. The impact of behavioral interventions on cognitive function in healthy older adults: a systematic review. Aging Res Rev. 2019;52:32–52.
41. Lustig C, Shah P, Seidler R, Reuter-Lorenz PA. Aging, training, and the brain: a review and future directions. Neuropsychol Rev. 2009;19:504–22.
42. Cuevas HE, Stuifbergen AK, Brown SA, Ward C. A nurse-led cognitive training intervention for individuals with type 2 diabetes. Res Gerontol Nurs. 2019;12(4):203–12. https://doi.org/10.3928/19404921-20190612-01.
43. Hopkins R, Shaver K, Weinstock RS. Management of adults with diabetes and cognitive problems. Diabetes Spect. 2016;29(4):224–37. https://doi.org/10.2337/ds16-0035.
44. Gatlin PK, Insel KC. Severity of type 2 diabetes, cognitive function, and self-care. Biol Res Nurs. 2015;17(5):540–8. https://doi.org/10.1177/1099800414557565.
45. Lin JS, O'Connor E, Rossom RC, Perdue LA, Eckstrom E. Screening for cognitive impairment in older adults: a systematic review for the U.S. preventive services task force. Ann Intern Med. 2013;159(9):601–12. https://doi.org/10.7326/0003-4819-159-9-201311050-00730.
46. Cuevas HE, Stuifbergen AK, Brown SA, Rock JL. Thinking about cognitive function: perceptions of cognitive changes in people with type 2 diabetes. Diabetes Educ. 2017;43(5):486–94. https://doi.org/10.1177/0145721717729806.
47. Sharkey JR, Sharf BF, St John JA. "Una persona derechita (staying in the right mind)": perceptions of Spanish-speaking Mexican American older adults in south Texas colonias. Gerontologist. 2009;49(suppl 1):S79–S85. https://doi.org/10.1093/geront/gnp086.
48. Campesino M, Saenz DS, Choi M, Krouse RS. Perceived discrimination and ethnic identity among breast cancer survivors. Oncol Nurs Forum. 2012;39(2):E91–E100. https://doi.org/10.1188/12.ONF.E91-E100.
49. Hernández LH, Upton SDLS. Critical health communication methods at the U.S.-Mexico border: violence against migrant women and the role of health activism. Front Commun. 2019;4:34. https://doi.org/10.3389/fcomm.2019.00034.
50. Cueto M, Palmer S. Medicine and public health in Latin America: A History. New York: Cambridge University Press; 2014.
51. LeBrón AMW, Spencer M, Kieffer E, Sinco B, Palmisano G. Racial/ethnic discrimination and diabetes-related outcomes among Latinos with type 2 diabetes. J Immigr Minor Health. 2019;21(1):105–14. https://doi.org/10.1007/s10903-018-0710-0.
52. Wagner J, Armeli S, Tennen H, Bermudez-Millan A, Wolpert H, Pérez-Escamilla R. Mean levels and variability in affect, diabetes self-care behaviors, and continuously monitored glucose: a daily study of Latinos with type 2 diabetes. Psychosom Med. 2017;79(7):798–805. https://doi.org/10.1097/PSY.0000000000000477.
53. Assari S, Lee DB, Nicklett EJ, et al. Racial discrimination in health care is associated with worse glycemic control among black men but not black women with type 2 diabetes. Front Public Health. 2017;5:235. https://doi.org/10.3389/fpubh.2017.00235.
54. Barnes LL, Lewis TT, Begeny CT, Yu L, Bennett DA, Wilson RS. Perceived discrimination and cognition in older African Americans. J Int Neuropsychol Soc. 2012;18(5):856–65. https://doi.org/10.1017/S1355617712000628.