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Diet and Exercise Adherence and Practices Among Medically Underserved Patients With Chronic Disease: Variation Across Four Ethnic Groups

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Abstract

Many factors interact to create barriers to dietary and exercise plan adherence among medically underserved patients with chronic disease, but aspects related to culture and ethnicity are underexamined in the literature. Using both qualitative ($n = 71$) and quantitative ($n = 297$) data collected in a 4-year, multimethod study among patients with hypertension and/or diabetes, the authors explored differences in self-reported adherence to diet and exercise plans and self-reported daily diet and exercise practices across four ethnic groups—Whites, Blacks, Vietnamese, and Latinos—at a primary health care center in Massachusetts. Adherence to diet and exercise plans differed across ethnic groups even after controlling for key sociodemographic variables, with Vietnamese participants reporting the highest adherence. Food and exercise options were shaped by economic constraints as well as ethnic and cultural familiarity with certain foods and types of activity. These findings indicate that health care providers should consider ethnicity and economic status together to increase effectiveness in encouraging diverse populations with chronic disease to make healthy lifestyle changes.

Keywords

adherence; chronic disease management; diet; food insecurity; physical activity/exercise; race/ethnicity

Although diet and exercise changes are an effective way to improve the disease burden associated with both diabetes and hypertension (Bacon, Sherwood, Hinderliter, & Blumenthal, 2004; Brownell, 1998; Conlin, 1999; Miller et al., 2002; Roberts & Barnard, 2005), patients of all ethnicities often struggle to alter their lifestyle in response to a chronic disease diagnosis. Although all individuals must manage environmental, economic, and personal barriers that impede their ability to make lifestyle changes, these barriers may loom larger for minorities, especially the urban poor, who have fewer resources (Nwasuruba,

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Khan, & Egede, 2007; Oster et al., 2006) and higher rates of chronic disease (Centers for Disease Control and Prevention, 2008; Hajjar, Kotchen, & Kotchen, 2006). Examining how diet and exercise practices may differ according to ethnicity and cultural background may help providers by illuminating how individuals conceptualize the relationship between lifestyle change and chronic disease (Horowitz, Tuzzio, Rojas, Monteith, & Sisk, 2004) and by identifying barriers to adherence in particular populations (Russell et al., 2010). This article discusses self-reported adherence to diet and exercise plans among 297 self-identified White, Black, Vietnamese, and Latino study participants. We also present qualitative data on how patients at a community health center described their efforts to integrate diet and exercise changes into their lives.

Improving adherence to diet and exercise recommendations is an important aim of culturally appropriate interventions (Natarajan, Santa Ana, Liao, Lipsitz, & McGee, 2009). Ethnic differences in perceived adherence to lifestyle modifications have been intermittently identified (Aggarwal, Liao, & Mosca, 2010; Natarajan et al., 2009; Zhao, Ford, Li, & Balluz, 2011). While some studies show equal levels of adherence to diet recommendations among both Black and White diabetes patients (Cox, Carpenter, Bruce, Poole, & Gaylord, 2004), others show better dietary adherence among Blacks (Bell et al., 2010; Ellis, Grubaugh, & Egede, 2010) and Latinos (Natarajan et al., 2009) than Whites. Studies of exercise adherence show lower adherence by ethnic minority women compared with White women with hypertension (e.g., Zhao, Ford, & Mokdad, 2008).

Similarly, the literature remains divided on the extent to which cultural differences and the behavior of family and friends affect patients' actual dietary practices after diagnosis with diabetes or hypertension (Borovoy & Hine, 2008; Russell et al., 2010). Cultural expectations around food, for example, can make behavior change difficult. Doctor's recommendations that require patients to forgo traditional and preferred foods may cause tension for patients (Caban, Walker, Sanchez, & Mera, 2008; Horowitz, Tuzzio, et al., 2004; Liburd & Vinicor, 2003). Conversely, family members and friends may support chronic disease management through their direct actions or indirectly through emotional support of the patient (Carbone, Rosal, Torres, Goins, & Bermudez, 2007; Wen, Parchman, & Shepherd, 2004).

Medically underserved, low-income, and urban groups are especially likely to face economic barriers to chronic disease management, especially with regard to dietary adherence. These barriers include limited access to healthy foods and supermarkets, which shape meal possibilities for families (Haire-Joshu & Fleming, 2006; Horowitz, Colson, Hebert, & Lancaster, 2004; Lindsay, Sussner, Greaney, & Peterson, 2009; Russell et al., 2010), along with food insecurity and insufficiency (Basiotis & Lino, 2003; Zizza, Duffy, & Gerrior, 2008). Basiotis and Lino (2003) noted that women in food-insufficient households consumed fewer vegetables and fruits and less milk than those in comparable food-sufficient households.

Physical activity is another important component of lifestyle recommendations, and patients draw on a variety of strategies and resources as they implement exercise plans in their everyday lives. Walking was frequently named across studies as the preferred form of physical activity, along with other family-oriented, local, low-cost, culturally specific, and community-based programs (Ard, Rosati, & Oddone, 2000; Dornelas, Stepnowski, Fischer, & Thompson, 2007). Incorporating family and friends into exercise programs has been found to increase motivation for Blacks (Belza et al., 2004; Dunn, 2008) and Latinos (Mier, Medina, & Ory, 2007). Multiple studies indicate the importance of social and economic context (Govil, Weidner, Merritt-Worden, & Ornish, 2009), group participation (Garvin, Cheadle, Chrisman, Chen, & Brunson, 2004), and feasibility (Adams et al., 2011; Juarbe,

Turok, & Pérez-Stable, 2002) in adherence to exercise plans among medically underserved and minority populations (Crespo, Smit, Carter-Pokras, & Andersen, 2001).

Efforts to improve adherence to exercise plans must overcome a range of significant barriers. Ethnically diverse groups living in urban areas may face lack of time, physical pain, depression, being overweight, lack of facilities and safe areas for exercise, and bad weather (Lindsay et al., 2009; Mier et al., 2007; Plescia & Groblewski, 2004). Identified barriers to disease self-management among racial/ethnic minorities with type 2 diabetes include multi-caregiving responsibilities (Samuel-Hodge et al., 2000; Wen et al., 2004), financial and social obstacles, and competing health and family concerns (Carbone et al., 2007; von Goeler, Rosal, Ockene, Scavron, & De Torrijos, 2003).

Together, these studies of lifestyle change point to the confluence of cultural, social, and economic factors that influence adherence among urban, minority, and low-income people living with chronic disease. To explore facilitators and barriers to adherence among Black, Latino, Vietnamese, and White patients at a federally qualified health center, we combined quantitative survey data with a range of qualitative methods including chronic disease diaries, home visits, and food shopping trips. Below, we present a methodological overview, followed by responses to questions about adherence to diet and exercise recommendations assessed by quantitative surveys of patients from four ethnic groups. We next discuss qualitative data describing how members of each ethnic group understood diet and exercise recommendations and implemented them in their daily lives. We also summarize barriers to adherence to diet and exercise recommendations, respectively, that were discussed by participants in qualitative interviews and focus groups.

Method

Study Design and Participants

Our data come from a 4-year prospective study that combined a quantitative survey of 297 participants with data from a subsample of 71 participants completing one or more of four qualitative methods (focus groups, interviews, chronic disease diaries, home visits). The research site was Caring Health Center, a Section 330 federally qualified health center that provides primary care services to predominantly low-income and minority patients in a medium-size city in western Massachusetts. All incoming patients during specified time frames were screened for eligibility, and those diagnosed with diabetes and/or hypertension were invited to participate.

Data Collection

Bilingual/bicultural interviewers orally administered surveys in the participant's preferred language (English, Spanish, or Vietnamese) at the clinic or another convenient location. The elements of the survey relevant to this analysis include (a) self-reported adherence to diet and exercise recommendations and (b) demographic information including ethnicity, income (including food stamps), age, education level, body mass index (BMI),¹ and responses to the six-item U.S. Household and Food Security Questionnaire (Bickel & Nord, 2000). The adherence measure consisted of two questions asked of all participants in the disease-specific section of the survey. These were "How often do you follow your diet plan for diabetes [OR hypertension]?" and "How often do you follow your exercise plan for diabetes [OR hypertension]?" Responses were always, often, sometimes, never, don't know, and not applicable. If participants were dually diagnosed, they were asked about diet and exercise adherence for their diabetes and hypertension separately. Participants who affirmed being

¹BMI was calculated from self-reported values on the survey, cross-checked with medical records.

short of food, skipping meals, or going hungry due to lack of money on the Food Security Questionnaire were categorized as food “insecure.” Data were entered into SPSS for analysis.

All survey completers who expressed interest in talking about their chronic disease management experiences in greater detail were invited to participate in ethnographic activities. A total of 71 people took part in at least one ethnographic activity, and many completed more than one activity (focus group, in-depth interview, chronic disease diary, home visit). We sought to achieve a targeted ethnographic subsample that was diverse by age, ethnicity, gender, and chronic illness, as well as other factors (single, married, homeless, overweight, nonadherent, etc.). Focus groups ($n = 47$) were used to gain understanding of the chronic disease experience, whereas in-depth interviews ($n = 35$) elicited participants' self-care practices, including their ability to adhere to lifestyle changes recommended by their health care providers. For chronic disease diaries ($n = 15$), participants kept a 7-day journal about their self-care routine. During home visits ($n = 12$), the ethnographer went food shopping with participants, toured their kitchens, and took a food inventory before unloading the newly purchased groceries and discussing food preparation. The University of Arizona Institutional Review Board approved this study.

Data Analysis

We initially conducted a chi-square analysis to evaluate if self-reported adherence to diet and/or exercise differed by ethnicity. We then conducted a multivariate logistic regression analysis on diet and exercise adherence measures to control for potentially confounding covariates. Responses to questions about diabetes and hypertension diet and exercise adherence were analyzed separately. Small cell sizes for those diagnosed with only diabetes precluded analysis of data by diagnosis category, so diabetic respondents included anyone who answered questions about their diabetes ($n = 162$ total, 114 with both diabetes and hypertension). The same dual-diagnosis caveat applied to the participants who responded to questions about hypertension ($n = 200$ total). The variables for the self-report adherence calculation were ethnicity (White, Black, Vietnamese, and Latino) and self-reported adherence to diet or exercise. To maximize cell sizes, low adherence included “never” or “sometimes” responses and high adherence included “often” or “always” responses. “Don't know” and “Not applicable” responses were not considered. The logistic regression analyses incorporated the variables gender, age, monthly income, and level of education (years of schooling). Because income was considerably skewed in its original form, a square root transformation was applied rendering the variable effectively normal prior to entry as a covariate in the analyses.

With participants' permission, qualitative interviews were audiorecorded, transcribed verbatim, and translated into English if conducted in another language. English transcripts were coded following an open coding method (Strauss & Corbin, 1990) in the qualitative data management program Atlas.ti. Coders developed a preliminary list of themes (codes) based on a review of the literature. Using examples to explore our conceptual framework, the team discussed each code until all coders had the same understanding of it (MacQueen, McLellan, Kay, & Milstein, 1998). Regular meetings involved a comparison of transcripts coded by each individual coder to ensure intercoder agreement and to refine the code list as necessary.

Results

Participant Demographics

Table 1 describes key participant demographics. Overall, the sample can be characterized as relatively old (median = 56 years), poor, undereducated, and chronically ill, with more than 44% diagnosed with both diabetes and hypertension. More than half (59%) reported that they were disabled, and more than two thirds (67%) rated their health as fair or poor. There were roughly equal numbers of women and men distributed across the four ethnic groups represented in the study. Relative to the other ethnic groups (White, Black, Latino), the Vietnamese stood out in a number of ways. On average, they were older, poorer (than Whites), and least educated. Despite these apparent disadvantages, the Vietnamese participants were least likely to be obese, more likely to receive food stamps, and least likely to report being “food insecure.”

Our mixed-methods approach yielded both quantitative and qualitative data concerning diet and exercise adherence and practices across ethnic groups. For the sake of clarity, we present these results separately, concluding with an integrative summary.

Quantitative Results

Relationship between ethnicity and adherence—Although community health center physicians provided consistent information to all patients about lifestyle changes, ethnicity was consistently associated with self-reported adherence to diabetic diet and exercise plans. The pattern of findings was similar across both unadjusted and adjusted models (see Table 2). As compared with White participants who served as reference group in these analyses, Vietnamese participants were more than 17 times more likely to report “High” adherence to their diabetic diet plan (adjusted odds ratio [aOR] = 17.56; $p < .0001$) and almost 7 times more likely to report “High” adherence to their exercise plan (aOR = 6.75; $p < .006$). Latino participants also reported significantly higher rates of adherence to their diabetic diet plan than Whites after controlling for demographic covariates (aOR = 4.28; $p < .03$). Neither Latino nor Black adherence to diabetic exercise plans exceeded the value for White adherence.

Ethnicity was also associated with self-reported adherence among participants with hypertension. In the adjusted models, both the Vietnamese (aOR = 4.10; $p < .02$) and Latinos (aOR = 3.97; $p < .01$) were about four times more likely than Whites to report “High” diet adherence. Adherence to exercise plans for hypertension was not associated with ethnicity.

Ethnicity and barriers to dietary adherence—As seen in Table 3, barriers to diet and exercise adherence varied somewhat across ethnic groups. Mirroring patterns of adherence found in Table 2, the Vietnamese stood out relative to the others. They were, for example, least likely to report being “food insecure” (18.3%). Adjusting for covariates, Vietnamese participants were 89% less likely than the White reference group to be identified as food insecure (aOR = .11 [.04–.29]).

Despite expressing interest in accessible opportunities for exercise, a range of concerns kept many participants from meeting their exercise goals. The four most common barriers to exercise identified by participants were pain (37.7%), preference for doing other things (33.5%), not being motivated to exercise (28.2%), and disliking exercise (15.8%). Vietnamese participants endorsed all barriers at a lower rate than other groups, so the 25% of Vietnamese participants who “prefer doing other things” reflected the most frequently named barrier for these participants. Poverty served as a barrier to exercise for some

participants, with 12.3% indicating that they lacked transportation to exercise, whereas 6.7% endorsed “exercise costs too much.”

Qualitative Results

Implementing dietary changes in daily life—In-depth interviews and focus groups allowed us to learn more about how patients interpreted and acted on recommendations about lifestyle change. Although individuals in all ethnic groups stressed eating more vegetables and limiting carbohydrates on the advice of their health care provider, we identified ethnic differences in specific food types consumed in response to dietary advice. These patterns are summarized in Table 4. The higher rates of self-reported diet and exercise adherence seen in the Vietnamese participants were reflected in the qualitative data as they discussed how they took their health care providers’ recommendations and integrated them into their existing dietary norms. The major exception to the congruence of the Vietnamese diet with provider recommendations was rice. A 70-year-old Vietnamese participant commented, “The provider says eating too much rice is not good because it will raise the sugar level so be careful with that.” Latino and Black participants described how their health care providers’ advice conflicted with their traditional diets, forcing them to give up preferred foods or ways of preparing food. For example, a participant in a Puerto Rican focus group commented, “Because if you keep the Puerto Rican culture it is high in fats, red meats, rice, everything with lots of salt, bread, flour...” Another participant in the group concurred,

I think that for me it is number one, because I am already used to that style of eating. And even if I try with a diet, it’s like the people that want to lose weight but they like the food because it is really good but you start the diet and eventually you make a mistake.

Latino focus group participants seemed to experience this loss most acutely, especially those women who prepared food for their family members that they themselves were unable to eat.

Implementing exercise changes in daily life—As with diet, patients implemented exercise differently according to ethnicity (see Table 4). All participants interviewed, even the most inactive, discussed the importance of walking for exercise, and some also relied on walking as a means of transportation. Several Vietnamese and a few Latino participants stressed that walking was often a family activity, with group walks serving as a motivation for exercise. Latino participants offered details about physical activities and regimens that went far beyond the responses from the other three ethnic groups, focusing especially on their desire to work out at a gym and receive professional guidance on how to exercise.

Barriers to dietary adherence—Two common barriers to dietary adherence that exceeded the fixed responses provided in the surveys and crossed ethnicities were (a) the problem of being offered food not congruent with special diets and (b) the challenges of caring for others. In our sample, Black and Latino participants complained that friends and family members ate sugary or salty foods in front of them without consideration for their restricted diets, encouraging them to cheat on their diets. When asked if her family supported her efforts to manage hypertension with diet, a 51-year-old Latina participant quickly responded, “No, they always give me food [that I cannot have], they almost never remember that I have hypertension.” Vietnamese participants specifically mentioned their reluctance to offend family members who made or brought them “forbidden” foods. Another common barrier was living with and caring for family members who had different dietary needs and preferences. Some participants reported preparing separate meals for themselves, like the 53-year-old Latina who wrote in her chronic disease diary,

I felt tired but I made dinner by 5:00 p.m., when my family and I sat down to eat. It is very hard to know that you made lots of food, and cannot eat it. But I tell myself I do it for my pancreas.

Other participants prioritized caring for others over care for themselves. For example, one 67-year-old Black participant with diabetes told us that between caring for and cooking for her ailing mother, she did not have time to prepare well-balanced meals for herself. She picked at food while she cooked for her mother, but then while her mom was upstairs eating a good meal, she was downstairs doing laundry.

The larger context of urban poverty in which our participants lived created barriers to adherence, especially for diet. Nearly three quarters of our participants (74%) estimated their household income to be less than \$1,200 per month, although we found variability by ethnicity in the percentage of participants who received food stamps. Vietnamese participants were most likely to receive food stamps, with 77% (59/77) reporting this assistance as a form of income (see Table 1).² This food stamp eligibility was likely a result of many of our Vietnamese participants' arrival to the United States as refugees rather than family-sponsored immigrants. Low incomes contributed to high levels of food insecurity in our study population, consistent with other studies of low-income populations that found that only about half of participants were food secure (Laraia, Borja, & Bentley, 2009; Weiser et al., 2009). Many participants were knowledgeable about dietary guidelines for diabetes and hypertension but poverty contributed to their limited control over food choices. One 60-year-old Black participant explained that he avoided processed foods and salt to manage hypertension, but a home visit revealed that his weekly trips to the two food pantries in his neighborhood provided him with much processed and canned *but very little fresh* food.³ Another participant, a Latina diabetic, observed,

All the vegetable are ... expensive and everything has gone up. And I do get some food stamps, but um, by the end of the month somehow they, you know.... I go like three times a week to grocery shopping, uh, because I only buy a few, few, few, and I pay with the food stamps and then I pay with my money, and somehow I end up you know, cutting [back] on things because in reality I cannot buy it.

Social support from family and friends sometimes diminished diet-related barriers attributable to poverty. Qualitative data indicated that social support played a key role in food security, and several of our Vietnamese participants reported that they lived with family members or friends who shared resources. A 66-year-old Vietnamese participant explained how she manages after her food stamps run out at the end of the month: "The food stamps come on the 5th of each month and by the 25th or so, it's gone. And for the last few days there, then I would have to ask my daughter for food."

Integrative Summary

Our quantitative findings showed Vietnamese and Latinos to be more adherent to provider-recommended diet and exercise plans than individuals of other ethnicities, and our qualitative findings supported this by revealing that the Vietnamese diet tended to be more congruent with provider recommendations and that Latinos incorporated a wider range of exercise into their everyday lives. Qualitative methods also enabled us to explore social impacts on diet that crossed ethnicities, both positive aspects such as social support and

²This food stamp eligibility was likely a result of many of their arrival to the United States as refugees rather than family-sponsored immigrants. Refugees receive initial eligibility for food stamps and other benefits, creating greater familiarity with benefits that may make them more likely to maintain eligibility over time.

³During our trip to two food pantries, this participant brought home 15 cans of fruits or vegetables, several boxes of pasta or cereal, and only a very small selection of what might be termed *fresh* food or produce, such as eggs, unprocessed meat, or vegetables. He received ground turkey, fresh orange juice, and June peas from one food pantry site and eggs and butter from both sites.

negative aspects such as being offered “forbidden food” and the challenges of caring for others.

Discussion

Among participants living with diabetes and/or hypertension in this clinic-based study, self-reported adherence to diet and exercise plans differed across ethnic groups even after controlling for key sociodemographic variables such as gender, age, income, and education. Although participants of diverse ethnic backgrounds received similar messages from their health care providers about how to make lifestyle changes, a variety of factors affected how they put this advice into practice. Despite having a similar level of income as other groups, Vietnamese participants reported significantly higher diet and exercise adherence than Whites, Blacks, and Latinos. High levels of self-reported adherence to diet plans among Vietnamese may be the result of higher food security in this population, perhaps due to greater reliance on food stamps and social support, which may mitigate food insecurity (Hanson, Sobal, & Frongillo, 2007). The experiences of the Vietnamese participants in our study, and our findings of widespread food insecurity among Black and Latino participants, point to a need for health care providers to consider the economic barriers to improving diet in low-income, urban populations as well as the health consequences of food insecurity (Drewnowski & Darmon, 2005; Ikeda, Pham, Nguyen, & Mitchell, 2002; Seligman, Laraia, & Kushel, 2010; Shenkin & Jacobson, 2010).

Although some research indicates that ethnic minority individuals are often less adherent to lifestyle changes (e.g., Zhao et al., 2008), other studies report equal or greater adherence than White respondents (Natarajan et al., 2009). Our self-report data supported greater adherence among certain ethnic groups. Vietnamese and Latino participants reported the highest rates of adherence to their exercise plans and a wider repertoire of exercise options than Whites or Blacks. More frequent exercise among Vietnamese participants may be related to the lower incidence of overweight and obesity in this group (see Table 1).

This study identified barriers to diet and exercise adherence mentioned elsewhere in the literature, including caregiving responsibilities as a barrier especially to diet adherence (King et al., 2000) and physical pain as a barrier to exercise (Juarbe et al., 2002). Participants reported that their motivation to exercise and eat right was undermined when family and friends offered them forbidden foods and did not support their efforts to exercise (Wen et al., 2004).

Echoing findings in other studies (Dunn, 2008; Mier et al., 2007), our qualitative data indicated that Latino and Black participants preferred to exercise in supportive communities of people, and this was true of our Vietnamese participants as well. Evenson, Sarmiento, Tawney, Macon, and Ammerman (2003) reported that Latina women who knew others who exercised regularly were much more likely to exercise themselves. When discussing exercise practices in qualitative interviews, Latino participants tended to be the most detailed, describing physical therapy exercises they continued after therapy ceased, as well as their practice of (or desire to) work out in a gym. Latinos were also more likely to desire specific guidance on integrating exercise into their lives.

Poverty as well as cultural background shaped participants' ability to change their diet. For example, a nutritionist's advice to “eat more greens” might be implemented differently based on which foods were available and familiar to participants. In line with this, Garvin et al. (2004) found that culturally tailored health promotion programs for people with diabetes yielded positive results. Our findings build on and support previous research into the challenges faced by individuals making lifestyle changes.

Limitations

Although the combined use of quantitative and qualitative research methods has allowed us to probe at greater depth for meanings associated with adherence to diet and exercise recommendations among medically underserved patients living with diabetes and hypertension, this study is limited by several factors. Since the ethnographic subsample was significantly smaller ($n = 71$) than the entire sample ($n = 297$), we are unable to compare qualitative with quantitative data for all participants. Furthermore, because of our broader interest in facilitators and barriers to chronic disease self-management, qualitative data were not analyzed separately according to diagnosis (diabetes or hypertension) as survey data were. Qualitative data were intended to provide nuanced information about the *context* of adherence, which we were unable to obtain through a structured survey. Quantitative data analysis was limited by small cell sizes when participants were grouped both by ethnicity and diagnosis (diabetes, hypertension, or dually diagnosed). Although it would be informative to examine self-report adherence to diet and exercise plans by diagnosis, small cell sizes particularly for diabetes limited our ability to conduct this analysis. Quantitative data on adherence to diet and exercise plans come from participant self-reports as part of an extensive interviewer-administered survey. Interviews are subject to reporting and selection bias and may be limited by participant recall (Politzer et al., 2001). We trained interviewers to probe for additional information if answers seemed vague or incomplete. Interviewers were *not* health care providers and were instructed to develop rapport with participants, asking questions and hearing answers in a nonjudgmental way. Moreover, we situated self-reports within a cultural context through ethnographic observations with a subsample of participants, following the lead of other studies that have found that self-reports of items such as health status may be culturally shaped (Kandula, Lauderdale, & Baker, 2007).

Qualitative approaches have their own strengths and weaknesses, including exploring the experiences of smaller numbers of people in greater detail. Our qualitative data analysis strategies were designed to enhance generalizability by highlighting consistencies within and among groups, while preserving the uniqueness of individual cases. The four ethnic groups sampled in this study do not reflect the diversity of populations in the United States. In this project, we focused on the ethnic groups that form the majority of patients at the Caring Health Center. It is our hope that the range of beliefs and behaviors demonstrated and expressed by our study participants offer insight into the variability of experiences possible in other urban, low-income ethnic groups.

Implications for Practice

Individuals across ethnicities talked about changing their diet and exercising more to manage their chronic illnesses, but ethnicity and poverty shaped their implementation of these recommendations. Although the influence of ethnicity was by no means monolithic, our findings point to the importance of querying how individuals interpret their physicians' or nutritionists' advice about diet and exercise. Barriers to a healthy diet that crossed ethnic lines included tempting foods, family and friends who provided unhealthy food, and the reality of caring for others, pointing to the need for both individualized assessment of diet barriers and the potential for success of a nutrition intervention aimed at whole families. Participants implemented their health care provider's advice based on food options available to them, which were shaped by not only economic constraints but also ethnic and cultural familiarity with certain foods and their understanding of these foods as central or peripheral to their ethnocultural identity. Exercise barriers included physical limitations and a desire for more guidance about how to exercise properly and stay motivated.

Conclusion

Although ethnicity is only one of many variables that may influence how individuals with chronic disease interpret physician advice about diet and exercise and apply it to their daily behavior, it captures important elements of cultural background, historically formed social structures of inequality, and social support available to diverse individuals. By considering ethnicity together with economic status, health care providers may be able to increase their effectiveness in encouraging diabetic and hypertensive patients of varying ethnic backgrounds to make healthy lifestyle changes.

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Table 1

Participant Demographics ($n = 297^a$)

Ethnicity	White ($n = 40$)	Black ($n = 64$)	Vietnamese ($n = 93$)	Latino ($n = 100$)	χ^2 Result	Sig.
Percent male	62.5	53.1	45.2	49.0	$\chi^2(3) = 3.63$	.304
Percent food insecure	60.0 ^a	54.7 ^a	18.3 ^b	80.0 ^c	$\chi^2(3) = 75.03$	.000
Percent diagnosed with diabetes only	7.5	17.2	14.0	25.0	$\chi^2(3) = 7.47$	.058
Percent diagnosed with hypertension only	47.5	50.0	34.4	31.0	$\chi^2(3) = 6.39$	.094
Percent dually diagnosed	45.0	32.8	51.6	44.0	$\chi^2(3) = 5.45$	.142
Percent with body mass index 25 (normal weight)	16.7 ^a	23.0 ^a	40.9 ^b	8.0 ^a	$\chi^2(3) = 32.61$	.000
Percent receiving food stamps	37.5 ^a	46.3 ^a	76.6 ^b	52.3 ^a	$\chi^2(3) = 18.29$	.000
ANOVA Result						
Mean age in years (<i>SD</i>)	54.2 (9.2) ^a	50.5 (9.4) ^a	61.9 (9.4) ^b	53.9 (10.9) ^a	$F(3, 293) = 19.73$	.000
Mean education level (<i>SD</i>)	3.1 (0.9) ^a	3.0 (0.9) ^a	1.7 (0.9) ^b	2.2 (1.2) ^c	$F(3, 292) = 30.41$	<.004
Mean monthly income (<i>SD</i>)	3.7 (1.9) ^a	3.1 (1.7) ^{ab}	2.7 (1.3) ^b	2.6 (1.4) ^b	$F(3, 292) = 5.24$	<.005

Note. Differing superscripts represent significant pairwise differences (by pairwise chi-square or Tukey's HSD). Educational categories: 1 = 8th grade or less; 2 = some high school; 3 = high school degree or equivalent; 4 = some college or beyond. Income categories: 1 = less than \$400 per month; 2 = \$400 to \$799; 3 = \$800 to \$1,199; 4 = \$1,200 to \$2,499; 5 = \$2,500 to \$2,999 (categories continued to \$6,000+ but only 5.3% of the sample reported monthly income >\$2,999).

^aFor all categories except "Number receiving food stamps," where $n = 210$.

Table 2Association Between Ethnicity and Self-reported Adherence to Diet and Exercise Plans (Overall $n = 297$)

Adherence Variables	Ethnicity	N	Percent Adherent ^a	Unadjusted OR (CI)	Sig.	Adjusted ^b OR (CI)	Sig.
Diabetic diet plan	Overall	162					
	White ^c	18	33	NA		NA	
	Black	29	52	2.14 (0.63–7.27)	<i>ns</i>	2.79 (0.76–10.19)	<i>ns</i>
	Vietnamese	55	91	20.0 (5.22–76.66)	.0001	17.56 (3.77–81.70)	.0001
	Latino	60	62	3.22 (1.06–9.76)	.04	4.28 (1.20–15.24)	.03
Diabetic exercise plan	Overall	162					
	White	17	35	NA	.005	NA	
	Black	31	42	1.32 (0.39–4.50)	<i>ns</i>	1.43 (0.40–5.04)	<i>ns</i>
	Vietnamese	57	74	5.13 (1.62–16.31)	.006	6.75 (1.72–26.48)	.006
	Latino	57	49	1.77 (0.58–5.44)	<i>ns</i>	2.32 (0.67–8.02)	<i>ns</i>
Hypertension diet plan	Overall	200					
	White	28	54	NA		NA	
	Black	47	62	1.40 (0.54–3.60)	<i>ns</i>	1.60 (0.59–4.33)	<i>ns</i>
	Vietnamese	66	82	3.90 (1.48–10.30)	.006	4.10 (1.28–13.15)	.02
	Latino	59	76	2.79 (1.07–7.24)	.04	3.97 (1.34–11.74)	.01
Hypertension exercise plan	Overall	188					
	White	27	59	NA		NA	
	Black	40	43	0.51 (0.19–1.37)	<i>ns</i>	0.56 (0.20–1.55)	<i>ns</i>
	Vietnamese	68	62	1.11 (0.45–2.76)	<i>ns</i>	1.12 (0.39–3.24)	<i>ns</i>
	Latino	53	53	0.77 (0.30–1.97)	<i>ns</i>	0.77 (0.28–2.13)	<i>ns</i>

Note. OR = odds ratio; CI = confidence interval.

^aPercent adherent = “Always/often follow diet/exercise plan.”^bAdjusted logistic regression analysis included gender, age, monthly income, and education (years of schooling) as covariates.^cWhite ethnicity served as the reference group in logistic regression analyses.

Table 3

Ethnic Differences in Barriers to Diet and Exercise ($n = 297$)

Barriers to Diet and Exercise	Ethnicity	<i>n</i>	%	Unadjusted OR (CI)	Sig.	Adjusted OR (CI) ^a	Sig.
Food Insecurity		295					
	White	40	60.0	—		—	
	Black	64	54.7	0.81 (0.36–1.79)	<i>ns</i>	0.51 (0.21–1.23)	<i>ns</i>
	Vietnamese	92	18.3	0.15 (0.07–.34)	.0001	0.11 (0.04–0.29)	.0001
Exercise painful	Latino	99	80.0	2.67 (1.20–5.94)	.02	1.68 (0.68–4.11)	<i>ns</i>
		282					
	White	40	55.0	—		—	
	Black	60	45.0	0.67 (0.30–1.49)	<i>ns</i>	0.59 (0.26–1.34)	<i>ns</i>
Prefer doing other things than exercise	Vietnamese	87	17.0	0.17 (0.07–0.39)	.0001	0.11 (0.04–0.30)	.0001
	Latino	95	44.8	0.66 (0.32–1.39)	<i>ns</i>	0.50 (0.22–1.12)	<i>ns</i>
		282					
	White	40	50.0	—		—	
Not motivated to exercise	Black	60	56.7	1.31 (0.59–2.92)	<i>ns</i>	1.30 (0.56–2.96)	<i>ns</i>
	Vietnamese	87	25.0	0.33 (0.15–0.73)	.006	0.29 (0.12–0.73)	.009
	Latino	95	19.8	0.25 (0.11–0.55)	.001	0.22 (0.09–0.53)	.001
		282					
Dislike exercise	White	40	57.5	—		—	
	Black	60	45.0	0.61 (0.27–1.36)	<i>ns</i>	0.49 (0.21–1.15)	<i>ns</i>
	Vietnamese	87	10.2	0.08 (0.03–0.21)	.0001	0.06 (0.02–0.17)	.0001
	Latino	95	21.9	0.21 (0.09–0.46)	.0001	0.15 (0.06–0.36)	.0001
No transport to exercise		282					
	White	40	27.5	—		—	
	Black	60	21.7	0.73 (0.29–1.84)	<i>ns</i>	0.72 (0.27–1.88)	<i>ns</i>
	Vietnamese	87	11.4	0.34 (0.13–0.88)	.03	0.20 (0.09–0.90)	.03
No transport to exercise	Latino	95	11.5	0.34 (0.13–0.87)	.02	0.32 (0.11–0.88)	.03
		282					

Barriers to Diet and Exercise	Ethnicity	n	%	Unadjusted OR (CI)	Sig.	Adjusted OR (CI) ^a	Sig.
Exercise costs too much	White	40	12.5	—		—	
	Black	60	13.3	1.08 (0.33–3.56)	<i>ns</i>	1.00 (0.30–3.40)	<i>ns</i>
	Vietnamese	87	14.8	1.21 (0.40–3.67)	<i>ns</i>	0.76 (0.21–2.73)	<i>ns</i>
	Latino	95	9.4	0.72 (0.23–2.31)	<i>ns</i>	0.54 (0.16–1.88)	<i>ns</i>
		282					
	White	40	17.5	—		—	
	Black	60	15.0	0.83 (0.28–2.45)	<i>ns</i>	0.46 (0.20–2.06)	<i>ns</i>
	Vietnamese ^b	87	0.0	—		—	
	Latino	95	3.1	0.15 (0.04–0.62)	.009	0.11 (0.02–0.50)	.005

Note. OR = odds ratio; CI = confidence interval.

^aModel includes gender, age, monthly income and level of education (years of schooling).

^bNone of the Vietnamese identified this barrier; therefore, Vietnamese were compared with Whites using Fisher's exact test, $p < .0001$.

Table 4Implementing Health Care Provider Advice on Diet and Exercise by Ethnicity ($n = 71$)

Health Advice	White	Black	Vietnamese	Latino
Eat more vegetables	Add salads (primarily iceberg lettuce)	Eat green vegetables (most often canned)	Eat more homemade vegetable soup and more “healthy” vegetables such as bitter melon	Add salads (primarily iceberg lettuce)
Limit carbohydrates		Avoid bread, rice, potatoes, and pasta	Reduce rice	Avoid white rice and bread
Limit fat	Limit saturated fat	Bake foods rather than fry them	Avoid fat and oil	Avoid Puerto Rican diet: it’s high fat and uses a lot of red meat and rice
Eat a healthy diet	Eat low-calorie food	Use Kosher salt in place of table salt Limit greasy foods	Consume food of many colors	Eat white meat instead of red meat Read food labels to avoid low-sugar foods high in salt
Exercise more	Walk or jog	Walk Calisthenics or physical therapy exercises	Walk Housework, yard work Cycling Tai chi	Walk outside or on treadmill Calisthenics or physical therapy exercises Use machines at gym Housework, yard work Cycling