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Physical Activity Among Chinese American Immigrants with Prediabetes or Type 2 Diabetes

Findings from this mixed-methods study reveal deficits and suggest areas for change.

The rapid and exponential rise in the incidence of type 2 diabetes, along with its related complications and costs, represents a major public health problem worldwide.[1,2] In the United States in 2014, according to the Centers for Disease Control and Prevention (CDC), diabetes was the seventh-leading cause of death overall—and the fifth-leading cause of death among Asian Americans.[3] Chinese Americans constitute the largest subgroup of Asian Americans, numbering over 4 million.[4] One recent large study among Chinese Americans living in New York City found that more than one in three (34.5%) had prediabetes and another 8.6% had diabetes,[5] indicating a great health threat to this population. Furthermore, people identifying as Chinese American may be at higher risk for prediabetes than Chinese living in China. A large study conducted among Chinese living in China found the prevalences of prediabetes and diabetes to be 15.5% and 9.7%, respectively.[6] The vast environmental and social differences between China and the United States, particularly in terms of immigrants' lifestyle behaviors, may play a role in this discrepancy.

It's well established that having diabetes increases one's risk of cardiovascular and cerebrovascular complications,[7] and research indicates that having prediabetes—impaired fasting glucose or impaired glucose tolerance—also increases such risk.[8,9] Glucose management is thus vital for people with prediabetes and type 2 diabetes alike. The current care guidelines from the American Diabetes Association (ADA) recommend regular aerobic exercise and flexibility and strength training as key elements in the prevention and management of both prediabetes and type 2 diabetes.[10] Specifically, at least 150 minutes of moderate-to-vigorous or 75 minutes of vigorous physical activity per week are recommended, as well as two to three sessions of strength training and, for older adults, flexibility training. Yet national survey data indicate that only about half of all Asian American adults engage in regular, sufficient physical activity.[11] Moreover, little is known about the specifics of physical activity performed by urban Chinese Americans in the context of diabetes prevention and management.[12]

Language limitations may contribute to making Chinese American immigrants more vulnerable to health problems than members of other minorities.[13,14] According to the Migration Policy Institute, in 2013, 62% of Chinese American immigrants five years of age or older reported having limited English proficiency,

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ABSTRACT

Background: Although the benefits of aerobic exercise and strength training for patients with type 2 diabetes have been studied extensively, research on physical activity among Chinese American immigrants diagnosed with prediabetes or type 2 diabetes has been limited.

Purpose: We sought to learn more about this population's knowledge of physical activity, the types and intensity levels performed, and the barriers to such activity.

Design and methods: A concurrent mixed-methods design was used. The short version of the International Physical Activity Questionnaire–Chinese was used to quantitatively measure participants' levels of exercise intensity. Semistructured face-to-face interviews were conducted to obtain qualitative information regarding participants' knowledge about physical activity, the types performed, and the barriers to such activity.

Results: A total of 100 Chinese American immigrants were recruited for the study from January to July 2012 in New York City. On average, participants had lived with a diagnosis of prediabetes or type 2 diabetes for 3.3 years and had lived in the United States for 21.5 years. Energy expenditure was measured in metabolic equivalent of task (MET) units; intensity was measured in cumulative MET-minutes per week. The mean total intensity score was 2,744 MET-minutes per week. This was achieved mainly through walking. The mean intensity score for walking was 1,454 MET-minutes per week; the mean duration was 79 minutes per day. Vigorous physical activity was least common. The mean intensity score for vigorous physical activity was 399 MET-minutes per week, and the mean duration was 17 minutes per week. Regarding types of physical activity, the most common were housekeeping, walking up stairs, and taking walking or stretching breaks every hour during the workday. Based on the interviews, three themes emerged regarding barriers to moderate or vigorous physical activity: insufficient education about physical activity, health concerns about physical activity, and work-related barriers to physical activity.

Conclusions: The majority of Chinese American immigrants with prediabetes or type 2 diabetes do not engage in sufficient physical activity, performing at a rate significantly below that of the general U.S. population. Increases in the intensity and duration of physical activity should be promoted as part of diabetes management for Chinese American immigrants.

Keywords: disease management, exercise, health, immigrants, physical activity, prediabetes, type 2 diabetes

compared with 50% of all foreign-born immigrants.[13] And a survey by Shelley and colleagues conducted at senior centers in New York City found that Chinese Americans were less proficient in English, had more dental problems, and used health care less often than other minorities.[14] These findings suggest that the unique characteristics of Chinese American immigrants must be taken into consideration by health care providers.

Study purpose. Although the benefits of aerobic exercise and strength training for patients with type 2 diabetes have been studied extensively, there has been little research in this area specifically among Chinese American immigrants diagnosed with prediabetes or type 2 diabetes. We sought to learn more about this population's knowledge of physical activity, the types and intensity of activity performed, and the barriers to such activity.

METHODS

Theoretical framework and study design. The self- and family management framework described by Grey and colleagues,[15] which has been applied to people with chronic conditions, was used to guide our study design. Grey and colleagues view self-management as a dynamic process in which a person uses certain behaviors to manage her or his condition in the context of daily life. In this framework, facilitators and barriers are the antecedents to processes and outcomes. Thus a better understanding of barriers to physical activity is an important first step in helping clinicians to develop effective ways to encourage behaviors that will increase such activity.

A concurrent mixed-methods design was used, since having both quantitative and qualitative data can yield a richer perspective than quantitative results alone.[16, 17] The quantitative portion of this study was cross-sectional and descriptive. Data on the intensity of performed physical activities were collected using the International Physical Activity Questionnaire–Chinese (IPAQ-C).[18] The qualitative portion, which involved a phenomenological approach,[19] afforded a further understanding of Chinese immigrants' experiences in terms of their knowledge about physical activity, the

types of activities they performed, and the barriers to such activity.

Sample size and participants. The sample size calculation was based on a larger study, which investigated the relationship between lifestyle and body composition in Chinese Americans and helped us to better understand factors associated with prediabetes and diabetes in this population. (Findings from the larger study have not yet been published.) For this study, to calculate sample size, we used the point biserial model correlation test in G*Power 3.1.5.[20] The results indicated a minimum sample size of 82 participants. A community-based convenience sample of 100 participants was recruited from January 9 to July 31, 2012.

Inclusion criteria included being self-identified as a foreign-born Chinese immigrant; being 18 years of age or older; having a diagnosis of prediabetes or type 2 diabetes; and being able to communicate in English, Mandarin, or Cantonese. People who could not stand unaided on a stadiometer (a device that measures height and weight) or had a physical disability were excluded. All participants received a free exercise and diet consultation tailored to their current knowledge of disease management upon completion of their data collection. Approval for the study was obtained from the New York University School of Medicine's institutional review board before data collection began.

Study site and recruitment. The study site was a community health center affiliated with a medical center in Queens, New York. The community health center was chosen because it provides diabetes management care and its clinicians speak many Chinese dialects. We felt that language and cultural barriers to diabetes management for Chinese immigrants would be limited at this site.

To recruit participants, study flyers were placed at the front desk of the site, making them available to Chinese patients who might be interested in participating. Interested patients were instructed to contact the research team nurses directly. Other nurses and physicians at the study site were also asked to identify potential participants and obtain their permission to be contacted by the research nurses. The research nurses then verified with potential participants their eligibility for the study and answered any questions. As part of the informed consent process, all participants were first asked to verbally repeat the purpose of the study and to confirm their participation was voluntary before they signed the informed consent form (in either English or Chinese).

Demographic information was collected, including age, sex, highest level of education, years living in the United States, and occupation. Anthropometric measures were used for height and weight. Body mass index (BMI) was used to assess weight status. While being overweight or obese is a risk factor for type 2 diabetes, the distribution of body fat, specifically abdominal and visceral fat, is even more significant. There is evidence that Asians tend to have more abdominal and visceral fat than whites.[21,22] One study among Chinese Americans found a high prevalence of prediabetes or diabetes even in those with a relatively low BMI (less than 23 kg/m^2).[5] Therefore, instead of using the CDC's standard definitions for weight categories, which are based on data for the general population,[23] we redefined them as follows: underweight, BMI less than 18.5 kg/m^2; normal weight, BMI 18.5 to 22.99 kg/m^2; preobese, BMI 23 to 27.49 kg/m^2; and obese, BMI 27.5 kg/m^2 or greater. This is in keeping with the ADA's recommendation that all Asian Americans who present with a BMI of 23 kg/m^2 or greater be screened for type 2 diabetes.[24]

Data collection was conducted from January 9 to July 31, 2012, using both the IPAQ-C and semistructured interviews. Trained research nurses (including one of us, SHH) gave each participant the questionnaire and then conducted a semistructured interview in a quiet, private examination room. Interview participation was voluntary; participants could complete the IPAQ-C and then choose not to be interviewed.

Many Chinese American immigrants lack sufficient understanding about the importance of exercise in diabetes management.

IPAQ-C. The short version of the IPAQ-C was used to assess intensity of physical activity. The IPAQ-C has good test–retest reliability and moderate-to-good validity for total activities, as well as for the categories of moderate and vigorous physical activities and walking.[18] It asks participants to report the frequency and duration of physical activity (walking and various moderate or vigorous activities) during the previous seven days.[18] In our study, to be counted as moderate or vigorous, an activity had to last at least 30 minutes and be performed at least three days per week. That criterion was used by Morrato and colleagues in their national survey of physical activity among U.S. adults with or at risk for type 2 diabetes.[25]

Data collected with the IPAQ can be both continuous and categorical.[26] Energy expenditure is often

Table 1. Participant Demographics and the Reported Intensity of Physical Activity (N = 100)

Variable	n (%)
Sex	
Male	53 (53)
Female	47 (47)
Age, years (mean, 63.01 ± 14.48; range, 26–92)	
< 30–44	10 (10)
45–64	44 (44)
≥ 65	46 (46)
Highest level of education (mean years, 11.87 ± 4.66; range, 0–21)	
Elementary or lower	10 (10)
Junior high or senior high	46 (46)
Associate's degree or higher	44 (44)
Marital status	
Married	78 (78)
Single/widowed/separated/divorced	22 (22)
Years in the United States (mean, 21.53 ± 12.69; range, 2–71)	
< 5	17 (17)
5–10	45 (45)
11–20	26 (26)
> 20	11 (11)
Years since diagnosis with prediabetes or type 2 diabetes (mean, 3.33 ± 6.64)	
≤ 1	68 (68)
1.1–4.99	7 (7)
5–9.99	5 (5)
≥ 10	19 (19)
Intensity of physical activity	
Low	75 (75)
Moderate	15 (15)
Vigorous	7 (7)
Moderate and vigorous	3 (3)
BMI, kg/m^2	
< 18.5 (underweight)	2 (2)
18.5–22.99 (normal)	34 (34)
23–27.49 (preobese)	40 (40)
≥ 27.5 (obese)	22 (22)
Employment status	
Full time	39 (39)
Part time	5 (5)
Unemployed or retired	47 (47)

BMI = body mass index.
Note: Some participants did not answer all questions. Because of missing data, numbers and percentages might not sum to 100.

described in metabolic equivalent of task (MET) units, defined as the ratio of the metabolic rate associated with a given physical activity to the resting metabolic rate.[27] The IPAQ assigns activities the following values for analysis: walking, 3.3 METs; moderate activity, 4 METs; and vigorous activity, 8 METs. A continuous IPAQ score for the intensity of physical exercise, performed at the level of walking and above, can be expressed in MET-minutes per week and this is what we used. Furthermore, qualitative 24-hour recall was used to check the consistency of data obtained from the IPAQ-C and participants' self-reported exercise patterns and intensity. Any inconsistency was clarified immediately with the participant.

Semistructured interviews. Each participant was interviewed once, and interviews were guided by a

semistructured interview protocol, which ensures reliability.[28] Each interview included three open-ended questions: "What do you know about exercise for diabetes management?" "What are the most common types of physical activity that you have practiced in the past three months?" and "What are the barriers to your exercising?" Written field notes were taken by the interviewer during each interview; immediately afterward, the interviewer transcribed these notes into a password-protected computer file.

Data analysis. To analyze quantitative data, we used IBM SPSS Statistics for Windows, Version 20. Demographic data and reported types of physical activity were analyzed using descriptive statistics. To analyze qualitative data from the open-ended interview questions, two of us (SHH and MRF) conducted content analysis to identify emerging themes and patterns. To ensure interrater reliability, we coded the data separately. Physical activity was coded according to four categories—being active (including housekeeping, walking up stairs, and walking around while talking on the telephone), flexibility exercises, aerobic exercise, and strength training—which are among the types of physical activity recommended by the ADA.[29] Any coding inconsistencies regarding the reported types of physical activity, as well as knowledge of and barriers to such activity, were reconciled through discussion until consensus was reached.

RESULTS

Participant characteristics. Demographic and IPAQ-C data were collected from 100 Chinese American immigrants with prediabetes or type 2 diabetes who live in Queens, New York. The mean age of all participants was 63 years (range, 26 to 92 years). Fifty-three (53%) were male and 47 (47%) were female. The average length of time lived in the United States was 21.5 years, and the majority (82%) had lived in this country for longer than five years. The mean time since diagnosis with prediabetes or type 2 diabetes was 3.3 years. Most participants had obtained at least a junior or senior high school education (46%) or beyond

Table 2. Reported Types of Physical Activity by Category (N = 447 Instances)

Type of Physical Activity by Category (Rank)[a]	n (%)
Being active	
Housekeeping (1)	62 (13.87)
Walking up stairs (2)	54 (12.08)
Walking or stretching hourly during the workday (3)	53 (11.86)
Walking through every aisle when shopping (5)	43 (9.62)
Stretching or walking in place while watching TV (6)	39 (8.72)
Walking around while talking on the telephone (8)	35 (7.83)
Parking far away (9)	28 (6.26)
Flexibility exercises	
Stretching (4)	49 (10.96)
Yoga (13)	3 (0.67)
Aerobic exercises	
A combination of brisk walking, tai chi, and kung fu (7)	36 (8.05)
Playing ball (such as basketball, ping-pong) (10)	13 (2.91)
Bicycle riding (11)	10 (2.24)
Swimming (12)	5 (1.12)
Aerobic dancing (12)	5 (1.12)
Strength training	
Weight lifting (11)	10 (2.24)
Resistance training (14)	2 (0.45)

[a] Participants could report performing more than one physical activity in the prior three months. A total of 447 instances of exercise were mentioned by the 55 participants who volunteered for the semistructured interviews.

Table 3. Intensity and Duration of Physical Activity (N = 100)

Intensity and Duration by Type of Physical Activity	Mean (SD[a])
Intensity, MET-minutes/week	
Total intensity	2,744 (± 3,210)
Walking	1,454 (± 1,914)
Moderate activity	577 (± 2,139)
Vigorous activity	399 (± 1,117)
Duration	
Walking, minutes/day	79 (± 107)
Moderate activity, minutes/week	31 (± 84)
Vigorous activity, minutes/week	17 (± 60)
Sitting, minutes/weekday	325 (± 192)

MET, metabolic equivalent of task.
[a] A majority of participants led relatively sedentary lives, but a few were quite active. Very few exercised at vigorous intensity, but some did. Thus the ranges for intensity and duration were very wide, and standard deviations were often larger than mean values.

(44%). About half the participants (47%) were either retired or unemployed. With regard to BMI, nearly two-thirds (62%) were either preobese or obese. See Table 1 for more details.

Semistructured interviews were conducted with 55 participants. Their mean age was 62.8 years. They had lived in the United States for an average of 22.7 years. The mean time since diagnosis with prediabetes or type 2 diabetes was 3.4 years. The majority of these participants had obtained at least a junior or senior high school education (45%) or beyond (44%). There were no statistically significant differences in the demographic characteristics of those who participated in semistructured interviews and those who did not.

Types of physical activity. A total of 447 instances of physical activity were mentioned by the 55 participants who were interviewed. Housekeeping was the most common activity reported (62 instances; 13.9%), followed by using stairs instead of taking an elevator (54 instances; 12.1%), walking or stretching hourly during the workday (53 instances; 11.9%), and stretching before performing other exercises (49 instances; 11%). The category of being active accounted for the most physical activity (314 instances), followed by aerobic exercises (69 instances) and flexibility exercises (52 instances). Very few instances of strength training were reported. See Table 2 for more details.

Intensity and duration. In our study, participants tended to exercise less often and at a lower intensity than is recommended by the ADA. Based on IPAQ-C data for 100 participants, the mean total intensity score was 2,744 MET-minutes per week. Walking was the most commonly performed activity. The mean intensity score for walking was 1,454 MET-minutes per week, and the mean duration was 79 minutes per day. The mean intensity scores for moderate and vigorous physical activity were 577 and 399 MET-minutes per week, respectively. The mean durations, respectively, were 31 and 17 minutes per week. See Table 3.

Information resources. Of the 100 participants completing the IPAQ-C, a majority reported receiving information about physical activity from their family physicians (53%), followed by newspapers (36%) and friends (31%). Very few participants reported receiving such information from nurses (6%) or endocrinologists (1%). See Table 4.

Barriers. Content analysis of qualitative data for the 55 interviewed participants revealed three themes: insufficient education about physical activity, health concerns about physical activity, and work-related barriers to physical activity.

Insufficient education about physical activity. The participants did not say directly that they hadn't received sufficient education about physical activity. Many participants had altered their diets, but either didn't know that exercise is another important area for lifestyle modification or didn't know what types of exercise to perform. As one participant said,

> Although I have been diagnosed with diabetes for 17 years, I still was not clear about this disease. I manage my blood glucose with oral hypoglycemics and frequent finger sticks almost every day. I rarely eat sweets and try to eat healthy, but I don't like to exercise. I do know that exercise is important for me, but I don't know how important it is, so I don't really do it.

Another participant stated, "I eat very healthy, but I don't know much about exercise. I don't know the difference between walking, aerobic exercise, and muscle training exercise."

Health concerns about physical activity. Several participants indicated that although they'd had good exercise habits in the past, they had stopped exercising because of emerging or worsening health conditions. Some said that because of health limitations, they didn't know how to continue to exercise or what exercises they could perform. One participant said, "I used to ride my bike frequently and kept a very good shape 20 years ago. But riding a bicycle is too aggressive an exercise for me now." Another stated, "I was very active and did lots of exercises, push-ups, running before having lung cancer. After I had surgery, I can only do a few sit-ups and walking."

Work-related barriers to physical activity included being too busy or feeling too tired after the workday. Some participants had jobs that required them to stand on their feet for long periods of time, so they thought they had exercised enough. Others had long workdays and wanted to relax on their days off. One participant said, "I'm a nurse. I know my health. I walk a lot during work. After work, I just want to rest. I thought walking during my work is sufficient to manage my sugar." Another said, "I know that I need to exercise more, but I am always too tired after work, and I have no extra time." And a third participant stated, "I work in a restaurant five days a week and stand most of the time. . . . I rarely exercise. When I have some free time, I just want to sit and go surfing on the Internet."

Table 4. Reported Sources of Information on Exercise for Diabetes Management (N = 100)

Source	n (%)
Family physician	
Yes	53 (53)
No	47 (47)
Nurse	
Yes	6 (6)
No	94 (94)
Endocrinologist	
Yes	1 (1)
No	99 (99)
Friends	
Yes	31 (31)
No	69 (69)
Newspaper	
Yes	36 (36)
No	64 (64)
Family members	
Yes	25 (25)
No	75 (75)
Radio	
Yes	7 (7)
No	93 (93)

DISCUSSION

The study findings indicate that even after living in the United States for many years, many Chinese American immigrants lack sufficient understanding about the importance of exercise in diabetes management and face challenges in performing physical activity. The findings also highlight some of the barriers to such activity and suggest a need for greater involvement by nurses.

Increased physical activity has been established as effective in the prevention and management of prediabetes and type 2 diabetes, along with pharmacotherapy and dietary modifications.[30] Yet research indicates that, compared with the general population, people who have or are at risk for type 2 diabetes are significantly less likely to engage in regular physical activity.[25] In the survey by Morrato and colleagues, based on data from the 2003 Medical Expenditure Panel Survey, only 39% of adults with diabetes performed moderate or vigorous exercise at least 30 minutes a day and at least three days a week, compared with 58% of adults without diabetes.[25] In our study, which used the same criterion, only 25% of Chinese American immigrants with prediabetes or type 2 diabetes did so. Clearly, there is a great need for this population to increase the intensity and frequency of physical activity.

In our study, although the mean overall intensity score for physical activity was 2,744 MET-minutes per week, more than half of these MET-minutes involved walking (mean, 1,454 MET-minutes per week). Very few involved vigorous exercise (mean, 399 MET-minutes per week). This suggests that it's important for patients to understand the value of including more moderate or vigorous activities. The IPAQ-C also asks participants to report time spent sitting on weekdays, as increased sedentary behavior has been associated with the development of metabolic syndrome and diabetes.[31, 32] In our study, the average time spent sitting was 325 minutes per weekday, which we considered a rather long duration. Although in the past Chinese American immigrants typically worked as manual laborers in industries such as mining and farming, they now work at a wide variety of jobs, and our study findings reflect a more sedentary lifestyle. Interventions to enhance physical activity in this population, both within and outside the workplace, are needed.

The qualitative data we collected helped us to better understand how participants approached physical

activity. Being active was by far the most common type of exercise, and aerobic and flexibility exercises were more common than strength training. We found it interesting that fewer than 10% of the participants reported engaging in traditional Chinese exercises such as tai chi and kung fu. One possible reason is that many participants had been living in the United States for a long time and may have lost connection with Eastern modes of exercise. And as noted, only 25% of participants engaged regularly in moderate or vigorous physical activity. This suggests a need to create interventions aimed at encouraging people to engage in a wider range of activities, and to perform them with sufficient intensity. It also suggests providers should not assume that Chinese American immigrants know about traditional Chinese exercises.

As noted earlier, after all data were collected, we provided each participant with a free face-to-face lifestyle modification consultation. After the consultation, many participants realized that they needed to modify both diet and physical activity in order to achieve better blood glucose management. As one participant said,

> I know that I have prediabetes, and I have tried to be healthy, so I have been very cautious about my diet. I don't understand why my [glycated hemoglobin] is still increased. I know diet can help my sugar, but I didn't know exercise is important, too. Now I know that diet is not the only thing that matters to my sugar. Exercise is also important to help me prevent and manage my prediabetes status.

In the self- and family management framework described by Grey and colleagues,[15] facilitators and barriers are antecedents to processes and outcomes. In our study, reported barriers to moderate and vigorous physical activity included insufficient knowledge regarding appropriate types and intensity levels of physical activity for diabetes prevention and management, health concerns regarding physical activity, and a busy work schedule. To develop effective interventions and improve outcomes, these barriers must be addressed.

Our findings showed that family physicians play an important role in providing diabetes management information to Chinese American immigrants. Yet although patient education is a vital part of nursing practice, very few participants mentioned nurses as resources of information. Although the reasons for this are unclear, nurses caring for this population should be aware that patients may not realize nurses can provide invaluable information and support. A recent systematic review found that when health care professionals coached adults with chronic diseases (including diabetes), such coaching could lead to significantly increased physical activity.[33] It may also increase patient satisfaction with care.[33] Furthermore, given that language is often a barrier with immigrant populations, it stands to reason that involving more providers who understand Chinese dialects could improve patients' understanding of the importance of physical activity in diabetes prevention and management. This could also help them to feel better supported and heighten their motivation to increase moderate and vigorous physical activity.

Strengths and limitations. Strengths of this study include its mixed-methods design, which yielded a broader understanding of the areas studied. We hope the findings can be used to design more effective interventions aimed at diabetes prevention and management among Chinese American immigrants. All of the research team members identify as Chinese or Chinese American, and this likely helped with participant recruitment and gave us a richer understanding of how culture influences physical activity.

Limitations include the possibility of recall bias in self-reported patterns and preferences, which may have caused under- or overestimation of actual physical activity. That said, the use of qualitative 24-hour recall to check the consistency of quantitative IPAQ-C data enhanced the validity of the data. Another limitation was that people may change their physical activity in response to health status, illness, or a perceived need for such change, and this can be elucidated only through longitudinal studies. A third limitation was our use of a community-based convenience sample. But this did allow us to sample a hard-to-reach immigrant population, a group often missed by other sampling strategies.[34, 35]

CONCLUSIONS

Our findings provide evidence that Chinese American immigrants with prediabetes or type 2 diabetes tend to be sedentary and are less likely to perform moderate or vigorous physical activity than the general population. It's essential that information about physical activity be provided to such patients in all settings, especially at primary care sites. Providers caring for Chinese American immigrants should strive to increase their patients' awareness of the importance of physical activity; teach patients about appropriate types of physical activity; and, when necessary, encourage patients to increase exercise intensity. Providers should also assess the barriers these patients face to performing physical activity and develop more effective interventions to overcome these barriers. Lastly, there is a clear need for Chinese American immigrants with prediabetes or type 2 diabetes to be more aware of nurses as a primary resource for information and education. The role of nurses in educating and coaching this population with regard to physical activity should be enhanced. ▼

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