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Correlates of Physical Activity Among Middle-Aged and Older Korean Americans at Risk for Diabetes

Benjamin Han, MD,
Instructor at the NYU School of Medicine, benjamin.han@nyumc.org

Tina Sadarangani, MSN,
PhD Student at New York University College or Nursing, trs233@nyu.edu

Laura C. Wyatt, MPH,
Research Data Manager for the NYU School of Medicine's Department of Population Health, laura.wyatt@nyumc.org

Jennifer M. Zanowiak, MA,
Senior Research Coordinator for the NYU School of Medicine's Department of Population Health, jennifer.zanowiak@nyumc.org

Simona C. Kwon, DrPH,
Assistant Professor in the Departments of Population Health and Medicine at the NYU School of Medicine and holds an appointment in the NYU Global Institute of Public Health, simona.kwon@nyumc.org

Chau Trinh-Shevrin, DrPH,
Associate Professor in the Departments of Population Health and Medicine in the NYU University School of Medicine, chau.trinh@nyumc.org

Linda Lee, MSW, and
Executive Director of Korean Community Services of Metropolitan New York, Inc., llee@kcsny.org

Nadia S. Islam, PhD
Assistant Professor in the Department of Population Health at NYU School of Medicine, nadia.islam@nyumc.org

Abstract

Purpose—To explore correlates of meeting recommended physical activity (PA) among middle-aged and older Korean Americans at risk for diabetes mellitus (DM).

Design and Methods—PA patterns and their correlates were assessed among 292 middle-aged and older Korean Americans at risk for DM living in New York City (NYC) using cross-sectional design of baseline information from a diabetes prevention intervention. PA was assessed by self-report of moderate and vigorous activity, results were stratified by age group (45-64 and 65-75), and bivariate analyses compared individuals performing less than sufficient PA and individuals

Corresponding author: Benjamin Han, 550 First Avenue, BCD615, New York, NY 11109, ; Email: Benjamin.Han@nyumc.org

performing sufficient PA. Logistic regression was used to calculate adjusted odds ratios predicting sufficient PA.

Findings—After adjusting for sex, age group, years lived in United States, marital status, health insurance and body mass index (BMI), sufficient PA was associated with male sex, older age, lower BMI, eating vegetables daily, and many PA-specific questions (lack of barriers, confidence, and engagement). When stratified by age group, male sex and eating vegetables daily was no longer significant among Koreans age 65 to 75 years of age, and BMI was not significant for either age group.

Conclusions—PA interventions targeting this population may be beneficial and should consider the roles of sex, age, physical and social environment, motivation, and self-efficacy.

Clinical Relevance—Clinical providers should understand the unique motivations for PA among Korean Americans and recognize the importance of culturally driven strategies to enable lifestyle changes and support successful aging for diverse populations.

Diabetes mellitus (DM) is among the most common chronic conditions found in older adults and is associated with macrovascular and microvascular complications such as heart disease, stroke, nephropathy, and retinopathy (American Diabetes Association [ADA], 2014). Complications from DM contribute to functional decline and disability as adults age (Kirkman et al., 2012). In 2010, DM affected 25.8 million people, or 8.3% of the U.S. population, with disproportionally higher rates among adults aged 65 years of age and older (26.9%) (Centers for Disease Control and Prevention [CDC], 2011). Racial and ethnic minorities also experience a greater burden of DM compared to whites in the United States (Chow, Foster, Gonzalez, & Mciver, 2012). Nationally, Asian Americans are among the fastest growing racial groups (Pew Research Center, 2012) and are at increased risk for developing DM (King et al., 2012). Using proposed lower body mass index (BMI) cutoffs for obesity in Asian Americans (Yi, Kwon, Wyatt, Islam, & Trinh-Shevrin, 2015), nationally based DM prevalence rates adjusted for BMI show that Asian Americans have a 60% higher prevalence of DM compared to whites (Mcneely & Boyko, 2003). However, Asian Americans represent a tremendously diverse group, both culturally and genetically, with varied risk for DM (Islam et al., 2012). This creates a need for studies to further explore and understand the specific risks facing different Asian American populations and to design culturally relevant DM prevention.

Studies have shown that intensive lifestyle modifications, including regular physical activity (PA) and structured PA interventions, reduce the rate of DM for those at risk (ADA, 2014). Through a lifestyle intervention that included PA and dietary components, the Diabetes Prevention Program (DPP) showed a 58% decrease in the incidence of type 2 DM among high-risk adults over a 2.8 year follow up (The Diabetes Prevention Program Research Group, 2002). Regular PA has also been associated with improved physical function, reduced falls, and reduced risk for cognitive impairment among older adults (Chalé-Rush et al., 2010; Mcdermott et al., 2002; Rejeski et al., 2011; Ku, Stevinson, & Chen, 2012).

However, there is limited research on interventions to promote PA among adults of diverse racial and ethnic backgrounds in the United States, particularly those at risk for DM. Acculturation factors, including length of time in the United States, English proficiency, and

ethnic identity, may play an influential role in PA, since health behaviors tend to change as individuals adapt to a new environment (National Research Council, 2004). Among a population-based sample of California adults who are ≥ 45 years old, racial and ethnic minorities engaged in less PA compared to whites. In particular, Asian/Pacific Islanders were less likely to engage in vigorous PA compared to whites, especially individuals 45 to 64 years of age, regardless of English proficiency (August & Sorkin, 2010). Additionally, a small study in Chicago found that older Korean Americans with hypertension from health clinics were significantly less likely to self-report weight control or weight loss compared to age- and gender-matched hypertensive non-Hispanic Whites and Blacks taken from a national dataset (Kim, 2005). Data specific to Korean Americans in New York City (NYC) show an age-adjusted DM rate that is higher than the rate among non-Hispanic Whites in NYC (Islam et al., 2012). Few studies have been conducted among middle-aged and older Korean Americans at risk for DM, and there is a lack of research regarding older Korean Americans and PA (Lim, Kayser-Jones, Waters, & Yoo, 2007).

Given the importance of PA for older adults who are at risk for DM, identifying PA barriers and facilitators among specific populations can lead to targeted interventions that can help to prevent DM and its complications. The purpose of this study is to explore the patterns, influences, and correlates of recommended sufficient weekly PA among middle-aged and older, urban, community-dwelling Korean Americans at risk for DM living in NYC. This article presents baseline findings from Project RICE (Reaching Immigrants through Community Empowerment), a community health worker (CHW) intervention designed to promote DM prevention and healthy lifestyle changes in a Korean American population at risk for DM (Islam et al., 2013).

Methods

Study Design and Data Collection

The data for this study were taken from a cross-sectional baseline survey for a CHW intervention program in the NYC Korean community (Islam et al., 2013). Baseline surveys were administered in Korean by a trained bilingual interviewer. Individuals were eligible to participate in the intervention if they (a) self-identified as Korean; (b) were between 18 and 75 years old; and (c) were identified as at-risk for DM using a translated American Diabetes Association Risk Test (ADA, 2012)that was translated into Korean and adapted to include Asian BMI and an additional question asking if they had been told by a doctor in the past 3 months that they had pre-diabetes. Individuals were ineligible to participate if they self-reported a DM diagnosis or were currently taking medication for diabetes, had serious health problems (including cancer, a cardiovascular event in the past 12 months, or end stage renal disease), or had participated in a previous cardiovascular disease study. Participants were recruited for the study at various community-based venues such as health fairs and churches in the borough of Queens in NYC between May 2011 and March 2014.

Study population—The study population for this analysis included all individuals enrolled in the parent intervention that answered the weekly PA question on the baseline survey and were age 45 or older.

Measures—The survey questions and measures used were translated into Korean from previous surveys and scales described below.

Physical activity—Current weekly PA was taken from the Behavioral Risk Factor Surveillance System (BRFSS) (CDC, 2011), and PA levels were based on the 2008 Physical Activity Guidelines for Americans, which recommends that all adults perform ≥150 min of moderate-intensity PA, ≥75 min of vigorous-intensity PA, or an equivalent combination each week (U.S. Department of Health and Human Services, 2008). Individuals were asked how many times in the last 7 days they performed both moderate and vigorous PAs, and the approximate minutes spent doing these types of activities each day. Weekly vigorous activity was multiplied by 2 and combined with weekly moderate activity. Once summed, a new PA variable represented sufficient PA (≥150 min per week) and insufficient PA (<150 min per week).

Demographic characteristics—Demographic questions were taken from the American Community Survey (United States Census, 2011) and the BRFSS (CDC, 2011). The following characteristics were included: sex, age group, education level, household number, income, marital status, and years lived in the United States.

Acculturation—English-language proficiency and years of residency in the United States are indexes of acculturation (Lee, Nguyen, & Tsui, 2011). All respondents were asked about English language fluency. Limited-English proficiency (LEP) was defined as self-reporting speaking English “not well” or “not at all”, a cutoff frequently used in the literature (Sentell & Braun, (2012).

Individual health characteristics—Individual health characteristics were taken from the BRFSS. The following characteristics were included: self-reported general health, current cigarette smoking, health insurance, BMI (kg/m^2) calculated using height and weight taken by a CHW, a self-reported diagnosis of high cholesterol, and a self-reported diagnosis of high blood pressure. BMI was divided into normal (<25 kg/m^2) and overweight/obese (≥25 kg/m^2).

Barriers to exercise—Seven barriers to exercise were included, and were adapted from the Exercise Benefits and Barriers Scale (Sechrist, Walker, & Pender, 1987). Participants were asked if they agreed or disagreed with the following statements: (a) I don't have enough time to exercise; (b) I am not motivated to exercise; (c) I don't have a safe place to exercise; (d) Health problems prevent me from exercising; (e) I don't like to exercise; (f) I need someone to exercise with but don't have one; and (g) I don't know what exercises to perform. Barriers to exercise were examined as a scale variable (scale of 0-7, where 7 = *greatest barriers to exercise*) and as individual questions.

PA social interaction—Social interaction was adapted from a previous intervention (Nothwehr, Dennis, & Wu, 2007). Four questions were asked: How often do you: (a) Suggest doing something active when you get together with family members or friends, such as going for a walk, biking, or swimming; (b) Set aside a special time to do PA; (c) Ask a friend or relative to do some PA with you; and (d) Talk to others about the benefits of PA?

PA social interaction is examined as a scale variable using the mean of the four questions (scale of 1-4, where 4 = *highest PA social interaction*) and as individual questions.

PA self-efficacy—Self-efficacy questions related to exercise were adapted from the Bandura Self-Efficacy Scale (Bandura, 2006). Two questions were included: How sure do you feel that you will be able to: (a) Know what exercises are healthy for you; and (b) Exercise for at least 30 min five times each week in the future. PA self-efficacy is examined as a scale variable using the mean of the two questions (scale of 1-4, where 4 = *highest PA self-efficacy*) and as individual questions.

Nutrition—Fruit and vegetable intake was taken from the BRFSS. Individuals were asked "Over the past week, how often did you eat fruits (such as oranges, apples, pears, melon, berries, etc.)?" and "Over the past week, how often did you eat vegetables or greens (such as green onions, lettuce, mushrooms, peppers, broccoli, zucchini, cucumbers, spinach, etc.), but do not include potatoes)?" If an individual answered one or more times per day, he or she was considered to eat fruits or vegetables at least daily.

Statistical analyses—Bivariate analyses were run by PA level for the overall sample, and by age strata (45-64 and 65-75 years). This stratification was chosen to facilitate understanding of differences between middle-aged and older adults in our study and has been used in other studies examining health behaviors (August & Sorkin, 2010). Chi-square tests and Fisher's exact tests were run for categorical variables, and *t* tests were run for continuous variables; Fisher's exact tests were employed when expected cell counts were less than five. Adjusted logistic regression models predicting sufficient PA were run separately for each variable, overall and stratified by age group, while adjusting for any demographic or health-related variables with a *p* value <.10 in bivariate analysis (overall or age stratified). Odds ratios (ORs), 95% confidence intervals (CIs), and *p*-values are presented. Significance was set at p≤.05 for logistic regression. The study protocol was approved by the NYU School of Medicine Institutional Review Board (IRB).

Results

Characteristics of the study sample are presented in Table 1. Of the 292 participants included in the analysis, the mean age was 61.6 ± 7.5 years. The majority of participants were women (58.2%), married (85.2%), and educated beyond high school (52.9%). The average number of years lived in the United States was 22.5 ± 10.3 years, and the majority of participants (71.4%) reported LEP. Less than half of our sample (48.3%, n=141) performed sufficient PA. Among individuals 45 to 64 years of age (n=186), 42.5% performed sufficient weekly PA, while 58.5% of individuals 65 to 75 years of age (n=106) performed sufficient PA. Age-stratified characteristics of the study population and bivariate analyses are also presented in Table 1.

Validity and reliability have not previously been assessed for the PA scales in the Korean American population. Preliminary analysis found Cronbach's alphas of 0.622 for the barriers scale, 0.562 for the self-efficacy scale, and 0.831 for the social interaction scale. We plan to further assess validity and reliability of these scales in future analyses.

Adjusted ORs for the associations of sufficient weekly PA with potential correlates of sufficient PA are presented in Table 2, and are stratified by age group. Several demographic variables were significantly associated with sufficient PA in the adjusted models. In the overall model, individuals 65 to 75 years of age were 2.7 times more likely than individuals 45 to 64 years of age to engage in sufficient PA (p=.001), and men were 1.7 times more likely than women to engage in sufficient PA (p=.040). Among individuals 45 to 64 years of age, men were 2.0 times more likely than women to engage in sufficient PA (p=.037). In the model, individuals with a BMI <25 were 1.9 times more likely to engage in sufficient PA than individuals with a BMI ≥ 25 (p=.010). There were no significant correlations with LEP or years lived in the United States and sufficient PA, even after stratifying by age. In all models, setting aside a special time and knowing what exercises are healthy were significantly associated with engaging in sufficient PA. Needing someone to exercise with and having time to exercise were only significant in the overall model. Being motivated, safe location, knowing what exercises to perform, and eating vegetables at least daily were significantly associated with recommended PA in the overall model and among individuals 45 to 64 years of age. Needing someone to exercise with was significant in the overall model and among individuals 65 to 75 years of age, and talking to others about the benefits of PA and liking exercise were only significant among individuals 65 to 75 years of age.

Discussion

Findings from this study indicate that in NYC, older Korean Americans are more likely than middle-aged Korean Americans to engage in sufficient PA. National prevalence rates for PA from BRFSS data show that approximately half of adults in both the 45 to 64 and ≥ 65 age groups engage in sufficient PA (CDC, 2013), and NYC data found that 49% of adults 45 to 64 years of age and 38% of adults aged ≥65 years of age engage in sufficient PA (New York City Department of Health and Mental Hygiene, 2012). These data are consistent with the prevalence rate for Korean Americans 45 to 64 years of age (42.5%) in our sample, but diverge in our study for those ≥65 years of age (58.5%). Participants in our study also had higher rates of self-reported PA compared to other racial and ethnic minority groups, including Asian Americans in California (August & Sorkin, 2010). Higher levels of PA among middle-aged and older Korean Americans were associated with male sex, older age, lower BMI, eating vegetables daily, physical environment, having social support, and greater PA self-efficacy.

In general, older adults have been found to self-report less PA engagement compared to younger adults (National Research Council, 2004); (New York City Department of Health and Mental Hygiene, 2012), and poor health and lack of energy have been found to deter older adults from diverse backgrounds from engaging exercise (Bird et al., 2009). However, older adults in our study were more likely to report adequate levels of PA when compared to their middle-aged counterparts. Possible explanations for this include more leisure time to engage in formal PA or motivation due to heightened risk of illness, which were noted in a study among older Mexican American women (Cantu & Fleuriet, 2008). Further research is needed to explore the reasons why older Korean Americans engaged in more self-reported PA compared to younger groups.

Conversely, our finding that men were more likely to achieve sufficient levels of PA compared to women is consistent with the literature (Bird et al., 2009; Cantu & Fleuriet, 2008). Women typically report greater barriers that take priority over physical fitness, such as household and caregiving responsibilities (Cantu & Fleuriet, 2008). Moreover, exercise is often conceptualized by immigrant and minority groups as being deliberate; thus, house cleaning and other forms of nonsedentary activity may not be viewed as PA (Bird et al., 2009), and therefore may not have been fully captured in this study. This suggests that PA interventions should be incorporated into daily routines as opposed to formal practices that are undertaken outside the home. Future research should investigate how racial and ethnic groups define PA.

Having a safe location to exercise was significantly associated with PA among individuals aged 45 to 64 years of age. While adults may prefer to exercise and walk outdoors, determents to PA may include heavy traffic, inadequate lighting, and poor walking surfaces, which may be perceived as a threat to safety (Lee, Ory, Yoon, & Forjuoh, 2013). In addition, immigrant enclaves are likely to have reduced walkability and to be less conducive to exercise (Osypuk, 2009). Conversely, adults ≥ 50 years of age who perceive greater neighborhood safety have also been found to enjoy greater amounts of leisure-time PA (Tucker-Seeley, Subramanian, Li, Sorensen, 2009). Interventions for older racial and ethnic minorities need to be designed with an understanding of their perceptions of safety, preferences, and behaviors regarding public parks and community-based recreational programs; this will inform how to better utilize existing infrastructures in urban settings, such as parks and recreational services, in order to increase opportunities for PA in this population. The majority of our sample resided in Flushing, Queens; the urban NYC location should be considered when designing interventions, as parks and recreational areas may not be easily accessible or available.

In our study, individuals who reported having someone to exercise with were much more likely to meet PA requirements, particularly among adults 65 to 75 years of age. This underscores the importance of the social environment for being physically active in this population; a concept that may be embedded in Korean culture (Lim et al., 2007). Thus, including social support and engagement in the form of group-based activities or providing a buddy-system model may be more effective intervention for this population. PA self-efficacy, including knowledge of exercise, was also strongly correlated with PA in both age groups; this emphasizes the need for targeted PA education among older Koreans, such as educational campaigns to raise awareness of PA and specific exercises. Finally, social interaction measures such as setting aside time for PA and nutrition measures such as eating vegetables were also associated with sufficient PA in our adjusted models. These behaviors are likely proxies for healthier lifestyles and behaviors overall, and should be further studied.

Some of our study findings run counter to existent literature on PA among Asian Americans, as well as among other immigrant populations in the United States. This indicates that U.S. immigrants tend to have healthier behaviors, but the longer they reside in the United States, the more unhealthy lifestyles are adopted (August & Sorkin, 2010). Level of acculturation based on English language proficiency was not associated with PA in our sample. Additionally, years lived in the US was not associated with sufficient PA in adjusted

analyses, regardless of age group. Further study is needed to better explore the how acculturation may or may not affect PA levels of older Korean Americans, which may include alternate ways of measuring acculturation in this specific population.

It is important to note several study limitations. First, this community-based sample may not allow for generalizability of the study findings. Furthermore, the findings based on our age stratification do not suggest how Korean ethnicity itself may play a role in physical activity. Future studies comparing Korean Americans to other ethnic groups, such as Hispanics, Non-Hispanic Whites, and other Asian populations, are needed to further explain the role of culture and ethnicity. Second, PA relies on patient self-report, which may have recall and social-desirability biases. Third, there is a lack of information regarding comorbidities and physical and cognitive function for this population. Physical limitations, such as mobility, may impact the effectiveness of PA for older adults at risk for DM; along with comorbidities, they must be considered when designing PA interventions for older adults. More studies are needed among older Korean American populations to further understand the prevalence and impact of comorbidities on physical and cognitive function and their affect on DM risk.

Conclusion

Our study identifies important correlates of PA among a sample of middle-age and older Korean Americans at risk for DM living in an urban environment, including sex, age, physical and social environment, motivation, and self-efficacy. This serves as a foundation for future prospective and interventional studies that can better characterize the facilitators and barriers of performing recommended sufficient PA for this population, particularly for those at risk for DM.

Clinical Resources

Minority Health Asian American Populations, Centers for Disease Control and Prevention: http://www.cdc.gov/minorityhealth/populations/REMP/asian.html

How much physical activity do older adults need, Centers for Disease Control and Prevention: http://www.cdc.gov/physicalactivity/basics/older_adults/index.htm

Physical activity and older adults, World Health Organization: http://www.who.int/dietphysicalactivity/factsheet_olderadults/en/

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Table 1

Characteristics of the study population by level of physical activity (PA), % (n=292)

	Overall (N=292)			45-64 years of age (n=186)			65-75 years of age (n=106)		
	< Sufficient PA (n=151)	≥ Sufficient PA (n=141)	p-value	< Sufficient PA (n=107)	≥ Sufficient PA (n=79)	p-value	< Sufficient PA (n=44)	≥ Sufficient PA (n=62)	p-value
Sex			**0.017**			**0.022**			0.213
Female	64.9	51.1		66.4	50.6		61.4	51.6	
Age (years)			**0.008**						
45-64	70.9	56.0		n/a	n/a		n/a	n/a	
65-75	29.1	44.0		n/a	n/a		n/a	n/a	
Years in United States			**0.032**			**0.042**			0.235
≤10	15.9	12.1		16.8	13.9		13.6	9.7	
11-20	19.9	33.3		23.4	40.5		11.4	24.2	
>20	64.2	54.6		59.8	45.6		75.0	66.1	
Total household number (including self)			0.928			0.269			0.541
Lives alone	11.3	10.7		12.1	6.3		9.1	16.4	
Lives with one person	41.7	40.0		34.6	30.4		59.1	52.5	
Lives with more than one person	47.0	49.3		53.3	63.3		31.8	31.1	
Marital status			**0.042**			**0.007**			0.954
Married	81.5	89.3		81.3	94.9		81.8	82.3	
Unmarried/widowed/divorced	18.5	10.7		18.7	5.1		18.2	17.7	
Education			0.967			0.326			0.425
≤ high school	47.2	47.0		46.6	39.2		48.8	56.9	
Annual household income			0.895			0.515			0.830
< $20,000	22.5	21.3		17.8	11.4		34.1	33.9	
$20,000 - $49,999	31.1	34.8		36.4	45.6		18.2	21	
≥ $50,000	21.9	19.1		28.0	25.3		6.8	11.3	
Skipped/Refused/Don't know	24.5	24.8		17.8	17.7		40.9	33.9	
English spoken fluency			0.264			0.909			0.149
Very well/Well	26.7	30.7		29.0	28.2		20.9	33.9	

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	Overall (N=292)			45-64 years of age (n=186)			65-75 years of age (n=106)		
	< Sufficient PA (n=151)	≥ Sufficient PA (n=141)	p-value	< Sufficient PA (n=107)	≥ Sufficient PA (n=79)	p-value	< Sufficient PA (n=44)	≥ Sufficient PA (n=62)	p-value
Not well/Not at all	73.3	69.3		71.0	71.8		79.1	66.1	
Health insurance			0.363			**0.025**			0.695
Insured	55.3	50.0		45.8	29.5		79.1	75.8	
Self-reported health status			0.770			0.960			0.442
Excellent/very good	9.3	11.3		11.3	12.7		4.5	9.7	
Good	36.7	38.3		37.7	36.7		34.1	40.3	
Fair/Poor	54.0	50.4		50.9	50.6		61.4	50.0	
Body Mass Index (BMI)			**0.013**			0.182			**0.029**
Normal (<25)	45.0	59.6		45.8	55.7		43.2	64.5	
Overweight/Obese (≥25)	55.0	40.4		54.2	44.3		56.8	35.5	
High cholesterol diagnosis			0.566			0.350			0.607
Yes	30.2	27.1		29.2	23.1		53.5	48.4	
High blood pressure diagnosis			0.728			0.203			0.695
Yes	36.2	34.3		30.2	21.8		30.2	33.9	
Fruits over the past week									
At least once a day	50.0	57.6	0.198	50.9	58.4	0.315	47.7	56.5	0.375
Vegetables or greens over the past week									
At least once a day	50.3	67.9	**0.002**	49.5	66.7	**0.020**	52.3	69.4	0.074
Barriers to exercise (scale of 1-7, 7 = greatest)									
Mean ± SD	1.9 ± 1.7	1.1 ± 1.3	**<0.001**	2.0 ± 1.7	1.4 ± 1.4	**0.010**	1.8 ± 1.6	0.7 ± 1.2	**0.001**
PA Social interaction (scale of 1-4, 4 = greatest)									
Mean ± SD	1.9 ± 0.7	2.3 ± 0.8	**<0.001**	1.9 ± 0.7	2.1 ± 0.7	**0.045**	1.8 ± 0.7	2.5 ± 0.8	**<0.001**
PA Self-efficacy (scale of 1-4, 4 = greatest)									
Mean ± SD	2.8 ± 0.7	3.2 ± 0.6	**<0.001**	2.8 ± 0.7	3.1 ± 0.7	**0.010**	2.8 ± 0.6	3.4 ± 0.5	**<0.001**

Note. Boldfaced values signify statistical significance with a $p < .05$.

Table 2

Adjusted associations of ≥ recommended weekly physical activity

	Overall (n=292)		45-64 (n=186)		65-75 (n=106)	
	Adjusted OR (95% CI)[a]	**p-value**	**Adjusted OR (95% CI)[b]**	**p-value**	**Adjusted OR (95% CI)[b]**	**p-value**
Demographic characteristics						
Male (ref=female)	**1.7 (1.0 - 2.8)**	**0.040**	**2.0 (1.0 - 3.8)**	**0.037**	1.3 (0.6 - 3.1)	0.510
Age 65-75 years (ref=45-64)	**2.7 (1.6 - 4.9)**	**0.001**	n/a		n/a	
11-20 years lived in United States (ref=<10 years)	2.2 (0.9 - 5.0)	0.073	1.9 (0.7 - 5.0)	0.227	2.4 (0.4 - 12.7)	0.311
>20 years lived in United States (ref=<10 years)	1.0 (0.4 - 2.2)	0.975	0.9 (0.3 - 2.2)	0.781	1.0 (0.2 - 4.7)	0.971
Married (ref = unmarried)	1.9 (0.9 - 3.9)	0.088	3.1 (1.0 - 10.0)	0.054	1.2 (0.4 - 3.4)	0.784
Education > high school (ref = ≤ high school)	1.0 (0.6 - 1.7)	0.908	1.3 (0.7 - 2.5)	0.452	0.5 (0.2 - 1.3)	0.167
Lives with one person (ref=lives alone)	1.0 (0.5 - 2.2)	0.985	1.4 (0.3 - 6.0)	0.638	0.4 (0.1 - 1.5)	0.157
Lives with > one person (ref=lives alone)	1.1 (0.5 - 2.4)	0.806	1.6 (0.4 - 6.7)	0.501	0.5 (0.1 - 2.3)	0.386
Speaks English Very well/Well	1.4 (0.8 - 2.5)	0.239	1.2 (0.6 - 2.5)	0.660	2.0 (0.8 - 5.4)	0.151
Individual health						
Excellent/very good health (ref=fair/poor)	1.4 (0.6 - 3.3)	0.436	1.0 (0.3 - 2.8)	0.968	3.4 (0.6 - 19.6)	0.173
Good health (ref=fair/poor)	1.1 (0.6 - 1.9)	0.719	0.9 (0.4 - 1.9)	0.789	1.6 (0.7 - 4.1)	0.283
No current smoking (ref=current smoking)	1.7 (0.6 - 4.8)	0.340	2.5 (0.7 - 9.0)	0.172	0.5 (0.1 - 5.7)	0.593
Has health insurance (ref=no insurance)	0.6 (0.3 - 1.1)	0.099	0.5 (0.3 - 1.1)	0.071	1.0 (0.3 - 3.2)	0.978
BMI < 25 (ref= BMI ≥ 25)	**1.9 (1.2 - 3.1)**	**0.010**	1.8 (0.9 - 3.4)	0.072	2.2 (1.0 - 4.9)	0.057
High cholesterol diagnosis (ref=no diagnosis)	1.1 (0.6 - 1.9)	0.749	0.9 (0.4 - 2.0)	0.882	1.4 (0.6 - 3.3)	0.503
High BP diagnosis (ref=no diagnosis)	0.9 (0.5 - 1.6)	0.759	1.0 (0.5 - 2.0)	0.897	0.9 (0.4 - 2.0)	0.735
Barriers to exercise (disagree, ref=agree)						
I don't have enough time to exercise	1.2 (0.6 - 2.5)	0.545	1.1 (0.5 - 2.4)	0.819	2.4 (0.5 - 10.5)	0.259
I am not motivated to exercise	**3.8 (2.0 - 7.1)**	**<0.001**	**4.9 (2.1 - 11.2)**	**<0.001**	2.6 (0.9 - 7.1)	0.072
I don't have a safe place to exercise	**2.2 (1.1 - 4.3)**	**0.022**	**2.5 (1.1 - 5.8)**	**0.025**	1.7 (0.5 - 6.2)	0.410
Health problems prevent me from exercising	1.4 (0.7 - 2.8)	0.307	1.2 (0.5 - 2.9)	0.712	2.2 (0.7 - 7.0)	0.206
I don't like to exercise	1.7 (1.0 - 3.1)	0.059	1.4 (0.7 - 2.9)	0.310	**3.1 (1.0 - 9.2)**	**0.047**
I need someone to exercise with but don't have one	**2.7 (1.5 - 4.9)**	**0.001**	2.0 (0.9 - 4.2)	0.073	**4.8 (1.6 - 14.2)**	**0.004**

	Overall (n=292)		45-64 (n=186)		65-75 (n=106)	
	Adjusted OR (95% CI)[a]	**p-value**	**Adjusted OR (95% CI)[b]**	**p-value**	**Adjusted OR (95% CI)[b]**	**p-value**
I don't know what exercises to perform	**1.9 (1.0 - 3.4)**	**0.038**	**2.1 (1.0 - 4.2)**	**0.049**	1.5 (0.5 - 4.8)	0.454
Feels somewhat/very sure that he/she…(ref=not at all sure/not very sure)						
Knows what exercises are healthy	**2.6 (1.3 - 5.1)**	**0.006**	**2.3 (1.0 - 5.4)**	**0.050**	**3.3 (1.0 - 10.4)**	**0.044**
Will be able to exercise for at least 30 minutes 5 times each week in the future	**1.9 (1.0 - 3.6)**	**0.044**	1.8 (0.8 - 3.8)	0.142	2.2 (0.7 - 7.6)	0.197
Physical activity engagement scale (Almost always/always, ref=almost never/ sometimes)						
Suggests doing something active when getting together with family members	1.6 (0.9 - 2.6)	0.102	1.2 (0.6 - 2.4)	0.589	2.5 (1.0 - 6.1)	0.054
Sets aside a special time to do physical activity	**4.5 (2.6 - 8.0)**	**<0.001**	**3.7 (1.8 - 7.8)**	**0.001**	**8.2 (3.0 - 22.5)**	**<0.001**
Asks a friend or relative to do some physical activity with him/her	1.4 (0.8 - 2.5)	0.236	1.0 (0.4 - 2.0)	0.895	2.6 (1.0 - 6.8)	0.052
Talks to others about the benefits of physical activity	1.4 (0.8 - 2.3)	0.211	1.0 (0.5 - 2.0)	0.981	**2.5 (1.0 - 5.8)**	**0.041**
Nutrition						
Fruits ≥ 1 time per day	1.5 (0.9 - 2.6)	0.065	1.5 (0.8 - 2.9)	0.184	1.5 (0.6 - 3.5)	0.346
Vegetables ≥ 1 time per day	**2.0 (1.2 - 3.4)**	**0.007**	**2.1 (1.1 - 4.1)**	**0.024**	2.1 (0.9 - 4.7)	0.094

Note. Boldfaced values signify statistical significance with a $p < .05$. BMI = body mass index; BP = blood pressure; CI = confidence interval; OR = odds ratio; ref = reference.

[a]Adjusted for sex, age group, years lived in US, marital status, health insurance and BMI.

[b]Adjusted for sex, years lived in US, marital status, health insurance and BMI.