PHYSICAL ACTIVITY, LENGTH OF RESIDENCE, AND VEHICLE OWNERSHIP AMONG U.S. IMMIGRANTS: AN ANALYSIS OF THE 2003 NEW IMMIGRANT SURVEY

By

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This Masters thesis is dedicated Shigeo and Ryo Terasaki as well as Genshyo and Amy Ambo, who grew up in immigrant households, contributed to the storied history of America's "Greatest Generation," raised my loving parents, and served as quiet role models to my brothers and me.

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ABSTRACT

BACKGROUND: As immigrants' length of residence in the U.S. increases, it is unclear how their levels of physical activity change. Vehicle ownership may play a role by discouraging active transportation.

METHODS: Using data from the 2003 New Immigrant Survey, a nationally representative questionnaire of recent, documented immigrants (n=7240), we assessed the cross-sectional relationship between length of U.S. residence and levels of light (LPA) and vigorous (VPA) physical activity with descriptive analysis and multivariate logistic regression. We also assessed the impact of vehicle ownership on this relationship.

RESULTS: Some 38.8% reported engaging in LPA five or more times per week, 31.2% reported VPA at least once per week, and 56.9% reported either LPA or VPA beyond thresholds. During the first ten years of residence, there was a small decrease in average LPA and small increase in average VPA. Most of the decline in LPA occurred within three years after arrival. In regression models adjusted for demographic and socioeconomic factors, those living in the U.S. more than one year were less likely to engage in LPA five or more times per week than the newest arrivals (e.g. 1 to <5 vs. <1y of residence, OR: 0.82 95% CI: 0.71-0.96). This relationship was not significant after controlling for vehicle ownership. In models adjusting for demographic and socioeconomic factors, those living in the U.S. five to less than ten years and fifteen or more years were *more* likely to engage in VPA at least once per week than those living in the U.S. less than one year. This relationship did not change when vehicle ownership was added to the model.

CONCLUSIONS: These data suggest that many immigrants participate in high levels of light physical activity upon arrival, but this percentage decreases within the first three years of residence. Curbing the decline in may require an understanding of how vehicle ownership decreases light physical activity, particularly active transportation. Levels of vigorous activity may increase slightly over time but remain relatively low regardless of length of residence.

INTRODUCTION

BACKGROUND

The Centers for Disease Control & Prevention and the World Health Organization both advocate increasing physical activity in order to combat obesity, hypertension, cardiopulmonary disease, diabetes, depression, decline in musculoskeletal functioning, and some cancers [1,2]. While lack of physical activity threatens the health of many communities in the United States, immigrants may be particularly vulnerable as they transition to new social and physical environments. From 1990 to 2010, the foreign-born portion of the U.S. population grew from 7.9 to 12.9 percent [3]. By 2050, nearly one in five (19%) Americans are projected to be foreign-born [4]. Thus, it is critical for public health researchers to understand the trajectory of physical activity among this growing segment of U.S. residents.

Data suggest that immigrants engage in less physical activity than the U.S. population as whole. According to the Behavioral Risk Factor Survey System, the national average of the population meeting physical activity recommendations is about 48.8 percent [5]. Broken down by race, Blacks, Hispanics and Asians (6.1, 44.8, 70.5% of which were foreign-born in 2000, respectively [6]) are less likely to meet national recommendations for physical activity than Whites. More specific to immigrants, National Health Interview Study data from 2000 show that, by and large, immigrants of Latino, Asian, and White (but not Black) racial groups report lower physical activity levels than U.S.-born comparisons [7]. Data on Canadian immigrants provide relevant insight as well, because the U.S. and Canada have similar economies and health beliefs [8]. A 2010 study among Canadians revealed that new and established immigrants are less likely than Canadian-born residents to report walking, sports, endurance, and recreation activities, yet more likely to report active commuting [9], underscoring a need to distinguish between various types of physical activity.

It is not clear when or why immigrants' levels of physical activity change as they adjust to their new location and culture. A recent systematic review by Gerber et al. [10] examined the relationship between acculturation and physical activity. They posited that, because levels of physical activity tend to be higher among the U.S.-born population than the foreign-born population, acculturation toward the host country's norms and attitudes would be associated with higher physical activity. Yet the forty-four studies they reviewed showed mixed results in supporting their hypothesis. An exemplar supportive study found that among Mexicans in California, English language at home and U.S.-born status are both positively associated with vigorous leisure-time activity [11]. One partly supportive study analyzed a statewide survey of California, oversampling Asians, and found that acculturation (based on length of residence and language) is associated with increased leisure-time physical activity (LTPA) and less inactivity [12]. However, there was no association between acculturation and non-leisure time physical activity (NLTPA). Another study found a positive association between immigrant generation (i.e., being in the U.S. for longer) and leisure-time activity among Mexican adults, but a negative association between generation and non-leisure time activity among Chinese and Filipino adults after adjusting for individual and neighborhood factors [13]. As these authors note, "Based on…studies reviewed, a pattern emerges: length of time in the U.S. or acculturation is positively associated with LTPA and negatively associated with NLTPA" (p. 3) [13].

There are numerous barriers and facilitators to physical activity among immigrants. In one study, older adults of American Indian/Alaska Native, African American, Filipino, Chinese, Latino, Korean, and Vietnamese focus groups reported weather, neighborhood safety, fear of crime, program costs, and inadequate availability of reliable transportation as barriers [14]. A recent study among Cambodian Americans along the west coast found that personal variables like knowledge of heart disease as well as neighborhood variables like access to parks, community centers, and shopping malls were associated with higher levels of activity [15]. The only variable associated with low physical activity was lacking neighborhood parks. Additionally, many

respondents from a Somali Health Study based in Minnesota reported a lack of places to walk as a reason for not exercising [16]. One participant noted: "When I was living in Somalia I used to walk everywhere despite the distance, but here in the U.S. I have to either take a bus or drive everywhere that I want to. I guess walking was the only way I used to get exercise, but now that is impossible." (p. 13)

Indeed, one aspect that has largely been neglected in the evaluation of immigrants' physical activity is their interaction with the built environment, especially immigrants' use of transportation. Urban environments that are designed around automobiles – a sedentary form of transportation, with long commutes associated with weight-gain [17] – have become pervasive in the United States [18,19]. In 2001, 86.4% of trips taken by Americans were by automobile [20]. That same year, over 90% of U.S. households owned at least one car and nearly 60% had two or more [20]. Thus, investigating U.S. immigrants – who are less likely to travel by single occupancy vehicle than the general population [21] – allows for analyzing how their time in the country with and without a vehicle might affect physical activity.

Theory and Conceptual Framework

This study uses a social ecological perspective of the built environment and transportation to examine the constructs of acculturation and physical activity. Acculturation is operationalized as a unidirectional process, whereby immigrants adopt values, beliefs, and behaviors from the host culture over time. While this model is clearly problematic by neglecting the complexity of bicultural identities [22,23], we still considered it useful because we were not striving to gain insight into immigrant identity, per se. Nor were we attempting to impose or promote a normative paradigm. In fact it is quite the opposite; we were interested in the effect of a broadly defined environment – one that might be unhealthy and amenable to altering – over time on an outcome across a variety of immigrant groups.

A social ecological perspective acknowledges that behaviors are exercised within interacting layers intrapersonal, interpersonal, institutional/organizational, community, and public policy contexts [24,25]. It incorporates both personal behavior change as well as environmental restructuring in order to promote population health [26]. The built environment, loosely defined as one's physical surroundings created or modified by human activity, represents a community-level context in this perspective and has been gaining attention as a public health priority [27]. However, the built environment does not affect humans solely on a direct, physical level. It has wide-ranging social effects on how society is structured and how individuals behave. Studies have found that various built environment features can affect physical activity, specifically by promoting or discouraging active forms of transportation such as walking or bicycling [28–30]. However, even the most urban areas in the United States, compared to those in other countries, are largely composed of low density, car-oriented environments [18]. As mentioned earlier, an overwhelming majority of trips taken by Americans in aggregate are by automobile, and car-ownership is widely prevalent among the general population. This may represent a strong community-level influence on behavior, particularly for immigrants as they adjust to their new – possibly assimilating – environment.

Our conceptual framework, therefore, begins with the construct of length of residence. We hypothesized that it affects the construct of physical activity in a unidirectional manner, but its effects may differ based on the type of physical activity. We believed that longer lengths of residence would be associated with lower levels of light physical activity (including walking). We were also interested in the construct of vehicle ownership as part of the acculturative process. We posited that vehicle ownership lies along the pathway between length of residence and physical activity as a mediator. As length of residence increases, an immigrant may become more likely to need and own a vehicle – for both utilitarian [31] and symbolic/affective [32] reasons – and therefore substitute previously active forms of transportation for driving [21,33,34]. For vigorous

physical activity, we thought there may be different trajectory, because most of the literature showing an *increase* in physical activity with greater acculturation used outcomes that were more vigorous [10]. Regarding vehicle ownership, inadequate transportation is a barrier to accessing recreational facilities like parks and gyms for physical activity [14,16] as well as health care facilities [35,36] among immigrants and ethnic minorities. Thus, it is plausible that vehicle ownership could itself account for an increase in vigorous activity and, in a very different manner than for light activity, act as a mediator between length of residence and physical activity.

OBJECTIVES

Few studies have looked at physical activity among a nationally representative sample of U.S. immigrants, and even fewer have explored the impact of owning a vehicle on health behaviors. While automobile ownership may represent a clear improvement in quality of life among some immigrants [37] (p. 3) as well as a higher capacity to adapt to daily challenges [31], the health behavior changes of this transition ought to be addressed among a diverse range of U.S. immigrants. Thus, using data from a large, nationally representative survey that distinguishes between light (including walking) and vigorous physical activity, we sought to assess 1) the association between length of residence and level of light and vigorous physical activity, and 2) the influence of vehicle ownership on that relationship. We hypothesized that increased length of residence would be associated with lower levels of light physical activity, and that controlling for vehicle ownership would attenuate that relationship. We thought that vigorous physical might remain static or increase, and that controlling for vehicle ownership might also attenuate that relationship.

METHODS

DATA SOURCE

Data come from the New Immigrant Survey (NIS), a multi-cohort, nationally representative study of U.S. immigrants who recently acquired lawful permanent residence (LPR), or "green card," status. Details of the survey design are published elsewhere and available online [38]. Briefly, after an initial pilot survey in 1996, 12,500 electronic records were sampled from the U.S. Immigration and Naturalization Service – now the U.S. Citizenship and Immigration Services and the Office of Immigration Statistics. Their response rate was 68.6% yielding N=8573, considered to be successful by project staff. Immigrants were categorized into four strata based on immigration type: spouses of U.S. citizens, employment principles, diversity principles, and others. Spouses of U.S. citizens were undersampled; employment and diversity principles were both oversampled. Sample weights were included in the NIS data. Because the survey included both immigrants whose documents were granted overseas as well as those already living in the United States (some without documentation) whose status was adjusted, the lengths of residence at the time of interview were highly variable. Spouses and children of the respondent were interviewed when applicable, and their data are also publicly available. Interviews were conducted in the respondents' preferred language. Survey content included questions about education, family, languages, use of government services, religion, and – important to this study – health and specific assets (e.g. vehicle ownership). For some questions regarding household information, the respondents could defer to their spouse.

For our study, we used the first full adult cohort (N = 8573) from the 2003 public-use dataset. We excluded those who were severely disabled (n=122), a clear outlier based on reported physical activity (n=1), as well as those who were overseas at the time of interview (n=321) because length of residence may not as accurately represent an exposure for them. For missing

values of variables regarding household income and assets, we substituted data with responses from their spouse when available (e.g. 2830 substitutions were made for vehicle ownership). We used list-wise deletion for all remaining missing values (n=889) with the exception of home ownership (see: Demographic and Socioeconomic Variables section for explanation). Our final sample size was N=7240.

Physical Activity

Our main outcome variables were light and vigorous physical activity (from hereon: LPA and VPA, respectively) which were assessed using questions originally from the Health & Retirement Study (HRS) from the University of Michigan [39]. Respondents were asked, "How often do you participate in light exercise such as walking, dancing, gardening, golfing, bowling etc.?" and "How often do you participate in vigorous physical exercise or sports such as aerobics, running, swimming, or bicycling?" Answers were recorded as numbers followed by a unit (e.g. per month). Based on the distributions of responses, we calculated the number of times participants engaged in activity per week. For healthy adults, the American College of Sports Medicine recommends moderate exercise five or more days per week [40], and the Centers for Disease Control and Prevention recommends 150 minutes of moderate intensity aerobic activity (including brisk walking) [41]. Therefore, assuming NIS participants engaged in approximately 30 minutes of activity for every instance they report, we used a cutoff of five or more times per week to create an indicator variable for LPA. Because so few participants reported VPA at all and vigorous activity is known to be uncommon in most populations, we used a cutoff of one or more times per week for the VPA indicator variable.

Length of Residence

Our main exposure variable was length of residence, calculated by subtracting year of arrival from year of interview (either 2003 or 2004). Based on other studies [7,42], we stratified the variable into the following categories: less than one year, one to less than five years, five to less than ten years, ten to less than fifteen years, and at least fifteen years.

Vehicle Ownership

Vehicle ownership was dichotomized (yes/no), and those who had a vehicle or vehicles stored exclusively outside the United States were recoded as 'no.'

Demographic and Socioeconomic Variables

Other variables included basic demographic characteristics and variables linked to socioeconomic status (SES). Age was categorized into eighteen to less than thirty, thirty to less than forty, forty to less than fifty, fifty to less than sixty, and at least sixty years. Gender was dichotomized (female/male). Region of origin was categorized into Americas, Asia/Pacific (including Oceania), Africa/Middle East, and Europe/Central Asia. Education level was dichotomized (cutoff at twelve years). Income was dichotomized based on the 2003 federal poverty line for corresponding household sizes. Home ownership was originally dichotomized, but a dummy variable category [43] was included due to having a large number of missing values; results did not change significantly with dummy variable included.

Statistical Analysis

Statistical analyses were performed using STATA v.12. To explore the general characteristics of our sample, we calculated means and percentages of our exposure variable and

various demographic variables stratified by our outcome variables (e.g. mean age of those reporting LPA), means of outcome variables stratified by various demographic variables (e.g. mean VPA of those with less than twelve years of education), and percentages of exposure variable by various demographic variables (e.g. percentage of newly arrived immigrants among those who were unemployed). We also created bar graphs of mean physical activity levels by length of residence category, histograms of LPA and VPA by length of residence category, and bar graphs of those meeting LPA and VPA thresholds by individual years of residence. Bivariate odds ratios for dichotomized LPA and VPA were calculated using an alpha of 0.05 to interpret p-values and create 95% confidence intervals.

To assess the relationship between length of residence and physical activity, we conducted multivariate logistic regression for both LPA and VPA. Models for both LPA and VPA included the same covariates in order to simplify the comparison of results. Although we posited vehicle ownership to be a mediator, we also tested to see if vehicle ownership modified the relationship between length of residence and physical activity. To do this, we performed an Adjusted Wald Test with the null hypothesis defined as the interaction terms (between length of residence categories and vehicle ownership) all being non-zero. This resulted in p-values of 0.17 for LPA and 0.83 for VPA, giving us insufficient confidence to include the interaction terms (reject the null hypothesis). Our multivariate analysis thus proceeded without the interaction terms.

Covariate selection proceeded in a stepwise manner. Covariates available in the dataset were identified based on literature review and our conceptual model. We excluded covariates that were not significantly associated with LPA or VPA (e.g. marital status). We also included variables of interest that would aid in specific interpretation of results. For example, home ownership was included in order to isolate the effect of vehicle ownership above and beyond simply owning assets, and either LPA (in the VPA model) or VPA (in the LPA model) to more

narrowly isolate physical activity type from simply the tendency to report activity of all types.

Three multivariate models were estimated for both LPA and VPA to assess effects of different "classes" of covariates on the exposure-outcome ORs. The first (most simple) multivariate model included basic demographic covariates (age, gender, country of origin). The second multivariate model added socioeconomic covariates (education, employment status, household poverty status, and home ownership). The final multivariate model added vehicle ownership – the variable most connected with transportation behavior. For demographic percentages and regression odds ratios, we utilized sample weights provided within the public-use dataset. Counts were non-weighted.

RESULTS

SAMPLE CHARACTERISTICS

The mean age of the sample was 38.3 years. The mean length of U.S. residence was 5.5 years, with a range of <1 to 64 years. Some 38.8% of our sample reported engaging in LPA five or more times per week, 31.2% reported engaging in VPA one or more times per week, and 14.1% participated in both beyond threshold values. Some 56.9% met threshold values for *either* LPA or VPA. Table 1 includes additional averages and percentages of socioeconomic variables by length of residence. As their length of residence increased, from recently arrived to 5-10 years, immigrants earned higher incomes and became more likely to be employed, own a car, and own a home.

Table 2 presents demographic characteristics of our sample as a whole in addition to the sample stratified by those engaging in LPA and VPA. Those reporting LPA five or more times

per week were more likely than those reporting LPA less than five times per week to be older, male, originate from Asia/Pacific or Europe/Central Asia, be unemployed, be non-home owners, be non-vehicle owners, and to have lived in the U.S. for less than one year. In contrast, those who reported VPA at least once per week were more likely than those reporting VPA less than once per week to be younger, be male, originate from Africa/Middle East or Europe/Central Asia, have completed twelve years of school, be employed, own a home, own a vehicle, and have lived in the U.S. more than one year.

Age was positively associated with both LPA and VPA, but in opposite directions. Likelihood of LPA increased with age ($p<0.01$ comparing those forty to less than fifty years old and those eighteen to less than thirty years old), whereas VPA *decreased* with age. Women were less likely than men to report LPA or VPA, yet the magnitude of the association was much greater for vigorous (OR: 0.49, CI: 43-55%) than light activity (OR: 0.88, 95% CI: 79-98%). Comparing regions of origin, immigrants from the Europe/Central Asia region were the most likely to report both LPA and VPA, whereas those from the Americas region were least likely to report LPA and those from the Asia/Pacific region were least likely to report VPA. There was no association between education (completing twelve or more years) and LPA, but there was a strong association with VPA (OR: 2.18, 95% CI: 1.90-2.49). Those who were employed were less likely to report LPA but more likely to report VPA than those who were unemployed. Compared to immigrants who did not own a vehicle, vehicle-owners were about half as likely to report light activity, but over one and a half times as likely to report vigorous activity.

DESCRIPTIVE ANALYSIS OF LPA AND VPA

As length of residence increases, average physical activity levels changed slightly, particularly during the first three residence categories (Figure 1). On average, new arrivals in the country (less than one year) reported engaging in LPA 3.8 times per week and VPA 0.9 times per

week. Average LPA declined slightly for the next two residence categories, going from 3.8 to 3.4, and then to 3.1 times per week, where it subsequently leveled off. Average VPA showed little difference across length of residence categories, ranging from 0.9 to 1.2 times per week.

Figures 2 and 3 contain histograms that show the distribution of LPA and VPA for different residence categories. For LPA, the percentage of immigrants reporting less than once per week of LPA remained relatively constant across all residence categories. What did change, however, was the percentage of those reporting LPA *every* day. Upon arriving in the U.S., about 36.3% reported LPA every day of the week which dropped to almost 22.4% by years five to ten. Meanwhile, the percentage of those participating in LPA two to six times per week increased. For VPA, there was a different trend. The percentage of sedentary immigrants (less than once per week) dropped off from 69.1% among newest arrivals to 53.5% by years five to ten. Note that these percentages may not align exactly with the histogram spikes due to bin sizes.

Based on these analyses, we also assessed changes within the first ten years of arrival (Figure 4). Frequent LPA (five or more times per week) declines and VPA (one or more times per week) increases for the first three years before leveling off. This corresponds with an increase in vehicle ownership over the same period. Based on the LPA histograms (Figure 2) and Figure 4, it appears that most of the decline in LPA occurs within the first three years of residence, especially among immigrants reporting daily physical activity. Similarly, most of the small increase in VPA occurs as previously sedentary immigrants start to engage in vigorous activity during the first few years, though perhaps a less robust trend than for LPA.

CRUDE ODDS RATIOS FOR LPA

Table 2 also presents crude ORs for our "exposure" variables of interest. For LPA, each length of residence category is significantly associated ($p<0.001$ for each category) with *lower*

odds of reporting LPA as compared to the newest arrivals. For example, compared to the newest arrivals, immigrants of one to five years residence were about 73% (95% CI: 63-84%) as likely to report frequent LPA, and those of five to less than ten years residence were about 56% (95% CI: 47-67%) as likely.

Multivariate Odds Ratios for LPA

Multivariate analysis for LPA includes three models shown in Table 3. After controlling for VPA and basic demographic variables (Table 3, Model 1), each increasing length of U.S. residence remained statistically significantly associated with a lower odds of reporting frequent LPA ($p<0.001$). After including socioeconomic status variables (education, employment, household income, home ownership) in the model (Table 3, Model 2), each length of residence category again remained statistically significant. Finally, after including vehicle ownership in the model (Table 3, Model 3), three of the four residence categories were no longer statistically significant. Only immigrants of five to less than ten years of residence had a statistically significant (negative) association with reporting LPA after controlling for vehicle ownership. Vehicle ownership itself was negatively associated with reporting frequent LPA ($p<0.001$) in this final model.

Crude Odds Ratios for VPA

In contrast to LPA, each length of residence category for VPA was statistically significantly associated ($p<0.001$ for three categories) with *higher* odds of reporting VPA as compared to new arrivals. For example, compared to new arrivals, immigrants of one to less than five years of residence were about 36% (95% CI: 16-59%) more likely to report VPA at least once per week and those of five to less than ten years of residence were about 80% (95% CI: 50-115%) more likely.

MULTIVARIATE ODDS RATIOS FOR VPA

As with LPA, multivariate analysis for VPA includes three models shown in Table 4. After controlling for LPA and basic demographic variables (Table 4, Model 1), each length of residence category remained statistically significantly associated with a *higher* odds of reporting VPA. However, after including socioeconomic status variables (education, employment, household income, home ownership) in the model (Table 4, Model 2), two of the four residence categories were no longer statistically significant. Only immigrants of five to less than ten years of residence and those of at least fifteen years of residence had a statistically significant association (positive) with reporting VPA. After including vehicle ownership in the model (Table 4, Model 3), the odds ratios changed slightly but the same two length of residence categories remained statistically significant ($p<0.01$). Vehicle ownership itself was not associated with reporting VPA in this final model.

DISCUSSION

In this analysis of the 2003 NIS, we sought to assess the relationship between length of residence and reported light as well as vigorous physical activity among immigrants. Our results suggest a marked transition in the level of physical activity occurring after settling in the United States, especially during the first three years of residence.

Our overall percentage of those meeting light and vigorous activity thresholds for either light or vigorous activity, 56.9 percent, was higher than the national average of about 48.8 percent [5]. This may have resulted from the different definitions and measurement instruments used for physical activity. Our definition of being active was more liberal; we did not require particular

combinations of intensity and duration of activity, so actual levels of physical activity may be closer to the U.S. population as a whole. A study that used the same measurement instrument as ours among a nationally representative sample of older adults found that 28.6 percent of their sample participated in vigorous activity at least once a week [44], slightly lower than that observed in our younger sample (31.2 percent). Goel et al. [7] used a similar instrument, finding percentages between 40 and 59 among immigrant subgroups, consistent with our results.

Most immigrants in our sample were from Mexico (12.8 percent). In 2006, Mexico's first national assessment of physical activity revealed that 87.0 percent were at least moderately active [45]. Similar to our study, men were much more likely than women to report vigorous activity. Both men and women reported walking about one hour per day. These were encouraging data, but the country's more recent study from 2012 indicates a drop in physical activity and an increase in sedentariness [46]. Thus, new immigrants from Mexico – and potentially elsewhere if this is a global trend – may be less physically active at baseline in the near future than previous cohorts.

Contrasting Relationships Between Length of Residence and Activity Types

Like other studies [9,13] that found differing trends by type of activity, our analysis indicated that while LPA was negatively associated with length of residence, VPA was positively associated. This may underlie an important difference in perceptions between light and vigorous physical activity by immigrants as well as the U.S. population. Americans, especially those of "Generation Y," assign a high social value to vigorous activities like action sports, owing partly to commercial sponsorships, endorsements, and advertising [47]. Thus, with greater social acculturation of immigrants there is an increase in their participation in vigorous physical activity. This favorable perception of vigorous activity may also come from the relationship between biomedicine and society, as discussed by Andrea Abbas [48] in the journal *Leisure Studies*. She

articulates how the medical field conceptualizes leisure time as a health-promoting activity, and this has formed robust communities of health-minded, long-distance runners throughout the United States. While serving as an important avenue for public health promotion, this culture may also perpetuate the "slender muscular body" (p.159) image popular in Western countries, and its emphasis on personal responsibility may exacerbate inequality by age, gender, and race. Thus, it is not surprising that communities of runners might not include immigrants who lack such acculturation. But under these social pressures, an immigrant's physical activity profile might shift slightly in favor of vigorous activity – such as leisure-time aerobics – the longer they reside in the country and gain access to these activities and communities.

The decline in LPA, on the other hand, may more represent the effect of environmental (versus social) determinants. Immigrants experience physical environments immediately upon arrival, and behavioral shifts would be expected to follow soon after. Correspondingly, immigrants in our sample were less likely to meet light activity recommendations after just one to three years (Table 3 and Figure 4). While vigorous activity may increase slightly within a similar time frame, potentially suggesting an environmental role as well, the adjusted regression models show no significant difference comparing the first two length of residence categories for VPA (Table 4). In fact, if anything, the regression models suggest a robust increase in VPA after five to ten years of residence or after fifteen years of residence.

Various environmental contexts such as the home, workplace, and neighborhood could be a barrier to consistent, high levels of light activity. Dannenberg et al. [49] highlight several mechanisms by which poorly designed built environments become detrimental to health in their book, *Making Healthy Places*. For instance, workplaces that lack accessible, safe, and attractive staircases or job routines designed solely around sitting at a desk miss out on opportunities for activity (Ch. 12). The fact that immigrants in our sample declined in LPA despite a higher likelihood of employment suggests that their work environments (or the proximities and

environments between home and work), by and large, did not provide opportunities for light activity. This is consistent with a study by Church et al. [50] who examined occupational physical activity trends between 1960-2010. They confirmed a dramatic, linear decline in moderate-intensity jobs as well as average energy expenditure at U.S. workplaces. Thus, as immigrants settle in to increasingly sedentary jobs, this may cause particularly their LPA to decline, especially in the first three years of residence.

Our data also suggest that transportation plays a role in the trajectory of LPA, but not for VPA. Rates of vehicle ownership increased 3.5-fold over the first three years of residence (year "0", "1", and "2" in Figure 4), while frequent LPA declined during the same period. And after controlling for vehicle ownership in the regression model, statistical significance for LPA disappeared in all but one length of residence category. These findings are consistent with evidence that transportation (i.e. walking) has accounted for a large portion of light activity among new immigrants in the United States [9] and that walking has been the preferred choice of exercise across culturally diverse, older U.S. adults [14]. But immigrants' adaptation to car-oriented environments – pervasive in the U.S. – may come at the expense of consistent walking [34,51].

Furthermore, immigrants are not simply distributed at random among U.S. cities and towns. They are disproportionately represented in poor neighborhoods [52], which tend to lack safe, high-quality recreational facilities; thus immigrants may have limited access to certain kinds of physical activity [49]. But what is perhaps more concerning is a recent shift of both poverty and immigrant communities to suburban areas [53], where vehicles are often necessary for mobility. For example, South King County (WA state) – a car-dependent, suburban area with high rates of chronic diseases like diabetes [54] – welcomed 70,000 new residents and saw their foreign-born population grow from 6.1 to nearly 20 percent of their total population over the last two decades [55]. This underscores the urgency of the issue. Environments that are amenable to

walking for transportation may play a key role in maintaining and improving the health of immigrants as they settle into their new cities and towns.

Our findings are also consistent with data from immigrants' countries of origin outside the United States. Rising automobile ownership in Asia [56] and Latin America [57,58] has been associated with greater health risks related to inactivity such as overweight and obesity. And participants in the aforementioned Somali health study [16] described Somalia as a place where "physical activity was a part of their everyday lives. Both men and women said that they maintained an active life by walking, and through their work… Only a few men included leisure activities such as 'running' and 'playing soccer' as ways they exercised" (p. 12). In other words, walkable built environments may in fact be a more familiar, culturally appropriate strategy than specific, high-intensity activities to promote physical activity among immigrants.

SOCIOECONOMIC STATUS

After adjusting for demographic variables in the models, all length of residence categories remained significant correlates of LPA and VPA. However, after including socioeconomic variables in the model, only for LPA did all residence categories remain statistically significant, whereas only two of the four categories were significant for VPA. This suggests that socioeconomic status (SES) plays an important role in the association between length of residence and vigorous activity, but is perhaps less relevant with regards to light activity. The influence of SES on physical activity is well established [59–61], and certain vigorous activities like sports simply require more time and money than light activity. Yet few studies have explicitly connected socioeconomic status to higher intensity activity. Ford et al. [62] found that men of low SES spend more time walking and doing household chores whereas men of higher status participated in more leisure-time physical activity, likely to include vigorous exercise. The reasoning behind this may mirror an economic model developed by Meltzer & Jena

[63] in 2010 based on national health data. They hypothesized that as incomes rise, the opportunity cost of time for exercise rises as well, causing the intensity of activity to increase to more vigorous levels and duration to decrease. Stated another way, as earning power increases, one tends to use time more efficiently in order to acquire better health.

STRENGTHS AND LIMITATIONS

Strengths of this study include having a large sample including immigrants from various regions and varying lengths of residence in the U.S. The survey was also conducted in the respondents' native language, which likely enhanced the accuracy of the data.

Still, our study is not without limitations. We conducted a cross-sectional investigation for the purpose of investigating associations, so we cannot establish a causal relationship, per se, between length of time in the U.S. and physical activity levels based on our analysis. However, we benefited from the fact that our exposure variable (length of residence) is inherently retrospective, so it "precedes" the snapshot of physical activity level at the time of the survey. It also seems more plausible that vehicle ownership might affect physical activity versus the opposite. Secondly, the survey's response rate of 68.6%, the age of the data (about a decade old), and the inclusion of only documented immigrants make it difficult to generalize our findings to the entire population of current U.S. immigrants. This snapshot shed light into some U.S. immigrants' trajectories of physical activity and ought to be repeated with more recent data and perhaps location- or neighborhood-specific variables. Thirdly, the measurement of our outcome variables (physical activity) may not reflect actual behavior, as self-reported physical activity often differs substantially from more objective measurement tools like accelerometers [64–66]. As mentioned in the methods, the physical activity questions were adapted from the HRS [39], but they have not been validated as far as we are aware. In an HRS analysis looking at how physical activity related to race, ethnicity, and education, He & Baker [44] combined LPA and

VPA into one variable, "leisure-time physical activity" (LTPA), and they mention that the LTPA questions are similar to questions used in other validated measures, and that the construct itself appears to be predictive of overall health and physical functioning (p. 265). In addition, we believe our conclusions remain functional because measurement error would not account for the consistent associations we found, and any measurement error of physical activity is likely to underestimate, not exaggerate, the odds ratios we determined.

An additional issue that should be addressed is how appropriate the instrument's questions are for culturally diverse populations, such as U.S. immigrants. For instance, the question for LPA included golfing and bowling as examples, which may have been relatively obscure to our foreign-born sample population. Future research ought to respond to the need for testing validity among specific cultural subgroups [67] in assessing physical activity.

Social Ecological Model and Recommendations

This study sheds light on several factors that influence behavior beyond simply individual choice. Length of residence is an individual characteristic, but it also reflects adaptation to the social and physical environment of living in the United States. The milieu of factors that define the host environment appear to lead to a decline in certain types of physical activity, including walking most likely. Vehicle ownership, while also an individual characteristic, suggests a certain socioeconomic status as well as interpersonal contexts (e.g. a family with multiple school-age children) in which a vehicle might be more necessary. Understanding the built environment as a community-level context that influences behavior – partly through transportation – we found that vehicle ownership may mediate a decline in LPA. Furthermore, two institutional level contexts in particular – education and employment – were associated with likelihood of physical activity. Education beyond high school was associated with *higher* likelihood of VPA (even after controlling for SES), and current employment was associated with *lower* likelihood of LPA. In

other words, perhaps due to existing physical activity programs, health knowledge, or access to programmed activities later in life, graduating from high school is strongly predictive of VPA in our sample. And employment, for reasons already mentioned like the wholesale shift away from physically active jobs in America, marks a decline in light activity.

Yet contexts themselves can be modified and improved to support health behaviors; thus, our results would support efforts to alter these contexts in order to lessen the decline in LPA while continuing to promote VPA. Table 5 includes our recommendations for the public health sector and local government. In short, we suggest that public health practitioners incorporate opportunities for light, utilitarian activity – not just vigorous activities already promoted by popular culture – into a variety of settings. The challenge is to create systems that do not hamper opportunities for employment and do not require significant time trade-offs (e.g., increasing public transit access and speeds). Furthermore, maintenance of funding for physical activity programs at schools to boost VPA and interventions at employment sites in order to increase LPA would be promising approaches for health promotion. For example, through the CDC's Racial and Ethnic Approaches to Community Health (REACH) program, researchers at UCLA are focusing on incorporating physical activity into places like schools, offices, and churches [68]. One of the principal investigators conducted a systematic review on the potential of promoting short bouts of physical activity, and they found modest but consistent PA benefits, likely to be the most sustainable if implemented at the organizational (vs. individual) level [69]. Additionally, a Community Transformation Grant awarded to Seattle Children's Hospital, Public Health Seattle & King County, and Healthy King County Coalition is aimed at increasing physical activity at schools, childcare, and after-school programs, as well as enhancing the built environment through changes in land use and planning policies [70].

Additionally, we recommend that city planners promote affordable, ethnically diverse neighborhoods that encourage walking for transportation. Vehicle ownership and driving, while

potentially unhealthy [17,71], can represent both higher socioeconomic status and greater adaptability [31] in transportation. And in a study conducted in poor, suburban neighborhoods in Toronto, respondents noted that their number one priority in improving their standard of living would be owning a vehicle [37] (p. 3). Thus, policy prescriptions ought to respect immigrants' aspirations and try to avoid trading quality of life for modest public health improvements. Rather, we advocate for creating environments that do not *require* vehicle ownership for civic inclusion and/or do not require exclusive use of vehicles in order to meet daily needs. Teri Duarte, a public health nutritionist mentioned in an article titled, "The Role of clinicians to Empower communities through utilization of the Built Environment" [72] serves as a pertinent example. She was able to mobilize health professionals in Sacramento to advocate for incorporating walkability and health issues into land use planning at the county level. This kind of innovation may be as effective in improving health among immigrant communities as promotion of individual, vigorous, leisure-time activity.

CONCLUSION

This is the first study to investigate immigrants' physical activity patterns using the NIS data. Overall, while the data suggest a modest increase in vigorous activity over immigrants' length of residence in the U.S., the data show a rapid decline in light activity that is likely influenced by factors like transportation. In the next 50 years, the United States will become home to millions of new immigrants from around the world [4]. It is therefore critical to explore what constitutes a healthy – or unhealthy – environment and acculturative process for new arrivals. Research ought to focus on what cultural, economic, and infrastructural factors can curb this decline in LPA among U.S. immigrants, especially as it relates to a shift from walking to

driving. In addition, we support efforts to create urban environments that are both inclusive of immigrant communities and suitable for walking. These efforts will help combat chronic diseases in the United States for years and generations to come.

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FIGURES AND TABLES

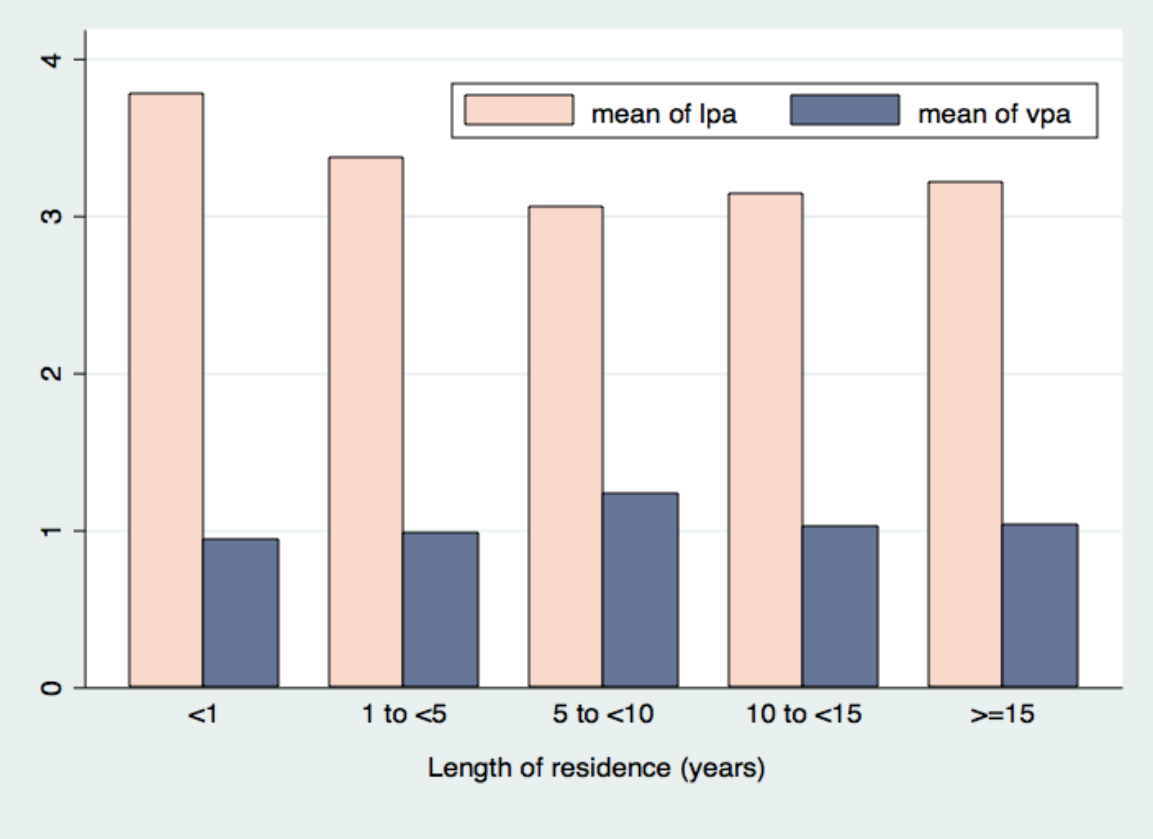


FIGURE 1 MEAN PHYSICAL ACTIVITY LEVELS BY LENGTH OF RESIDENCE

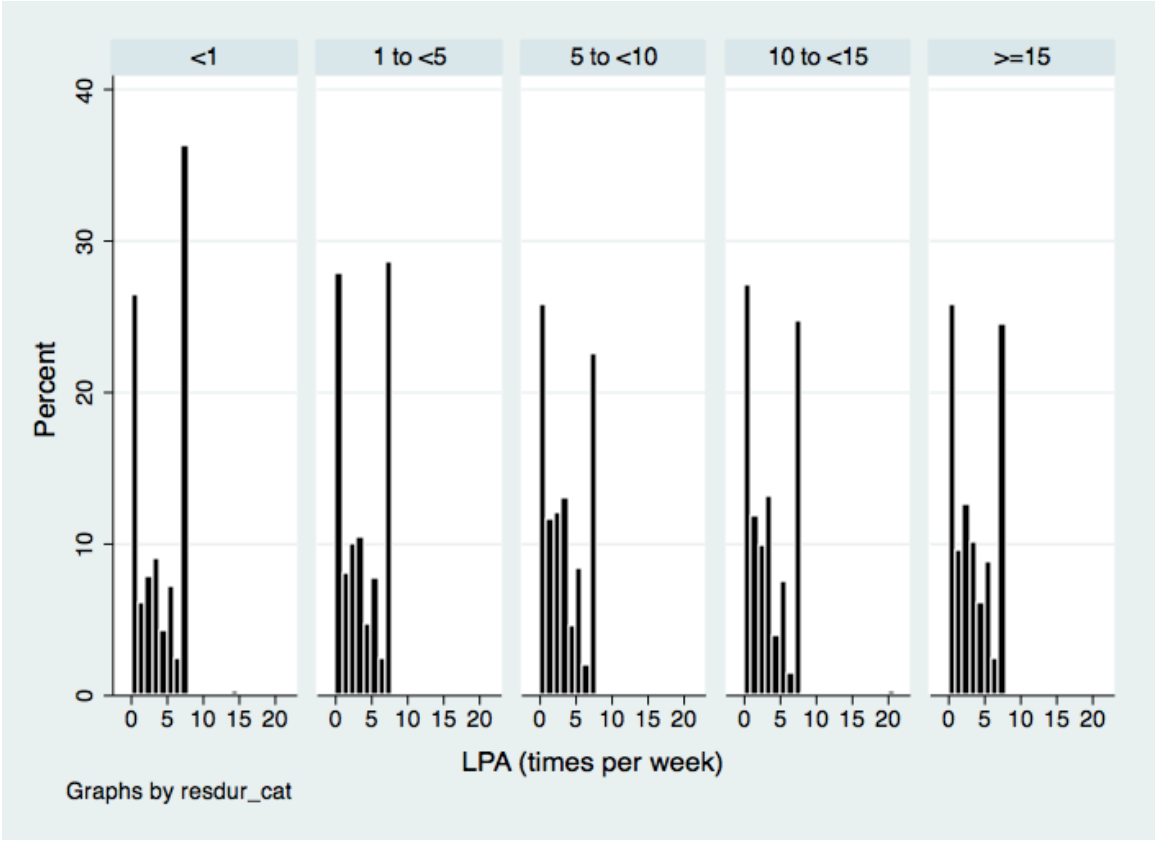


FIGURE 2 DISTRIBUTION OF LPA BY LENGTH OF RESIDENCE

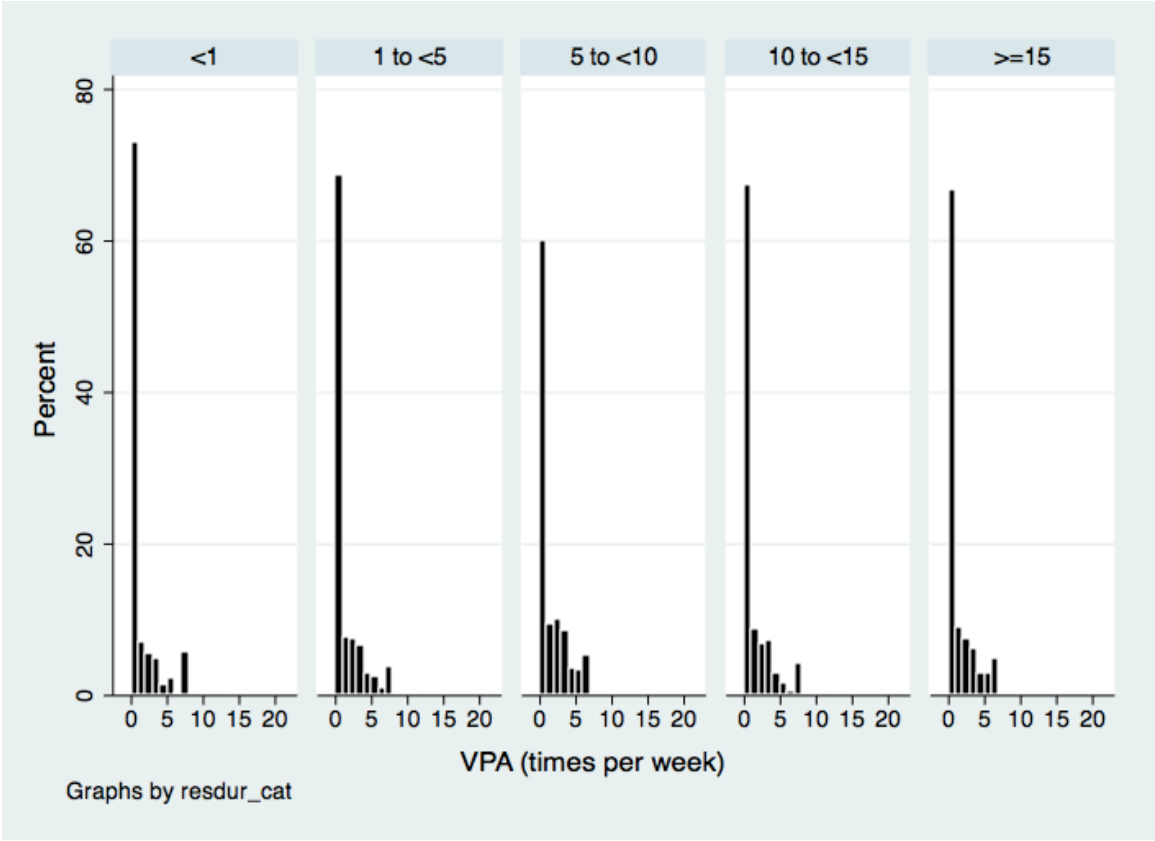


FIGURE 3 DISTRIBUTION OF VPA BY LENGTH OF RESIDENCE

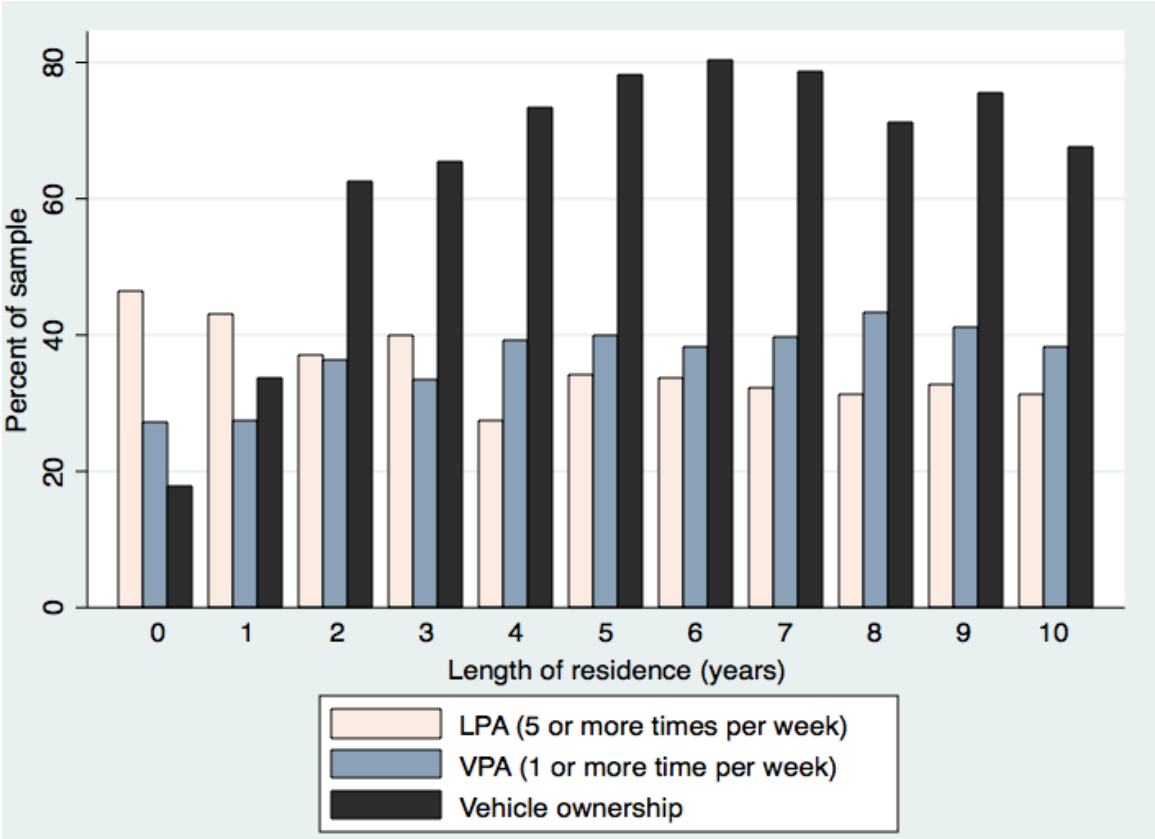


FIGURE 4 PERCENTAGES OF SAMPLE REPORTING LPA, VPA, AND VEHICLE OWNERSHIP IN FIRST TEN YEARS AFTER ARRIVAL

TABLE 1 SELECTED AVERAGES AND PERCENTAGES BY LENGTH OF RESIDENCE

Length of U.S. residence (years)	n	Mean LPA per week	Mean VPA per week	Median annual income	Employed (%)	Own vehicle (%)	Own home (%)
<1	2026	3.8	0.9	4700	35.4	21.1	5.1
1 to <5	2160	3.4	1.0	14424	45.1	55.8	17.5
5 to <10	1346	3.1	1.2	45000	73.6	77.0	34.8
10 to <15	905	3.1	1.0	28200	75.2	70.6	36.3
>=15	803	3.2	1.1	26280	72.2	68.6	32.8
Total	7240	3.4	1.0	20000	58.3	54.7	22.1

Sample weights used for means and percentages.

TABLE 2 WEIGHTED CHARACTERISTICS OF SUVEY PARTICIPANTS, STRATIFIED INTO GROUPS REPORTING LPA AND VPA

Characteristics[‡]		**Light PA** (>=5 times per week)		**Vigorous PA** (>=1 time per week)	
	Total n (%)[‡‡]	n (%)	Crude OR (95% CI)	n (%)	Crude OR (95% CI)
Age (years)					
18 to <30	1842 (27.9)	667 (24.4)	1.00	745 (35.9)	1.00
30 to <40	2648 (35.3)	941 (32.5)	1.08 (0.93-1.26)	943 (38.8)	0.78 (0.67-0.91)**
40 to <50	1462 (19.0)	565 (19.0)	1.25 (1.06-1.48)**	428 (16.8)	0.57 (0.48-0.68)***
50 to <60	704 (9.4)	323 (9.4)	1.85 (1.52-2.25)***	144 (5.8)	0.35 (0.28-0.45)***
>=60	584 (8.4)	329 (8.4)	2.50 (2.04-3.07)***	67 (2.8)	0.17 (0.13-0.23)***
Gender					
Male	3606 (45.2)	1426 (47.2)	1.00	1477 (57.4)	1.00
Female	3634 (54.8)	1399 (52.8)	0.88 (0.79-0.98)*	850 (42.6)	0.49 (0.43-0.55)***
Region of origin					
Americas	2747 (46.0)	1000 (42.3)	1.00	822 (44.8)	1.00
Asia/Pacific	2305 (29.0)	890 (30.1)	1.22 (1.07-1.39)**	624 (22.8)	0.74 (0.64-0.86)***
Africa/Mid. East	999 (11.1)	403 (11.4)	1.19 (1.00-1.43)	375 (13.4)	1.38 (1.15-1.66)**
Eur./C. Asia	1189 (14.0)	532 (16.2)	1.47 (1.25-1.74)***	506 (18.9)	1.68 (1.41-1.99)***
Education (years)					
<12 years	2224 (35.9)	912 (35.3)	1.00	452 (23.3)	1.00
>=12 years	5016 (64.1)	1913 (64.7)	0.95 (0.85-1.07)	1875 (76.7)	2.18 (1.90-2.49)***
Employment					
Not emp.	2776 (41.7)	1277 (47.8)	1.00	697 (33.0)	1.00
Currently emp.	4464 (58.4)	1548 (52.2)	0.66 (0.59,0.74)***	1630 (67.0)	1.70 (1.50-1.92)***
HH income					
<=FPL[‡‡‡]	2379 (30.7)	982 (32.0)	1.00	714 (31.7)	1.00
>FPL	4861 (69.3)	1843 (68.0)	0.91 (0.81-1.02)	1613 (68.3)	1.16 (1.02-1.31)*
Home ownership					
Rent or other	4661 (59.0)	1957 (63.6)	1.00	1447 (56.9)	1.00
Own	1182 (16.7)	381 (14.6)	0.71 (0.61-0.84)***	462 (19.4)	1.32 (1.13-1.55)**
Unknown	1397 (24.3)	487 (21.8)	0.74 (0.64-0.86)***	418 (23.8)	1.02 (0.88-1.19)
Vehicle ownership					
No	3608 (45.3)	1660 (53.4)	1.00	987 (37.6)	1.00
Yes	3632 (54.7)	1165 (46.6)	0.59 (0.53-0.66)***	1340 (62.4)	1.58 (1.40-1.78)***
Length of U.S. residence (years)					
<1	2026 (24.6)	940 (29.7)	1.00	547 (19.7)	1.00
1 to <5	2160 (31.5)	845 (31.7)	0.73 (0.63-0.84)***	679 (31.5)	1.36 (1.16-1.59)***
5 to <10	1346 (18.3)	443 (15.7)	0.56 (0.47-0.67)***	539 (22.0)	1.80 (1.50-2.15)***
10 to <15	905 (13.7)	309 (12.3)	0.61 (0.50-0.73)***	295 (13.8)	1.38 (1.13-1.69)**
>=15	803 (11.8)	288 (10.7)	0.61 (0.51-0.74)***	267 (12.9)	1.56 (1.27-1.90)***
Total	7240 (100.0)	2825 (38.8)		2327 (31.2)	

*p<0.05, **p<0.01, ***p<0.001

[‡]All characteristics are individual except for household size (household), home ownership (self or spouse) and vehicle ownership (self or spouse)

[‡‡]Counts (n) are based on unweighted sample; percentages are based on weighted sample; percentages by column except for row of totals; percentages may not add up to 100% due to rounding.

[‡‡‡]2003 federal poverty level

TABLE 3 ADJUSTED ODDS RATIOS AND 95% CONFIDENCE INTERVALS FOR LIGHT PHYSICAL ACTIVITY (>=5 TIMES PER WEEK)

Characteristics	**Multivariate Model 1** (main demographic variables)	**Multivariate Model 2** (socioeconomic variables included)	**Multivariate Model 3** (vehicle ownership included)
Length of U.S. residence (years)			
<1 (ref)	1.00	1.00	1.00
1 to <5	0.74 (0.64-0.86)***	0.82 (0.71-0.96)*	0.89 (0.76-1.04)
5 to <10	0.59 (0.49-0.70)***	0.71 (0.58-0.85)***	0.79 (0.65-0.97)*
10 to <15	0.67 (0.55-0.81)***	0.79 (0.64-0.97)*	0.88 (0.71-1.09)
>=15	0.62 (0.51-0.76)***	0.73 (0.59-0.90)**	0.81 (0.65-1.01)
VPA			
<1 (ref)	1.00	1.00	1.00
>=1	1.70 (1.50-1.93)***	1.73 (1.53-1.97)***	1.75 (1.54-1.99)***
Age (years)			
18 to <30 (ref)	1.00	1.00	1.00
30 to <40	1.16 (1.00-1.36)	1.20 (1.03-1.40)*	1.21 (1.04-1.41)*
40 to <50	1.36 (1.15-1.62)***	1.40 (1.18-1.67)***	1.39 (1.17-1.66)***
50 to <60	2.06 (1.68-2.52)***	2.01 (1.64-2.47)***	1.94 (1.58-2.39)***
>=60	2.86 (2.31-3.53)***	2.51 (2.01-3.14)***	2.30 (1.83-2.88)***
Gender			
Male (ref)	1.00	1.00	1.00
Female	0.93 (0.83-1.04)	0.87 (0.77-0.98)*	0.87 (0.77-0.98)*
Region of origin			
Americas (ref)	1.00	1.00	1.00
Asia/Pacific	1.07 (0.93-1.24)	1.08 (0.93-1.25)	1.08 (0.94-1.25)
Africa/Mid. East	1.13 (0.93-1.37)	1.11 (0.91-1.35)	1.10 (0.90-1.34)
Eur./Cen. Asia	1.35 (1.13-1.60)**	1.38 (1.15-1.65)**	1.41 (1.17-1.69)***
Education			
<12 years (ref)		1.00	1.00
>=12 years		1.02 (0.89-1.16)	1.03 (0.91-1.18)
Employment			
Not emp. (ref)		1.00	1.00
Currently emp.		0.70 (0.61-0.80)***	0.72 (0.63-0.83)***
HH Income			
<=FPL[‡] (ref)		1.00	1.00
>FPL		0.86 (0.75-0.98)*	0.89 (0.78-1.01)
Home ownership			
No (ref)		1.00	1.00
Yes		0.85 (0.72-1.01)	0.90 (0.76-1.08)
Unknown		0.85 (0.73-0.99)*	0.90 (0.78-1.06)
Vehicle ownership			
No (ref)			1.00
Yes			0.75 (0.65-0.86)***

As shown, Model 1 includes length of residence, vigorous physical activity, and basic demographic variables (age, gender, region of origin); Model 2 includes major socioeconomic variables (education, employment, household income, home ownership) in addition to all prior covariates. Model 3 includes vehicle ownership in addition to all prior covariates.

[‡]2003 federal poverty level

*p<0.05, **p<0.01, ***p<0.001

TABLE 4 ADJUSTED ODDS RATIOS AND 95% CONFIDENCE INTERVALS FOR VIGOROUS PHYSICAL ACTIVITY (>=1 TIME PER WEEK)

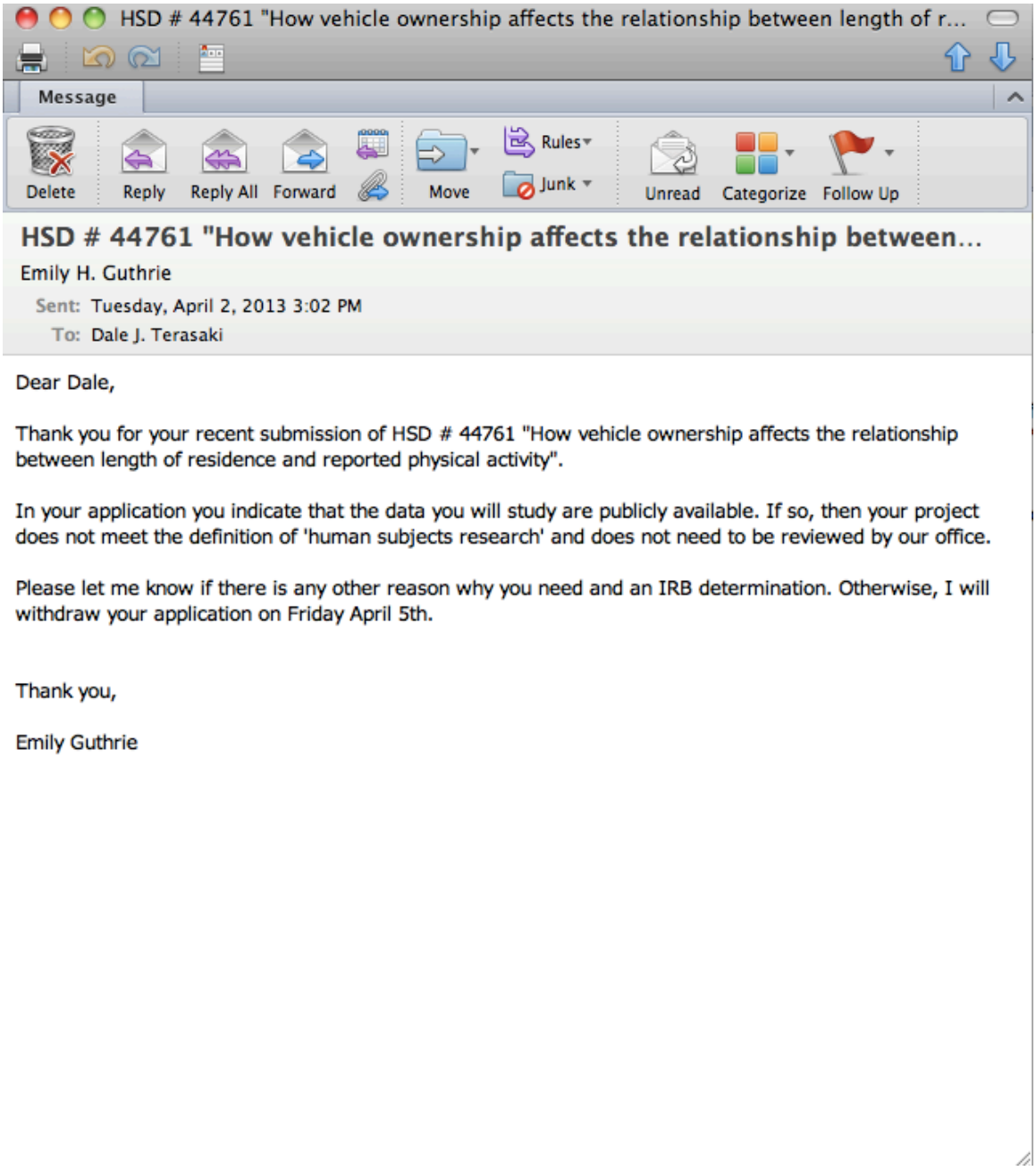
Characteristics	**Multivariate Model 1** (main demographic variables)	**Multivariate Model 2** (socioeconomic variables included)	**Multivariate Model 3** (vehicle ownership included)
Length of U.S. residence (years)			
<1 (ref)	1.00	1.00	1.00
1 to <5	1.31 (1.10-1.55)**	1.18 (0.99-1.40)	1.14 (0.95-1.36)
5 to <10	1.68 (1.39-2.03)***	1.42 (1.16-1.74)**	1.35 (1.09-1.67)**
10 to <15	1.31 (1.05-1.62)*	1.19 (0.95-1.50)	1.14 (0.90-1.44)
>=15	1.70 (1.35-2.13)***	1.60 (1.26-2.04)***	1.53 (1.19-1.96)**
LPA			
<5 (ref)	1.00	1.00	1.00
>=5	1.72 (1.51-1.95)***	1.75 (1.54-1.99)***	1.76 (1.55-2.01)***
Age (years)			
18 to <30 (ref)	1.00	1.00	1.00
30 to <40	0.71 (0.61-0.83)***	0.71 (0.61-0.83)***	0.71 (0.61-0.83)***
40 to <50	0.52 (0.44-0.63)***	0.54 (0.45-0.65)***	0.54 (0.45-0.65)***
50 to <60	0.32 (0.25-0.40)***	0.35 (0.28-0.45)***	0.36 (0.28-0.46)***
>=60	0.16 (0.12-0.22)***	0.20 (0.15-0.27)***	0.21 (0.15-0.28)***
Gender			
Male (ref)	1.00	1.00	1.00
Female	0.50 (0.44-0.56)***	0.51 (0.45-0.58)***	0.51 (0.44-0.58)
Region of origin			
Americas (ref)	1.00	1.00	1.00
Asia, Pacific	0.90 (0.77-1.06)	0.78 (0.66-0.93)**	0.78 (0.66-0.93)**
Africa, Mid. East	1.25 (1.02-1.53)*	1.08 (0.88-1.33)	1.09 (0.88-1.34)
Eur., Cen. Asia	1.68 (1.39-2.03)***	1.38 (1.14-1.68)**	1.37 (1.13-1.67)**
Education			
<12 years (ref)		1.00	1.00
>=12 years		1.83 (1.57-2.13)***	1.82 (1.56-2.12)***
Employment			
Not emp. (ref)		1.00	1.00
Currently emp.		1.16 (1.00-1.34)	1.14 (0.98-1.33)
HH Income			
<=FPL‡ (ref)		1.00	1.00
>FPL		1.18 (1.02-1.36)*	1.16 (1.00-1.34)*
Home ownership			
No (ref)		1.00	1.00
Yes		1.09 (0.91-1.30)	1.06 (0.88-1.27)
Unknown		1.03 (0.88-1.22)	1.00 (0.85-1.19)
Vehicle ownership			
No (ref)			1.00
Yes			1.14 (0.98-1.32)

As shown, Model 1 includes length of residence, light physical activity, and basic demographic variables (age, gender, region of origin); Model 2 includes major socioeconomic variables (education, employment, household income, home ownership) in addition to all prior covariates. Model 3 includes vehicle ownership in addition to all prior covariates.
‡2003 federal poverty level
*p<0.05, **p<0.01, ***p<0.001

TABLE 5 RECOMMENDATIONS

Sector	To prevent decline in LPA	To boost VPA
Academic / Non-profit Public Health	• Incorporate light activity opportunities into a variety of settings such as work environments. • Target immigrants in the first three years of residence for physical activity campaigns. • Educate the public, including immigrants, on connections between transportation and health. • Research how light physical activity (e.g. walking, gardening) could become more visible in the media and popular culture. • Use both valid and culturally appropriate measurement instruments for future studies.	• Maintain funding of existing physical activity programs in middle schools and high schools. • Research the connection between education and vigorous physical activity later in life • Research how various exercise-related communities might unintentionally neglect diverse populations. • Use both valid and culturally appropriate measurement instruments for future studies.
Local Government	• Engage in planning to create affordable, ethnically diverse, walkable communities with access to parks and trails • Increase subsidies for public transportation in order to decrease car dependence. • Locate affordable housing near jobs and amenities. • Establish incentives for employers – especially those of new immigrants – to create healthy work environments. • Improve physical activity surveillance among immigrants.	• Subsidize resource-intensive physical activity programming for immigrants in order to increase access. • Invest in increasing educational attainment and economic opportunity among immigrants. • Publicize city parks and recreational facilities among immigrants, with language-appropriate messaging and signage. • Improve physical activity surveillance among immigrants.

APPENDIX


HSD # 44761 "How vehicle ownership affects the relationship between length of r...
Message
Delete
Reply
Reply All
Forward
Move
Rules
Junk
Unread
Categorize
Follow Up
HSD # 44761 "How vehicle ownership affects the relationship between...
Emily H. Guthrie
Sent: Tuesday, April 2, 2013 3:02 PM
To: Dale J. Terasaki
Dear Dale,
Thank you for your recent submission of HSD # 44761 "How vehicle ownership affects the relationship between length of residence and reported physical activity".
In your application you indicate that the data you will study are publicly available. If so, then your project does not meet the definition of 'human subjects research' and does not need to be reviewed by our office.
Please let me know if there is any other reason why you need and an IRB determination. Otherwise, I will withdraw your application on Friday April 5th.
Thank you,
Emily Guthrie