Disability status differentials across different API ethnic groups and the effect of nativity and duration in the U.S. :
A replication of Cho and Hummer's 2001 analysis

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Introduction

Immigrants possess distinctive health patterns that differentiate them from non-immigrants. Immigrants are often healthier, yet, this immigrant advantage appears to decline over time (Frisbie, Cho, & Hummer, 2001; Singh & Miller, 2004). There are many explanations of immigrant health patterns; two of the most prominent are the healthy immigrant effect, and the negative duration (acculturation) effect. Although many studies find this pattern, some others do not (Jasso, Massey, Rosenzweig, & Smith, 2004; Lutsey et al., 2008; Mutchler, Prakash, & Burr, 2007; Singh & Miller, 2004; Takeuchi et al., 2007). Asian and Pacific Islander (API) immigrants are a good population to study these effects because APIs represent a sizeable proportion of the general U.S. immigrant population, and most APIs are immigrants (Malone, Baluja, Costanzo, & Davis, 2003). The current analysis has two aims: 1) describe the patterns of disability status across several different Asian and Pacific Islander (API) groups using the 2000 PUMS; and 2) examine the healthy immigrant and negative duration hypotheses in this sample.

The *healthy immigrant effect*, focuses on selective migration; those who are healthier are more likely to migrate to the U.S. than their native-country counterparts (Abraido-Lanza, Dohrenwend, Ng-Mak, & Turner, 1999; Rubalcava, Teruel, Thomas, & Goldman, 2008; Singh & Siahpush, 2001). Thus, the foreign-born represents a biased population that is positively selected on their pre-migration health status. Additionally, immigrants are believed to bring health-promoting behaviors, such as strong familial and social networks, healthy diets, and other norms and values that restrain risky behaviors such as smoking, abuse of alcohol or drugs and contribute to their positive health status.

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Among Asian immigrants, the healthy immigrant effect has been demonstrated in obesity, hypertension, cardiovascular disease and mental health status (Dey & Wilson Lucas, 2006; Frisbie et al., 2001; Goel, McCarthy, Phillips, & Wee, 2004). The immigrant advantage has not been demonstrated consistently across all studies of Asian immigrants, however. While Takeuichi et al. found that the foreign-born in their Asian sample had lower odds for some mental disorders compared to the US-born, they were not significantly different from the US-born in others (Takeuchi et al., 2007). Likewise, Singh and Miller found that the Asian foreign-born generally had better health and mortality outcomes than their US-counterparts but had higher risk for stomach, liver and cervical cancer mortalities (Singh & Miller, 2004).

A second complementary explanation is the *duration effect* which finds that the immigrant health advantage erodes with years in the U.S. This erosion is likely due to several factors working simultaneously, including the adoption of "Western" lifestyles (i.e. acculturation) and the accumulation of stressors such as racial discrimination over time. Among API immigrants, the duration effect appears in nearly all Asian and Pacific Islander ethnic groups and across several different health outcomes, including depression, disability, self-rated health and chronic diseases (Cho & Hummer, 2001; Frisbie et al., 2001; Singh & Siahpush, 2001). But again, this effect is not seen in all studies of immigrants (Lutsey et al., 2008; Mutchler et al., 2007).

Hence, the literature leads to several hypotheses. First, the healthy immigrant explanation underlies the hypothesis that rates of disability would be higher among U.S. born compared to foreign-born Asians. Second, the duration effect leads to the

hypothesis that rates of disability show a gradient within immigrants, with more recent immigrants having lower rates of disability than less recent immigrants.

Others have also hypothesized an interaction an interaction between age and length of stay(Cho & Hummer, 2001; Roshania, Venkat Narayan, & Oza-Frank, 2008). The probability of a disability increases with age, both as a function of increased probability to encounter an injury or illness simply as a function of time and with decline in one's biological functioning with age. However, we also expect the number of years to moderate age for immigrants. This is because the healthy immigrant effect would be most selective for recent than less recent immigrants. To see why this is so, consider two participants who are both age 65. One participant immigrated this year, at age 65 (i.e. length of stay=0 years), while the other participant immigrated at age 25 (i.e. length of stay = 40 years). The individual migrating during their younger age, during their prime working years, may have aspirations to improve their educational and financial circumstances and rejoin their families. For some, their family or indeed, entire village, might pool their resources to pay for travel in hopes of one day seeing remittances or other "paybacks" from this migrant's success. At age 25, the potential for an individual to build a career is fairly promising. Over time, however, some of the advantages this person has may erode, but perhaps not disappear entirely.

Now consider the individual who decides to migrate at age 65. It seems even more remarkable that someone would decide to move halfway around the world, from Asia to the United States, at that age. At older ages, individuals are more likely to have health problems and challenges of learning a new culture and language may be greater. A 65-year old migrant who has been in the U.S. for just a few years would be among

those who would be least likely to have disabilities related to physical mobility, vision, and mental health.   Accordingly, we anticipate the interaction between age and length of stay because healthy selection would be even more prominent among older persons who are recent immigrants than those who are less recent immigrants.

One notable study that considered the healthy immigrant, and negative duration and cohort effects was conducted by Cho and Hummer in 2001 (2001). They analyzed Asian and Pacific Islander respondents to the 1990 Census and found some support for both the healthy immigrant and negative duration explanations, but the findings varied upon the disability outcome. Longer-term immigrants had higher probabilities for all three of their disability outcomes, mobility, self-care and work. There was evidence for a healthy immigrant effect on work disability. The investigators also found that age moderated the relationship between years in the United States and disability status, suggesting that the effect of time spent in the United States on disability status was not equivalent across all ages. In other words, the negative effect of duration was not linear across all ages. The Cho and Hummer study also considered nativity and heterogeneity effects across different API ethnic groups and found significant differences in the disability status among 15 API ethnic groups. This analysis was significant because it provided an alternate perspective to the seemingly healthy trends of the aggregated population by highlighting some groups that may have poorer health. In particular, Southeast Asians, Vietnamese and all Pacific Islander groups had significantly higher odds for each of the disability outcomes compared to the Japanese baseline group, even after controlling for sociodemographic factors.

Because our research goals and data are closely aligned with those of Cho and Hummer (2003), we borrow their analytic approach in the present study. Our study is not a true replication because of differences in the wording of the disability questions between the 1990 Census and the 2000 Census. Nonetheless, the use of a common framework allows for some crude comparisons across time.

Methods

Data Set and Sample

We conducted our analysis using the Census 2000 Public Use Microdata (PUMS). The data represents a 5% subsample of the full census sample that received long form questionnaires (Gimpse, 2007).

We restricted our sample to respondents over 25 years of age who reported they were single-race Asian or Pacific Islander and of a single Asian or Pacific Islander ethnicity (e.g. Hmong only). Our minimum was age 25 to ensure that our sample included mostly working-age adults who completed their education. We only included those who reported being Asian alone because multiple-race Asians may have unique health influences that the general Asian population does not encounter, and we wanted to avoid sources of variation besides those that were related to immigration. We only included those who were a single Asian ethnicity because we wanted to test the heterogeneity across API ethnic groups and respondents of mixed ethnicity could not be categorized into a single API group. Our approach is consistent with that of Cho and Hummer (2001).

There were 315,518 respondents who met our criteria and 25 different ethnic groups represented. If a respondent reported being Asian or Pacific Islander, they were

subsequently asked to identify their ethnic group. Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, Native Hawaiian, Guamanian or Chamorro and Samoan were provided as response categories, along with an "Other Asian" category and an "Other Pacific Islander" category with write-in response areas (Grieco, 2001). Following Cho and Hummer's (2001) procedures, we separated out groups that had sample sizes larger than 1000 respondents. Groups with sample sizes less than 1000 were combined into either an "other Asian" or "other Pacific Islander" group.

In total, there were 18 Asian and Pacific Islander ethnic groups in the sample: Japanese, Asian Indian, Chinese, Taiwanese, Pakistani, Korean, Vietnamese, Cambodian, Hmong, Laotian, Thai, Indonesian, Asian Other, Hawaiian, Samoan, Guamanian and Pacific Islander Other. The Asian Other category included Bangladeshi, Malaysian, Sri Lankan and "other specified Asian". The Pacific Islander Other category included Tongan, Mariana Islanders, Chuukese and other written-in entries.

Outcome Variables

There were six disability measures in the 2000 Census: work, self care, mobility, physical, sensory and mental. Respondents were asked the following yes/no questions: "Does this person have any of the following long-lasting conditions: (1) Blindness, deafness, or a severe vision or hearing impairment; (2) a condition that substantially limits one or more basic physical activities such as walking, climbing stairs, reaching, lifting or carrying?" Questions (1) and (2) comprised our outcomes related to sensory disability and physical disability, respectively.

The remaining disability questions were as follows, "Because of a physical, mental or emotional condition lasting 6 months or more, does this person have any

difficulty doing the following: (3) learning, remember or concentrating (mental disability); (4) dressing, bathing or getting around inside the home (self-care disability); (5) going outside the home alone to shop or visit the doctor's office (mobility disability); (6) working at a job or business (work disability)?"

If a respondent answered "yes" to a having a particular disability, they were coded with a '1'. Those responding "no" to that disability were the baseline category and coded as '0'. Each of the six disability measures was analyzed as a separate outcome.

Covariates

The covariates, coding schemes and model components for the current report were similar to Cho and Hummer's (2001), with some modifications for the new disability outcomes.

Asian Ethnicity: The models included dummy variables for each of the 17 ethnic groups, with the Japanese as the baseline group. This coding scheme was replicated from Cho and Hummer, who argued that the Japanese American population are the most likely to be U.S. born and are among the most socioeconomically advantaged of the Asian ethnic groups.

Immigration Related Variables: We included a variable measuring nativity and the length of time an immigrant has been in the United States. There were four categories: US-born, Immigrant in US 0-5 years, Immigrant in US 6-10 years and Immigrant in the US over 11 years.

Interaction Term: In order to see if the effects of age varied by duration in the U.S. among immigrants, we created interaction terms between each of the duration categories (i.e. 0-5 years; 6-10 years; 11 or more years) by age.

<u>Sociodemographic Covariates</u>: The socioeconomic characteristics were age (continuous), gender, marital status (married, widowed, divorced or separated, never married), education, English ability (English only, English very well, English well or English not well, English not well or not at all), employment (currently employed, unemployed, not in labor force) and household income (less than $10,000, $10,000 to $19,999, $20,000 to $34,999 and above $35,000).

Analyses

All analyses used the Census person weights to account for the survey design. We conducted a series of logistic regression models with each of the six disability types. We used the same four models that Cho and Hummer specified in their analysis. Model 1 examined heterogeneity within the entire sample and contained only dummy variables for the Asian and Pacific Islander ethnic groups. We also controlled for age and gender, two robust predictors of disability. Model 2 included Asian and Pacific Islander ethnicity, age, gender and the nativity/duration categorical variable. This model tested for differences in disability odds across different duration groups, after controlling for within-group differences, age and gender. Model 3 included the interaction term to examine whether the duration effect varied across ages differently for each of the nativity/duration categories. Model 4 added the entire set of sociodemographic controls to consider whether any of the differences among the ethnic groups or the duration categories in the earlier models was due to other socioeconomic characteristics.

Results

Descriptive Characteristics

Table 1 shows the descriptive characteristics of our sample. The majority of Asians and Pacific Islanders are foreign-born, but this varies considerably by subgroup. Native Hawaiians and Japanese are mostly likely to be U.S. born (95.6%, and 58.4%, respectively), while Laotians and Cambodians are the least likely (1.6%, and 1.4%, respectively). Similarly, there is substantial variation in the distribution of years in the U.S. among immigrants and in English proficiency. For example, 28.0% of Indonesian immigrants are very recent arrivals (0-5 years), compared to 3.3% of Laotians. Over half of the Japanese, Hawaiians and Filipino groups speak English only. Over 30% of the Chinese, Korean, Vietnamese, Cambodian, Hmong and Laotian groups speak English not well or not at all. The groups that have the shortest tenures of immigration are South Asians, namely Asian Indians and Pakistanis. Over one-quarter of both groups had been in the United States less than 5 years. With the exception of Japanese and Native Hawaiians, all other Asian and Pacific Islander groups have at least 50% of their population in the United States for over 11 years.

The discrepancy in socioeconomic characteristics between the Southeast Asian and Pacific Islanders ethnic groups with the other Asian groups are particularly notable. Cambodians, Hmong and Laotian have among the lowest percent of college graduates and households making more than $35,000 a year and the highest rates of poor English. All Pacific Islander groups have between 10% and 15% college graduates. On the opposite end of the spectrum, Taiwanese and Asian Indians have among the highest levels of education, with well over half of each group graduating from college. Filipinos

and Asian Indians have the highest percent of households making more than $35,000 a year.   The Taiwanese and Chinese have similar household income distributions, despite the Taiwanese having higher levels of college graduation.

Prevalence

Table 2 displays the prevalence of the six disability outcomes for each API ethnic group. Following Cho and Hummer (2001), the values are age-standardized to the Japanese age distribution to enable direct comparison across ethnic groups. Overall, the highest rates of disability are seen among Southeast Asians. Specifically, 48.8% of the Hmong have any disability, followed by 43.7% of Cambodians, and 38.0% of Laotians. Pacific Islanders also show high rates of disability. Samoans have the fourth highest rate of disability across all API groups at 36.3%, with similarly high rates among other Pacific Islanders (32.6%), Guamanians (32.0%), and Native Hawaiians (30.3%). The lowest rates are seen among Taiwanese (14.9%), followed by Japanese (17.8%) and Chinese (20.4%) respondents.

The prevalence of sensory disability is between 3-5% for most groups, with the exception of the Southeast Asian and Pacific Islander groups, which are substantially higher. Likewise, Southeast Asians have the highest prevalence of both physical and mental disabilities. Over 20% of the Cambodian and Hmong groups report a mental disability. One-quarter of the Hmong report a work disability; it is the ethnic group with the highest prevalence. Samoan, Vietnamese, Cambodian, Laotian and Other PI all have around 20%.

The groups with the lowest prevalence of mobility disability are the Japanese and Taiwanese. Groups that range from 10-15% were the Chinese, Filipino, Asian Indian,

Korean, Thai, Indonesian, Native Hawaiian and Guamanian. Groups between 15-20% prevalence were Pakistani, Vietnamese, Laotian, Asian Other, Samoan and Other PI. Cambodian and Hmong had over 20%.

The groups with the lowest prevalence of self-care disability are the Japanese, Taiwanese, Thai and Indonesian. Other groups with rates between 3 and 5% were the Chinese, Filipino, Asian Indian, Pakistani, Korean and other Pacific Islander. Groups with over 5% were Vietnamese, Cambodian, Laotian, other Asian, Hawaiian, Samoan and Guamanian. Hmong have the highest prevalence, with over 10%.

In general, work and mobility disabilities are the most prevalent and sensory disabilities are the least, a trend that holds for most of the groups. However, for Hawaiians, Samoans, Guamanians and other Pacific Islanders, physical disabilities are among the most prevalent issues.

Sensory, Physical, Mental Disabilities

The logistic regression results of sensory, physical and mental disabilities share very similar patterns to one another. Tables 3-5 display the results of the multivariate analysis for sensory, physical and mental disabilities, respectively. In Model 1, most ethnic groups have higher odds for these disabilities than the Japanese. The only exception is in sensory disability; Taiwanese and Indonesians have lower odds for sensory disability and Asian Indians, Pakistanis, Koreans and Thai have the same odds as do the Japanese. The rest of the ethnic groups have noticeably higher odds for all three disabilities. For both physical and sensory disability, Laotians and Cambodians had three times the odds and Hmong had six times the odds for a sensory disability. All the Pacific Islander groups had over three times the odds for physical and sensory disability. For

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mental disability, Southeast Asian groups had strikingly higher odds. Vietnamese have five times the odds, Laotians over 6 times the odds, Cambodians over 10 times the odds and Hmong had over 13 times the odds.

In Model 2, each nativity/duration group has lower odds of disability than the US-born. There does not appear to be an obvious duration gradient; immigrants 11+ years had the lowest odds of sensory and mental disabilities, the 0-5 year group had the next lowest and the 6-10 year group had the highest odds compared to the US-born. In physical disability, immigrants with 0-5 years duration had the lowest odds, then the 11+ years group had next lowest, while the 6-10 year group did not have significantly different odds than the US-born. The interaction terms are significant for each disability outcome in Model 3, implying a significant moderating effect of duration. Model 4, the conspicuous differences between the Japanese baseline group and Southeast Asian groups decrease somewhat across all three disability outcomes, suggesting that the initial differences among the ethnic groups can be explained in part by socioeconomic factors. A similar, yet less dramatic, pattern is also displayed with the Pacific Islander groups. The values for other Asian groups, however, remain very similar to previous models, suggesting that the socioeconomic differences between the Japanese and these Asian groups do not explain their higher odds for each of the three disability outcomes.

The graphs for each of these disability outcomes looked similar (Figures 1-3). The US-born have the highest predicted probabilities for each of the disabilities across all ages, followed by each of the immigrants groups in descending order of duration; immigrants with over 11+ years duration had the second-highest predicted odds, followed by 0-6 years and 0-5 years had the lowest.

Self Care Disability

Table 6 displays the results for self-care disability. In Model 1, only the Taiwanese have lower odds of self-care disability than the Japanese. All other groups have significantly higher odds. In Model 2, the addition of nativity/duration groups increases the odds ratios for each ethnic group from Model 1. All three nativity/duration groups have lower odds of self-care disability than the US-born, but the 6-10 group is not significantly lower. In Model 3 the odds ratios for the some duration categories changed direction after including the interaction term. At age 25, immigrants 0-5 years have higher odds for self care disability than the US-born. There is not a significant difference between immigrants 6-10 and the US-born. Immigrants with over 11 years duration still have a significantly lower odds; their odds for self-care drops from .757 in Model 2 to .439 in Model 3. All of the interaction terms are significant. In Model 4, only the interaction term for the 0-6 year duration group remains significant. Figure 4 illustrates the graph of the predicted probabilities. There does not seem to be a distinction between the foreign and US-born groups, nor is there a duration gradient. All four groups start off with similar predicted probabilities until 40 years, when the 6-10 year group goes on a higher trajectory than the other groups. The 0-5 year and US-born groups have similar trajectories while the 11+ group have the lowest predicted probability across ages.

Work-Related Disability

Table 7 shows the results of the logistic regression models for work disability. In Model 1, all ethnic groups are significantly different from the Japanese in their likelihood of having a work disability, after controlling for age and gender. The Taiwanese are the only ethnic group with lower odds for work disability than the Japanese. Filipinos,

Pakistanis, Vietnamese, Other Asians, Samoans, Guamanians and Other Pacific Islanders have over double the odds, while Cambodians, Hmong and Laotians have over three times the odds of work disability. Model 2 adds duration in the United States. Most of the odd ratios drop slightly, suggesting that the differences between most API ethnic groups and the Japanese in Model 1 are partly due to the higher numbers of immigrants in these groups compared to the Japanese. It appears that immigrants have a higher risk for work disability than their US-born counterparts. All duration groups have a significantly higher odds of a disability than those born in the U.S.: 0-5 years (OR=1.24), 6-10 years (OR=1.51) and Over 11 years (OR=1.36). The interaction term in Model 3 tests whether the effect of duration on disability varies with age. The interaction is significant for newly arrived immigrants and immigrants who have been in the US for over 11 years.

Model 4 includes the entire set of sociodemographic covariates, and the odds ratios for some of the Asian ethnicities decrease, suggesting that some of their differences from the baseline Japanese population may be attributable to socioeconomic differences, such as schooling and income. The odds ratios for Vietnamese, Cambodian and Hmong have the most dramatic drops. Most of the odds ratios remain significantly different from the baseline, however, suggesting that another untested covariate may contribute to the heterogeneity in work disability.

Figure 5 illustrates the predicted probabilities of work disability for each of the four nativity/duration groups based off the coefficients from Model 4. Compared to the U.S. born, all immigrant groups have higher odds for work disability across working ages. The immigrants with the longest duration have the highest probability for work disability, followed by the next longest duration group, the 6-10 year group.

Mobility Disability

The results of the logistic regression are displayed in Table 8. Model 1 again illustrates the heterogeneity across API ethnic groups. Most groups, with the exception of the Taiwanese, have higher odds than the Japanese. Southeast Asian groups have substantially higher odds. Pakistanis also had nearly three times the odds; their odds for mobility disability compared to the Japanese were higher than their odds for any other type of disability.

In Model 2, we see the effect of nativity and duration. All nativity/duration categories have an odds ratio above one, suggesting that immigrants have higher odds for mobility disability than their US-born counterparts. Most of the odds ratios for each ethnic group decrease from Model 1 to Model 2, suggesting that the high percent of immigrants compared to the Japanese contribute to the larger odds ratio in Model 1. Immigrants who have been in the United States 6-10 years had the highest odds of mobility limitations (OR=1.65) when compared to the US-born, followed by the newest immigrants (OR=1.52) then those in the US 11+ years (OR=1.38).

The odds ratios for the duration categories become dramatically higher in Model 3 compared to Model 2. The inclusion of the interaction term alters the interpretation of the duration categories to apply to the 25 year-olds in the sample. Immigrants at the age of 25 have between 3 and 5 times the odds of mobility limitations compared to the US-born of the same age. All interaction terms were roughly equivalent; they are all below one and significant. These results suggest that the significance of the duration categories in Model 2 were due in part to the higher levels of mobility limitations of younger immigrants.

In Model 4, all of our interaction terms are significant, suggesting a significant moderating effect of duration in the United States on the relationship between age and mobility disability. Our graph in Figure 6 shows that immigrant groups have higher odds for mobility disability than the native born across all ages. There does not appear to be a strong ordering within the immigrant duration groups.

Discussion

Our analysis of over 315,000 Asians and Pacific Islanders in 2000 examined two major explanations of immigrant health – healthy selection and duration– with a focus on six disability outcomes. Support for healthy selection and duration were found for sensory, physical, and mental disabilities, but not for self-care, work, and mobility disabilities.

Our most straightforward findings relate to sensory, physical, and mental disabilities. As hypothesized, foreign-born participants had lower rates of disability compared to their U.S. born peers. This immigrant advantage held even after controls for education, age, ethnicity and other factors. Further, within the foreign-born population, there was a significant gradient whereby the longest-term immigrants have the highest probabilities of sensory, physical and mental disability, followed by the intermediate duration immigrants and the shortest-term immigrants with the lowest probabilities.

In contrast, self-care, work, and mobility disability do not follow these patterns. For self-care disability, immigrants in general were not very different than the U.S. born. The exception was immigrants who have been in the U.S. the longest. They had the lowest rates of self-care disability compared to the U.S. born and more recent immigrants. The reasons for these patterns are unclear, but they might be due to chance differences.

Alternatively, the oldest cohort might be the ones with the best support networks who can help them with stay relatively more mobile.

The results for work disability do not support selective migration; immigrants have higher odds for disability than the U.S. born. This finding may be explained in part by immigrants' higher risks for occupational hazards; foreign-born workers have been shown to have a higher risk for occupational injuries and fatalities than the native born (Peek-Asa, Erickson, & Kraus, 1999; Pransky et al., 2002). While a similar analysis has not been conducted solely among Asian immigrants, there is evidence to suggest that industries overrepresented by Asian immigrants have higher occupational risks (Peek-Asa, Casteel, Kraus, & Whitten, 2006; Peek-Asa et al., 1999; Ruder, Ward, & Brown, 2001). Our results and these studies suggest that the type of health outcome in question may have some bearing on finding support for the healthy immigrant effect. While immigrants have a lower prevalence of certain disorders that may hinder migration, the risk for other health conditions, such as work disability, may increase post-migration as immigrants are exposed to occupational risks and immigration-related stressors.

While there is a weak gradient across duration categories in predicted work disability, a stronger distinction appears between immigrants with over 6 years duration and the most recent immigrants and US-born. We speculate that these results might be explained by a cohort effect related to immigration policy. In 1996, three major laws relating to immigration were passed: the Illegal Immigration Reform and Immigrant Responsibility Act, the Personal Responsibility and Work Opportunity Reconciliation Act and the Antiterrorism and Effective Death Penalty Act. While this broad swatch of policies aimed to curb illegal immigration and the use of social services, they also

dramatically increased the number of work-sponsored visas and imposed new income requirements for US-citizens who wished to sponsor a family visa (Park & Park, 2005). These stipulations were an attempt to control the "quality" of new immigrants and ensure that they had professional skills or visa sponsors with adequate resources. This policy influenced the socioeconomic characteristics of new immigrant cohorts and as a result, post-1996 immigrants are more likely to be higher-income professionals who share characteristics with the US-born. This cohort of immigrants is represented by the subgroup of immigrants in our sample who have less than 5 years duration in the United States. Our data suggests that the goals of the 1996 immigration policy are being somewhat fulfilled; the newest cohort of immigrants share a similar work disability trajectory with the US-born and are significantly different from older immigrant cohorts.

Perhaps the most unusual finding was related to mobility disability. Immigrant APIs had *higher* rates of disability compared to the U.S. born, and within the foreign-born population, there is no clear gradient that would support the duration effect. One possible explanation for these findings may be a reporting artifact. The mobility question asked participants if they were impeded from going outside the home alone to shop or visit the doctor because of a health condition. It is possible that immigrants were reporting higher on this question because they had objectively more barriers in leaving their homes due to reasons other than disability, such as difficulties with transportation.

Not surprisingly, we saw that the probabilities of all disabilities increased with age. However, we also saw that the effect of age varied by duration of stay and nativity. We hypothesized that because of health selection, the relationship between age and disability would be weakest among the newest immigrants, intermediate among

immigrants of earlier arrival, and strongest among the U.S. born. This pattern held for sensory, mental and physical disability, but there was no difference in the age effect by nativity or duration for work or self-care disability. Mobility disability also showed an unusual pattern whereby immigrants had a steeper age gradient than the U.S. born.

Although these findings diverge based on the outcome, there does seem to be some overarching patterns when we consider the outcomes themselves. Sensory, mobility and mental disability appear to be outcomes that are most like "health" problems and these are the ones that are most consistent with the healthy migrant and duration perspectives. Yet, for work disability, it is the longer-term immigrants who have the greatest probability of disability; perhaps those cohorts of Asians who did not migrate under work visas are the ones most likely to enter into jobs that place them at highest risk of work disability. Finally, it appears to us that self-care and mobility disability have questions that have some potential for ambiguity and misinterpretation, and it is these two outcomes that have the least interpretable findings.

Our findings varied somewhat from Cho and Hummer's analysis. Although both analyses found support for the healthy immigrant effect, negative duration effect and age moderation, Cho and Hummer's findings were relatively consistent across their three outcomes, work, mobility and self-care disabilities. Our findings on work, mobility and self-care disabilities partly correspond with other studies that did not find an overall negative duration pattern in health outcomes among Asian immigrants (Dey & Wilson Lucas, 2006; Jasso et al., 2004; Mutchler et al., 2007). These studies did find support for the healthy immigrant effect, however. Furthermore, with the exception of the Mutchler et al study, these studies did not use Census data and had different health outcomes.

Several additional caveats should be noted. Most obvious is the cross-sectional design, which precludes the establishment of causal relations. Specifically, we are unable to firmly assess whether age or years in the U.S. are related to disability without longitudinal data. Further the disability measures provided by the Census are limited because they are not objectively verified, and as some of our analyses suggest, subject to interpretation.

These caveats are balanced against several strengths. The Decennial Census provides the largest sample of Asians and Pacific Islanders available in the United States and no comparable data exist elsewhere. Unlike any other study, the Census has large samples of Asian and Pacific Islander subgroups, and is nationally representative.

In closing, our analysis of the 2000 Census provides partial support for the healthy immigrant and duration explanations, these findings are tempered by partial support for cohort effects and methodological artifacts. Future studies should consider refining the disability questions provided in the decennial Census, replicating these results with other samples, and use longitudinal designs.

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Table and Figures

Table 1. Descriptive Characteristics

	Japanese	Chinese	Taiwanese	Filipino	Asian Indian	Pakistani	Korean	Vietnamese	Cambodian	Hmong	Laotian	Thai	Indonesian	Asian Other	Hawaiian	Samoan	Guamanian	P.I. Other
Nativity/Duration																		
U.S. Born	58.4	13.2	4.3	12.6	4.7	2.0	5.3	1.8	1.4	2.3	1.6	5.4	6.6	21.0	95.6	34.9	25.8	23.8
Immigrants, 0-5 ys	12.1	15.8	17.3	10.2	27.0	26.0	16.5	11.8	4.6	5.5	3.3	15.4	28.0	17.0	0.8	7.0	12.8	13.0
Immigrants, 6-10 ys	5.0	15.8	13.4	15.3	18.3	22.8	12.6	29.0	6.5	18.1	9.6	11.8	18.2	15.4	0.7	7.0	7.6	12.1
Immigrants, 11+ ys	24.5	55.2	65.0	62.0	50.1	49.3	65.5	57.3	87.5	74.2	85.6	67.5	47.2	46.7	2.9	51.1	53.8	51.1
Sex																		
Male	57.7	52.8	53.5	58.0	46.0	41.9	58.5	50.2	55.4	50.9	49.0	65.7	54.4	49.5	49.3	51.4	51.5	50.1
Female	42.3	47.2	46.5	42.0	54.0	58.1	41.5	49.8	44.7	49.1	51.0	34.3	45.6	50.5	50.7	48.6	48.6	49.9
Age (Mean)	50.8	45.9	44.4	46.4	41.2	41.3	44.5	42.7	43.0	41.1	42.2	42.7	40.8	41.8	45.6	42.9	42.4	41.2
Marital Status																		
Married	64.4	73.0	72.8	69.6	80.0	80.9	72.3	66.1	64.9	79.1	68.8	62.8	70.1	69.3	58.5	63.9	64.6	68.2
Widowed	7.9	5.3	2.5	6.3	3.1	3.4	5.3	4.6	8.3	6.5	5.4	3.3	3.1	3.4	6.3	6.8	3.4	4.0
Divored/Separated	8.5	5.6	4.8	8.4	4.0	3.6	7.2	7.0	9.9	5.9	8.5	12.0	6.4	7.6	15.4	10.7	13.0	11.2
Never married	19.1	16.1	19.9	15.8	13.0	12.1	15.3	22.3	16.9	8.6	17.3	21.9	20.5	19.7	19.8	18.6	19.0	16.8
English Ability																		
English only	53.5	13.5	6.3	82.8	14.9	4.0	12.6	5.7	5.1	4.4	5.4	15.1	18.2	26.1	81.9	26.9	48.5	29.7
English very well	19.5	30.0	30.6	3.6	58.8	56.6	24.4	22.0	23.1	20.8	23.4	30.6	41.0	33.8	13.3	49.3	34.3	37.3
English well	17.1	26.1	40.7	3.7	17.5	25.4	29.7	32.5	29.6	26.3	31.2	37.8	32.4	23.3	3.1	16.1	8.9	21.3
Not well/at all	10.0	30.4	22.4	10.0	8.9	14.0	33.3	39.9	42.3	48.5	40.1	16.6	8.5	16.8	1.7	7.7	8.4	11.7
Education																		
<HS Grad	9.1	23.5	6.7	12.8	13.2	17.9	13.7	37.5	53.0	59.4	52.2	21.0	8.6	20.1	17.3	26.1	20.3	27.3
HS Grad	22.1	13.4	10.1	14.9	10.5	14.0	21.2	19.0	19.0	16.4	23.5	17.2	16.4	16.2	35.2	35.7	32.0	30.1
Some college	27.0	15.7	16.2	28.3	12.6	15.3	21.1	23.9	18.8	16.9	17.9	24.3	30.8	22.5	31.9	27.7	33.7	27.6
College and more	41.8	47.3	67.0	44.0	63.8	52.8	44.0	19.6	9.1	7.3	6.4	37.4	44.3	41.3	15.6	10.6	14.1	15.0
Employment Status																		
Employed	56.9	63.5	61.0	66.4	68.3	59.6	59.4	62.4	52.2	49.7	57.1	66.0	62.8	64.5	62.1	58.0	66.0	63.9
Unemployed	1.7	2.4	1.7	2.9	2.5	3.3	2.6	3.2	3.6	3.2	3.3	3.0	2.8	3.3	5.0	5.1	4.4	4.2
Not in labor force	41.4	34.1	37.3	30.7	29.2	37.1	38.1	34.4	44.3	47.2	39.6	31.0	34.5	32.2	32.9	36.9	29.6	31.9
Household Income																		
<$10,000	6.9	7.5	9.8	3.6	5.2	5.8	11.6	6.5	9.7	9.9	7.0	6.5	10.3	9.1	9.0	8.8	6.5	9.5
$10,000-$19,999	5.5	8.0	5.5	3.7	4.6	9.0	8.2	8.0	12.2	13.2	8.9	5.7	7.4	7.7	6.2	9.2	6.9	9.3
$20,000-$34,999	12.3	12.8	10.8	10.0	10.0	17.0	15.3	14.5	18.1	21.9	15.5	16.6	13.2	14.4	16.3	14.2	15.3	17.4
$35,000 and more	75.4	71.7	73.9	82.8	80.2	68.2	65.0	71.0	60.1	55.0	68.6	71.2	69.1	68.8	68.5	67.8	71.4	63.8

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| **Total (N)** | 72,632 | 3,715 | 59,784 | 46,104 | 3,949 | 31,429 | 32,005 | 3,973 | 2,287 | 4,028 | 3,569 | 1,077 | 10,568 | 4,305 | 1,938 | 1,565 | 2,175 |

Table 2. Distribution of Disability Outcomes

	Japanese	Chinese	Taiwanese	Filipino	Asian Indian	Pakistani	Korean	Vietnamese	Cambodian
Work limited	10.27%	10.63%	5.57%	16.03%	14.59%	16.56%	12.40%	19.47%	22.26%
Sensory limited	3.90%	4.13%	3.18%	5.20%	4.61%	3.61%	3.34%	6.83%	8.16%
Physically limited	7.31%	7.29%	7.23%	10.63%	10.37%	11.39%	8.81%	12.67%	19.95%
Mentally limited	3.85%	5.06%	3.76%	4.96%	4.91%	6.10%	5.62%	13.27%	20.66%
Self Care limited	2.71%	3.18%	2.28%	3.34%	3.71%	4.63%	4.09%	6.39%	9.03%
Able to go outside limited	8.61%	11.26%	8.40%	15.41%	15.10%	17.86%	13.51%	19.61%	22.93%
Any limitation	17.83%	20.42%	14.90%	27.94%	25.95%	29.55%	23.16%	33.83%	43.68%

	Hmong	Laotian	Thai	Indonesian	Asian Other	Hawaiian	Samoan	Guamanian	Other PI
Work limited	24.88%	20.10%	13.89%	10.56%	15.41%	14.26%	19.15%	15.41%	18.85%
Sensory limited	13.24%	8.61%	4.18%	3.02%	5.43%	6.25%	8.28%	5.05%	6.32%
Physically limited	22.45%	17.62%	8.20%	8.76%	11.61%	14.57%	17.39%	16.42%	15.03%
Mentally limited	22.61%	14.80%	4.62%	4.48%	8.00%	7.98%	8.85%	7.76%	6.00%
Self Care limited	11.34%	7.77%	3.18%	1.48%	5.89%	5.12%	9.12%	5.92%	4.73%
Able to go outside limited	22.48%	19.68%	13.51%	10.64%	15.87%	12.89%	17.87%	14.36%	15.71%
Any limitation	48.53%	38.80%	25.48%	20.87%	28.31%	30.30%	36.28%	31.97%	32.59%

Table 3. Odds Ratios for the Effect of Asian Ethnicity, Nativity and Duration on Sensory Disability for Asian and Pacific Islander Adults

	Model 1		Model 2		Model 3		Model 4	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Asian Ethnicity								
Japanese	ref.		ref.		ref.		ref.	
Indian	1.113	[1.000 - 1.239]*	1.397	[1.235 - 1.580]***	1.321	[1.169 - 1.492]***	1.367	[1.207 - 1.548]***
Chinese	1.159	[1.065 - 1.261]***	1.419	[1.286 - 1.567]***	1.324	[1.201 - 1.461]***	1.17	[1.055 - 1.298]***
Taiwanese	0.68	[0.501 - 0.925]**	0.873	[0.638 - 1.194]	0.822	[0.601 - 1.125]	0.839	[0.611 - 1.152]
Filipino	1.49	[1.368 - 1.624]***	1.858	[1.678 - 2.058]***	1.722	[1.557 - 1.906]***	1.847	[1.664 - 2.049]***
Pakistani	1.084	[0.816 - 1.442]	1.349	[1.008 - 1.805]**	1.286	[0.960 - 1.722]*	1.204	[0.896 - 1.619]
Korean	0.926	[0.825 - 1.039]	1.18	[1.036 - 1.345]**	1.11	[0.975 - 1.264]	0.958	[0.837 - 1.096]
Vietnamese	2.135	[1.934 - 2.357]***	2.609	[2.321 - 2.932]***	2.47	[2.199 - 2.774]***	1.875	[1.663 - 2.115]***
Cambodian	3.303	[2.749 - 3.970]***	4.337	[3.569 - 5.270]***	4.144	[3.407 - 5.040]***	2.454	[2.018 - 2.985]***
Hmong	6.311	[5.047 - 7.892]***	8.043	[6.382 - 10.137]***	7.734	[6.120 - 9.775]***	4.307	[3.413 - 5.435]***
Laotian	3.007	[2.483 - 3.641]***	3.927	[3.208 - 4.807]***	3.755	[3.064 - 4.601]***	2.349	[1.913 - 2.885]***
Thai	1.018	[0.738 - 1.405]	1.322	[0.952 - 1.836]*	1.261	[0.908 - 1.750]	1.148	[0.823 - 1.601]
Indonesian	0.484	[0.237 - 0.991]**	0.608	[0.295 - 1.253]	0.575	[0.280 - 1.179]	0.575	[0.278 - 1.189]
Asian Other	1.864	[1.600 - 2.172]***	2.209	[1.884 - 2.590]***	2.046	[1.745 - 2.398]***	1.825	[1.552 - 2.145]***
Hawaiian	2.178	[1.798 - 2.638]***	2.003	[1.651 - 2.429]***	1.838	[1.523 - 2.219]***	1.563	[1.286 - 1.899]***
Samoan	3.324	[2.544 - 4.342]***	3.848	[2.927 - 5.059]***	3.575	[2.737 - 4.669]***	2.847	[2.175 - 3.726]***
Guamanian	2.124	[1.531 - 2.947]***	2.547	[1.832 - 3.543]***	2.352	[1.694 - 3.265]***	2.087	[1.500 - 2.903]***
PI Other	2.072	[1.511 - 2.841]***	2.473	[1.799 - 3.401]***	2.276	[1.657 - 3.127]***	1.898	[1.379 - 2.614]***
Male	1.169	[1.113 - 1.227]***	1.159	[1.104 - 1.216]***	1.158	[1.103 - 1.215]***	1.469	[1.394 - 1.549]***
Age	1.083	[1.081 - 1.084]***	1.083	[1.081 - 1.085]***	1.071	[1.068 - 1.075]***	1.054	[1.050 - 1.058]***
Years in the US								
US-Born					ref.		ref.	
In US 0-5 years					0.387	[0.263 - 0.569]***	0.347	[0.238 - 0.507]***
In US 6-10 years					0.317	[0.225 - 0.448]***	0.371	[0.264 - 0.520]***
In US over 11 years					0.276	[0.210 - 0.362]***	0.464	[0.354 - 0.610]***
Years in the US * Age								
US-Born x Age							ref.	
0-5 years x Age					1.01	[1.004 - 1.017]***	1.01	[1.004 - 1.017]***
6-10 years x Age					1.016	[1.011 - 1.022]***	1.013	[1.008 - 1.018]***

11+ years x Age	1.007	[1.003 - 1.011]***	1.014	[1.010 - 1.018]***
English Ability				
English only	ref.			
English Very Well	0.835	[0.763 - 0.913]***		
English Well	0.831	[0.755 - 0.913]***		
Not well or not at all	1.093	[0.995 - 1.201]*		
Marital Status				
Married	ref.			
Widowed	1.476	[1.378 - 1.581]***		
Divorced or separated	1.321	[1.200 - 1.453]***		
Never married	1.486	[1.359 - 1.625]***		
Education				
College Grad	ref.			
Less than HS Grad	1.665	[1.538 - 1.802]***		
HS Grad	1.214	[1.117 - 1.320]***		
Some college	1.266	[1.165 - 1.376]***		
Income				
More than 35,000	ref.			
Less than 10,000	1.361	[1.260 - 1.470]***		
10,000-19,999	1.246	[1.147 - 1.352]***		
20,000-34,999	1.183	[1.101 - 1.270]***		
Employment Status				
Employed	ref.			
Not in labor force	1.875	[1.590 - 2.212]***		
Unemployed	2.16	[2.021 - 2.309]***		

* significant at 10%; ** significant at 5%; *** significant at 1%

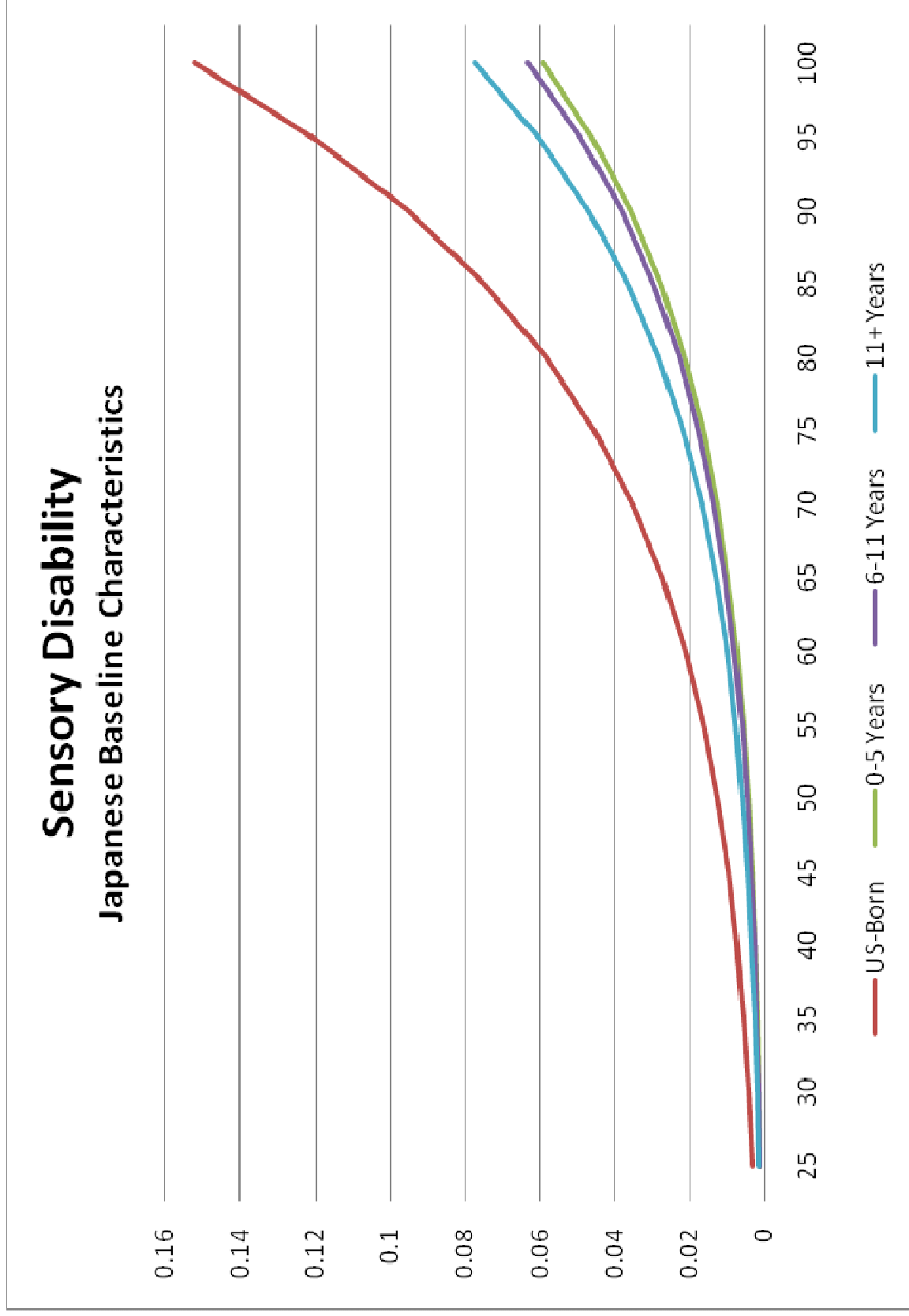Figure 1. Predicted Probability of Sensory Disability Status by Nativity/Duration

Sensory Disability
Japanese Baseline Characteristics

— US-Born
— 0-5 Years
— 6-11 Years
— 11+ Years

Table 4. Odds Ratios for the Effect of Asian Ethnicity, Nativity and Duration on Physical Disability for Asian and Pacific Islander Adults

	Model 1		Model 2		Model 3		Model 4	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Asian Ethnicity								
Japanese	ref.		ref.		ref.		ref.	
indian	1.638	[1.520 - 1.766]***	1.848	[1.695 - 2.015]***	1.749	[1.606 - 1.905]***	1.876	[1.717 - 2.049]***
Chinese	1.084	[1.017 - 1.157]**	1.197	[1.112 - 1.289]***	1.122	[1.042 - 1.207]***	0.957	[0.886 - 1.035]
Taiwanese	0.884	[0.708 - 1.102]	1.001	[0.800 - 1.253]	0.94	[0.751 - 1.177]	0.935	[0.741 - 1.180]
Filipino	1.769	[1.660 - 1.886]***	1.963	[1.821 - 2.116]***	1.83	[1.699 - 1.972]***	2.038	[1.887 - 2.202]***
Pakistani	2.08	[1.748 - 2.475]***	2.353	[1.967 - 2.814]***	2.24	[1.872 - 2.682]***	2.058	[1.711 - 2.476]***
Korean	1.341	[1.239 - 1.451]***	1.508	[1.379 - 1.649]***	1.422	[1.301 - 1.554]***	1.18	[1.075 - 1.295]***
Vietnamese	2.622	[2.436 - 2.823]***	2.877	[2.641 - 3.134]***	2.724	[2.502 - 2.966]***	1.964	[1.798 - 2.146]***
Cambodian	5.307	[4.671 - 6.029]***	5.997	[5.238 - 6.866]***	5.73	[5.004 - 6.561]***	2.967	[2.588 - 3.401]***
Hmong	6.461	[5.444 - 7.667]***	7.183	[6.024 - 8.566]***	6.882	[5.763 - 8.219]***	3.322	[2.781 - 3.969]***
Laotian	4.331	[3.759 - 4.990]***	4.867	[4.196 - 5.645]***	4.646	[4.003 - 5.392]***	2.62	[2.251 - 3.049]***
Thai	1.422	[1.144 - 1.767]***	1.607	[1.288 - 2.005]***	1.527	[1.223 - 1.905]***	1.378	[1.096 - 1.733]***
Indonesian	1.515	[1.067 - 2.149]**	1.71	[1.201 - 2.434]***	1.617	[1.135 - 2.304]***	1.619	[1.129 - 2.321]***
Asian Other	2.26	[2.018 - 2.530]***	2.462	[2.190 - 2.769]***	2.294	[2.040 - 2.579]***	2	[1.774 - 2.254]***
Hawaiian	3.406	[2.964 - 3.915]***	3.23	[2.808 - 3.716]***	2.931	[2.561 - 3.354]***	2.483	[2.161 - 2.852]***
Samoan	4.389	[3.603 - 5.347]***	4.72	[3.866 - 5.762]***	4.353	[3.576 - 5.300]***	3.267	[2.672 - 3.993]***
Guamanian	3.966	[3.149 - 4.995]***	4.327	[3.429 - 5.460]***	4.012	[3.183 - 5.057]***	3.553	[2.799 - 4.510]***
PI Other	3.168	[2.571 - 3.904]***	3.451	[2.797 - 4.258]***	3.199	[2.594 - 3.946]***	2.538	[2.059 - 3.130]***
Male	0.826	[0.797 - 0.856]***	0.823	[0.794 - 0.852]***	0.822	[0.793 - 0.851]***	1.088	[1.047 - 1.131]***
Age	1.084	[1.083 - 1.085]***	1.084	[1.083 - 1.085]***	1.073	[1.071 - 1.076]***	1.051	[1.048 - 1.054]***
Years in the US								
US-Born			ref.		ref.		ref.	
In US 0-5 years			0.728	[0.670 - 0.791]***	0.339	[0.259 - 0.443]***	0.239	[0.184 - 0.312]***
In US 6-10 years			0.966	[0.896 - 1.041]	0.414	[0.326 - 0.525]***	0.423	[0.334 - 0.534]***
In US over 11 years			0.826	[0.777 - 0.878]***	0.406	[0.336 - 0.491]***	0.644	[0.535 - 0.776]***
Years in the US								
US-Born X Age					ref.		ref.	
0-5 years x Age					1.013	[1.008 - 1.017]***	1.015	[1.011 - 1.020]***
6-10 years x Age					1.014	[1.010 - 1.018]***	1.012	[1.008 - 1.016]***

	Model 1	Model 2
11+ years x Age	1.012 [1.009 - 1.015]***	1.004 [1.001 - 1.007]***
English Ability		
English Only		ref.
English Very Well		0.881 [0.826 - 0.940]***
English Well		0.968 [0.904 - 1.036]
Not well or not at all		1.23 [1.147 - 1.318]***
Marital Status		
Married		ref.
Widowed		1.404 [1.333 - 1.479]***
Divorced or separated		1.53 [1.434 - 1.632]***
Never married		1.36 [1.274 - 1.453]***
Education		
College Grad		ref.
Less than HS Grad		1.765 [1.668 - 1.868]***
HS Grad		1.334 [1.257 - 1.416]***
Some college		1.402 [1.322 - 1.487]***
Income		
More than 35,000		ref.
Less than 10,000		1.571 [1.485 - 1.663]***
10,000-19,999		1.307 [1.231 - 1.387]***
20,000-34,999		1.192 [1.132 - 1.256]***
Employment Status		
Employed		ref.
Not in labor force		2.572 [2.302 - 2.874]***
Unemployed		3.192 [3.043 - 3.348]***

* significant at 10%; ** significant at 5%; *** significant at 1%

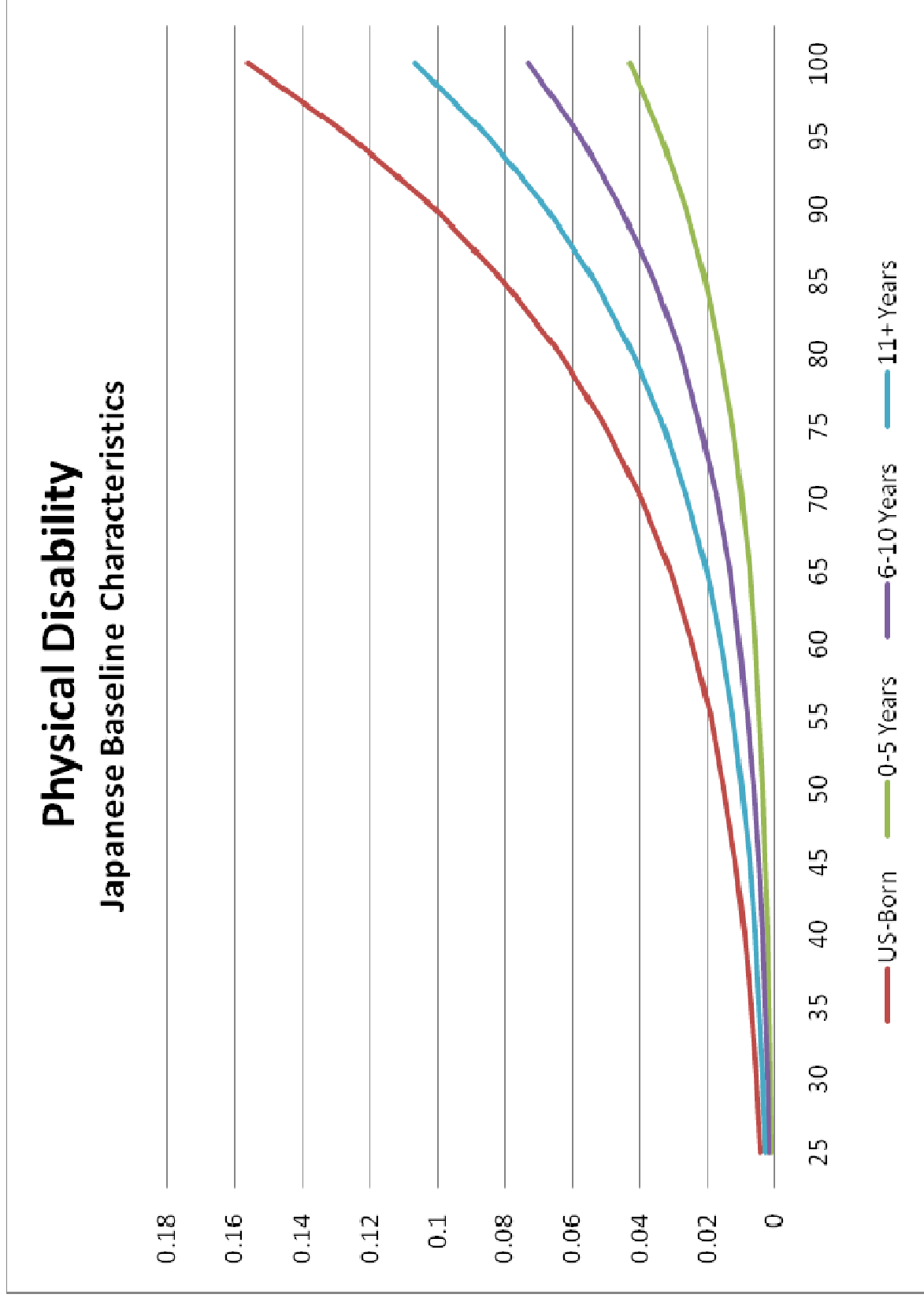Figure 2. Predicted Probability of Physical Disability Status by Nativity/Duration

Table 5. Odds Ratios for the Effect of Asian Ethnicity, Nativity and Duration on Mental Disability for Asian and Pacific Islander Adults

	Model 1		Model 2		Model 3		Model 4	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Asian Ethnicity								
Japanese	ref.		ref.		ref.		ref.	
indian	1.255	[1.131 - 1.393]***	1.528	[1.359 - 1.717]***	1.367	[1.218 - 1.533]***	1.476	[1.309 - 1.664]***
Chinese	1.477	[1.359 - 1.606]***	1.757	[1.598 - 1.930]***	1.548	[1.411 - 1.698]***	1.225	[1.107 - 1.355]***
Taiwanese	0.763	[0.561 - 1.036]*	0.95	[0.696 - 1.296]	0.844	[0.620 - 1.150]	0.827	[0.598 - 1.144]
Filipino	1.383	[1.267 - 1.508]***	1.669	[1.510 - 1.845]***	1.453	[1.317 - 1.602]***	1.711	[1.544 - 1.895]***
Pakistani	1.986	[1.586 - 2.486]***	2.395	[1.899 - 3.019]***	2.175	[1.725 - 2.742]***	1.996	[1.569 - 2.539]***
Korean	1.546	[1.398 - 1.709]***	1.916	[1.710 - 2.146]***	1.705	[1.526 - 1.906]***	1.307	[1.160 - 1.472]***
Vietnamese	4.912	[4.496 - 5.367]***	5.76	[5.196 - 6.385]***	5.218	[4.718 - 5.772]***	3.257	[2.925 - 3.626]***
Cambodian	10.89	[9.537 - 12.435]***	13.963	[12.094 - 16.121]***	12.956	[11.224 - 14.957]***	5.335	[4.599 - 6.189]***
Hmong	13.398	[11.331 - 15.843]***	16.491	[13.834 - 19.657]***	15.345	[12.851 - 18.324]***	5.846	[4.862 - 7.029]***
Laotian	6.693	[5.782 - 7.748]***	8.479	[7.254 - 9.911]***	7.814	[6.683 - 9.137]***	3.513	[2.987 - 4.131]***
Thai	1.384	[1.055 - 1.815]**	1.744	[1.322 - 2.302]***	1.576	[1.196 - 2.078]***	1.347	[1.010 - 1.795]**
Indonesian	0.811	[0.467 - 1.407]	0.988	[0.568 - 1.719]	0.879	[0.505 - 1.532]	0.928	[0.523 - 1.645]
Asian Other	2.761	[2.413 - 3.159]***	3.19	[2.771 - 3.672]***	2.772	[2.413 - 3.185]***	2.261	[1.955 - 2.615]***
Hawaiian	3.041	[2.560 - 3.613]***	2.79	[2.344 - 3.321]***	2.417	[2.042 - 2.860]***	1.844	[1.549 - 2.196]***
Samoan	3.306	[2.601 - 4.201]***	3.757	[2.942 - 4.798]***	3.291	[2.598 - 4.169]***	2.304	[1.816 - 2.925]***
Guamanian	2.843	[2.037 - 3.966]***	3.34	[2.391 - 4.665]***	2.889	[2.071 - 4.031]***	2.449	[1.736 - 3.454]***
PI Other	2.733	[2.078 - 3.596]***	3.184	[2.415 - 4.197]***	2.747	[2.090 - 3.612]***	2.034	[1.537 - 2.691]***
Male	0.809	[0.775 - 0.844]***	0.805	[0.772 - 0.840]***	0.804	[0.770 - 0.839]***	1.115	[1.064 - 1.168]***
Age	1.072	[1.070 - 1.073]***	1.072	[1.071 - 1.074]***	1.054	[1.050 - 1.057]***	1.031	[1.028 - 1.035]***
Years in the US								
US-Born					ref.		ref.	
In US 0-5 years					0.271	[0.198 - 0.371]***	0.213	[0.157 - 0.288]***
In US 6-10 years					0.231	[0.175 - 0.305]***	0.276	[0.211 - 0.360]***
In US over 11 years					0.183	[0.145 - 0.233]***	0.434	[0.345 - 0.546]***
Years in the US * Age								
US-Born x Age							ref.	
0-5 years x Age					1.016	[1.011 - 1.022]***	1.017	[1.012 - 1.022]***
6-10 years x Age					1.025	[1.020 - 1.029]***	1.019	[1.015 - 1.024]***

11+ years x Age	1.009	[1.005 - 1.013]***
	1.022	[1.019 - 1.026]***
English Ability		
English Only	ref.	
English Very Well	0.645	[0.593 - 0.703]***
English Well	0.77	[0.707 - 0.840]***
Not well or not at all	1.284	[1.182 - 1.395]***
Marital Status		
Married	.ref	
Widowed	1.486	[1.397 - 1.580]***
Divorced or separated	1.571	[1.451 - 1.701]***
Never married	2.187	[2.037 - 2.348]***
Education		
College Grad	ref.	
Less than HS Grad	2.464	[2.287 - 2.655]***
HS Grad	1.507	[1.392 - 1.631]***
Some college	1.428	[1.317 - 1.549]***
Income		
More than 35,000	ref.	
Less than 10,000	1.864	[1.748 - 1.989]***
10,000-19,999	1.43	[1.335 - 1.532]***
20,000-34,999	1.265	[1.190 - 1.344]***
Employment Status		
Employed	ref.	
Not in labor force	3.204	[2.802 - 3.665]***
Unemployed	3.974	[3.732 - 4.230]***

* significant at 10%; ** significant at 5%; *** significant at 1%

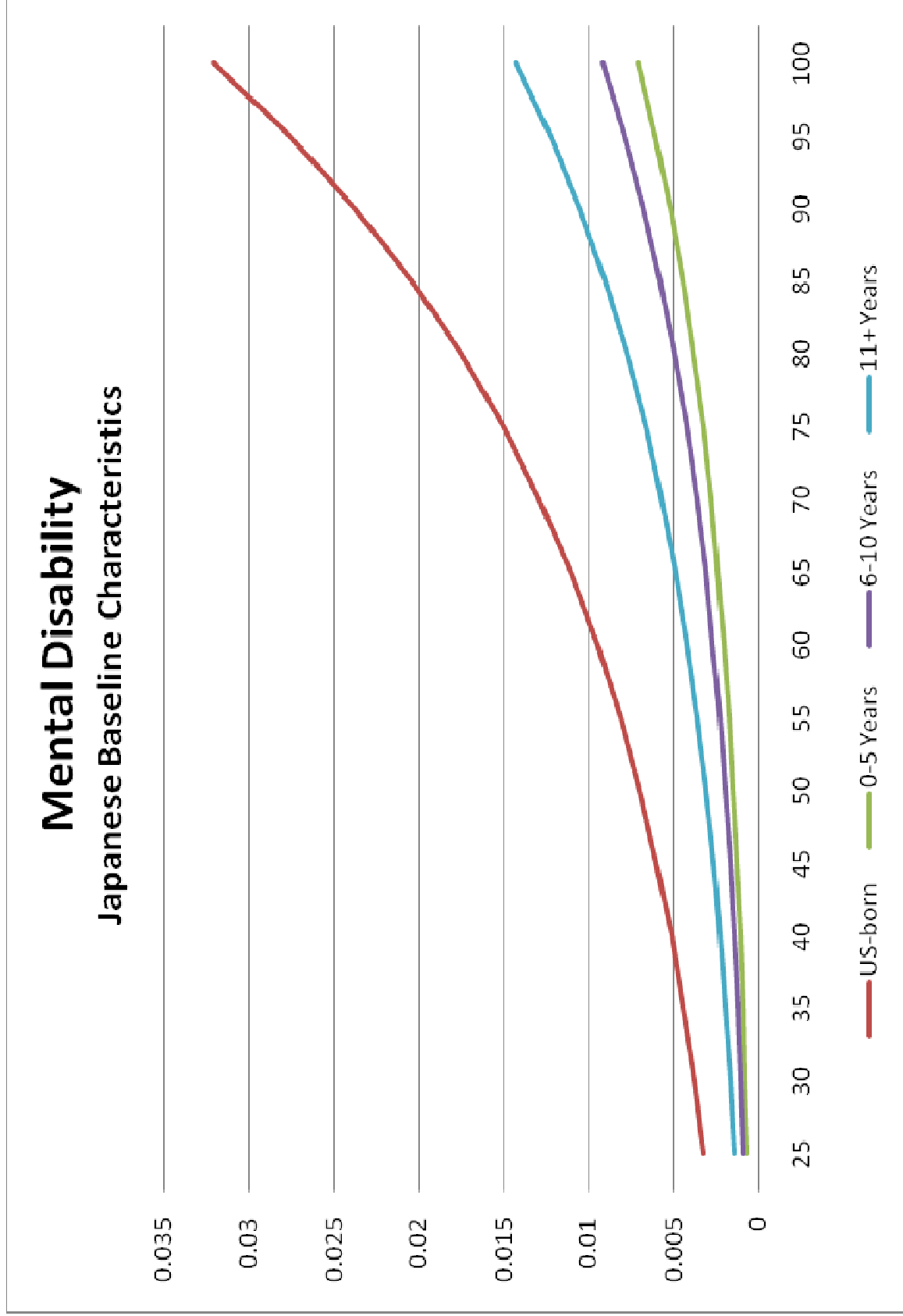Figure 3. Predicted Probability of Mental Disability Status by Nativity/Duration

Mental Disability
Japanese Baseline Characteristics

Table 6. Odds Ratios for the Effect of Asian Ethnicity, Nativity and Duration on Self Care Limitations for Asian and Pacific Islander Adults

	Model 1		Model 2		Model 3		Model 4	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Asian Ethnicity								
Japanese	ref.		ref.		ref.		ref.	
indian	1.401	[1.243 - 1.579]***	1.606	[1.398 - 1.844]***	1.617	[1.408 - 1.857]***	1.711	[1.486 - 1.969]***
Chinese	1.287	[1.169 - 1.417]***	1.462	[1.308 - 1.634]***	1.456	[1.302 - 1.628]***	1.226	[1.090 - 1.379]***
Taiwanese	0.606	[0.418 - 0.879]***	0.709	[0.486 - 1.036]*	0.728	[0.499 - 1.063]	0.711	[0.484 - 1.043]*
Filipino	1.277	[1.155 - 1.412]***	1.472	[1.306 - 1.658]***	1.478	[1.312 - 1.666]***	1.624	[1.439 - 1.833]***
Pakistani	1.908	[1.443 - 2.524]***	2.161	[1.618 - 2.886]***	2.2	[1.650 - 2.933]***	1.989	[1.486 - 2.663]***
Korean	1.587	[1.413 - 1.782]***	1.857	[1.624 - 2.124]***	1.868	[1.634 - 2.136]***	1.509	[1.313 - 1.733]***
Vietnamese	2.977	[2.677 - 3.312]***	3.358	[2.957 - 3.814]***	3.441	[3.029 - 3.909]***	2.389	[2.095 - 2.724]***
Cambodian	5.138	[4.249 - 6.213]***	6.18	[5.041 - 7.576]***	6.467	[5.263 - 7.947]***	3.248	[2.643 - 3.992]***
Hmong	6.956	[5.578 - 8.674]***	8.156	[6.465 - 10.290]***	8.429	[6.671 - 10.651]***	3.969	[3.146 - 5.007]***
Laotian	4.168	[3.408 - 5.096]***	4.991	[4.034 - 6.174]***	5.204	[4.198 - 6.452]***	2.806	[2.255 - 3.493]***
Thai	1.604	[1.165 - 2.209]***	1.905	[1.372 - 2.647]***	1.954	[1.407 - 2.715]***	1.737	[1.242 - 2.431]***
Indonesian	0.557	[0.256 - 1.212]	0.64	[0.294 - 1.393]	0.629	[0.288 - 1.374]	0.619	[0.289 - 1.326]
Asian Other	2.582	[2.201 - 3.028]***	2.867	[2.427 - 3.386]***	2.873	[2.428 - 3.398]***	2.43	[2.047 - 2.884]***
Hawaiian	2.316	[1.863 - 2.881]***	2.18	[1.750 - 2.714]***	2.163	[1.736 - 2.695]***	1.787	[1.429 - 2.235]***
Samoan	4.487	[3.492 - 5.767]***	4.936	[3.822 - 6.376]***	5.031	[3.892 - 6.503]***	3.64	[2.823 - 4.694]***
Guamanian	2.927	[2.088 - 4.103]***	3.301	[2.352 - 4.633]***	3.289	[2.335 - 4.634]***	2.845	[2.016 - 4.013]***
PI Other	2.03	[1.395 - 2.953]***	2.273	[1.558 - 3.315]***	2.268	[1.555 - 3.309]***	1.755	[1.203 - 2.562]***
Male	0.829	[0.786 - 0.875]***	0.826	[0.783 - 0.871]***	0.83	[0.786 - 0.875]***	1.097	[1.035 - 1.163]***
Age	1.077	[1.075 - 1.079]***	1.078	[1.076 - 1.080]***	1.075	[1.070 - 1.080]***	1.051	[1.046 - 1.056]***
Years in the US								
US-Born			ref.		ref.		ref.	
In US 0-5 years			0.892	[0.788 - 1.011]*	1.611	[1.059 - 2.449]**	0.953	[0.638 - 1.425]
In US 6-10 years			0.939	[0.838 - 1.052]	1.308	[0.884 - 1.935]	1.175	[0.808 - 1.709]
In US over 11 years			0.757	[0.689 - 0.831]***	0.439	[0.312 - 0.618]***	0.712	[0.514 - 0.986]**
Years in the US * Age								
US-Born x Age					ref.		ref.	
0-5 years x Age					0.988	[0.982 - 0.995]***	0.994	[0.988 - 1.001]*
6-10 years x Age					0.994	[0.988 - 1.000]**	0.994	[0.988 - 0.999]**
11+ years x Age					1.008	[1.003 - 1.014]***	1.001	[0.996 - 1.006]

English Ability		
English Only	ref.	
English Very Well	0.935	[0.845 - 1.035]
English Well	0.964	[0.867 - 1.071]
Not well or not at all	1.207	[1.086 - 1.341]***
Marital Status		
Married	.ref	
Widowed	1.323	[1.229 - 1.424]***
Divorced or separated	1.309	[1.179 - 1.454]***
Never married	1.849	[1.688 - 2.026]***
Education		
College Grad	ref.	
Less than HS Grad	2.121	[1.933 - 2.328]***
HS Grad	1.493	[1.357 - 1.644]***
Some college	1.363	[1.234 - 1.506]***
Income		
More than 35,000	ref.	
Less than 10,000	1.981	[1.840 - 2.134]***
10,000-19,999	1.214	[1.111 - 1.326]***
20,000-34,999	1.155	[1.068 - 1.250]***
Employment Status		
Employed	ref.	
Not in labor force	2.767	[2.331 - 3.284]***
Unemployed	3.543	[3.264 - 3.846]***

* significant at 10%; ** significant at 5%; *** significant at 1%

Figure 4. Predicted Probability of Self-Care Disability Status by Nativity/Duration
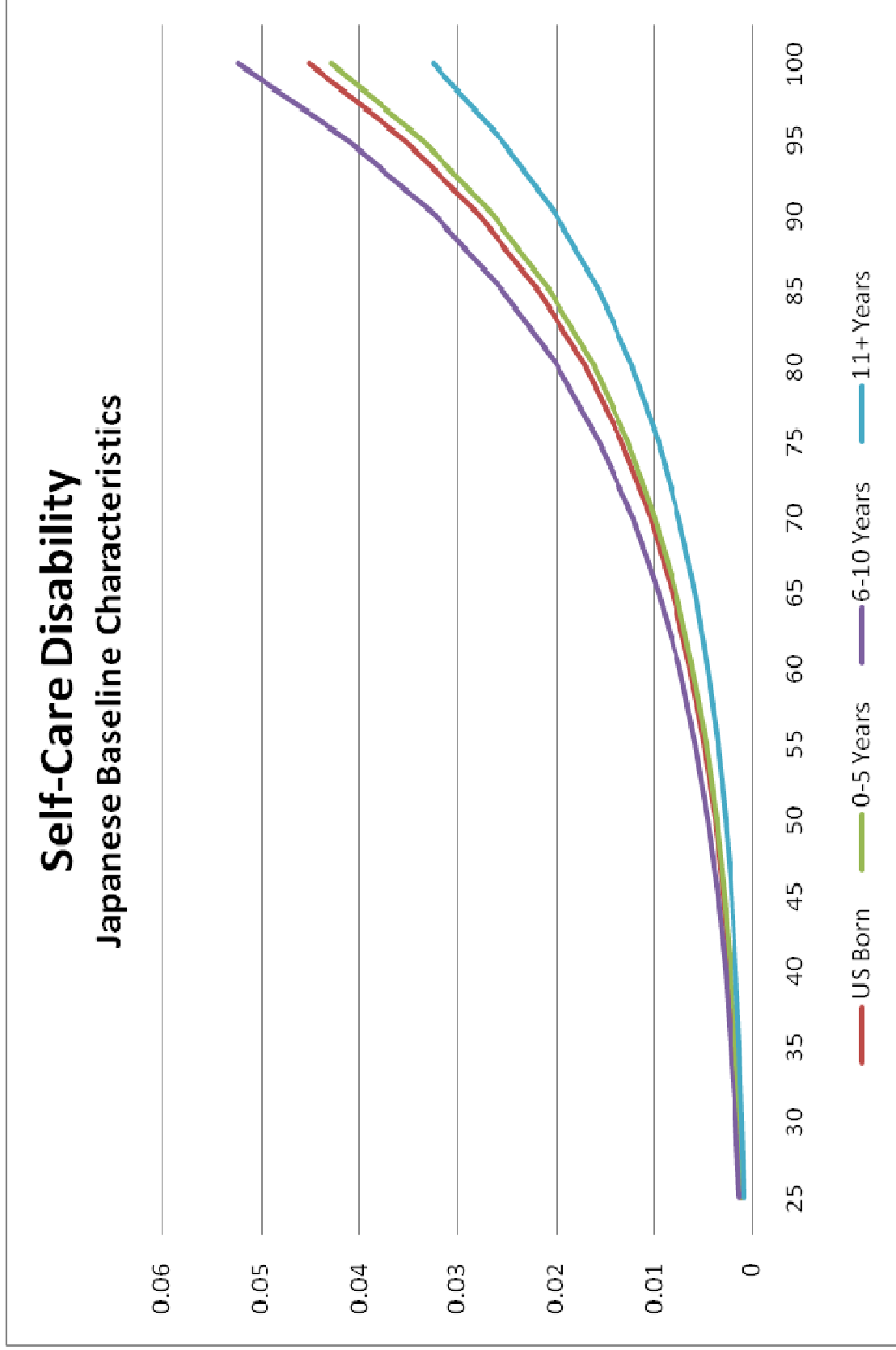

Self-Care Disability
Japanese Baseline Characteristics

Table 7. Odds Ratios for the Effect of Asian Ethnicity, Nativity and Duration on Work Disability for Asian and Pacific Islander Adults

	Model 1		Model 2		Model 3		Model 4	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Asian Ethnicity								
Japanese	ref.		ref.		ref.		ref.	
indian	1.942	[1.825 - 2.065]***	1.665	[1.560 - 1.778]***	1.674	[1.567 - 1.789]***	1.789	[1.674 - 1.913]***
Chinese	1.418	[1.334 - 1.506]***	1.239	[1.163 - 1.320]***	1.238	[1.161 - 1.320]***	1.105	[1.035 - 1.179]***
Taiwanese	0.716	[0.606 - 0.846]***	0.613	[0.519 - 0.725]***	0.616	[0.521 - 0.729]***	0.635	[0.536 - 0.751]***
Filipino	2.302	[2.168 - 2.444]***	2.006	[1.884 - 2.135]***	2.003	[1.880 - 2.134]***	1.97	[1.849 - 2.100]***
Pakistani	2.341	[2.095 - 2.614]***	1.983	[1.771 - 2.219]***	1.976	[1.765 - 2.213]***	1.903	[1.698 - 2.133]***
Korean	1.679	[1.571 - 1.794]***	1.442	[1.345 - 1.546]***	1.443	[1.345 - 1.549]***	1.305	[1.215 - 1.402]***
Vietnamese	2.898	[2.722 - 3.087]***	2.412	[2.256 - 2.579]***	2.392	[2.235 - 2.560]***	1.784	[1.665 - 1.911]***
Cambodian	3.487	[3.145 - 3.866]***	2.952	[2.655 - 3.282]***	2.93	[2.634 - 3.259]***	1.976	[1.772 - 2.203]***
Hmong	3.926	[3.453 - 4.465]***	3.287	[2.884 - 3.747]***	3.252	[2.852 - 3.708]***	2.189	[1.914 - 2.503]***
Laotian	3.044	[2.742 - 3.380]***	2.565	[2.304 - 2.856]***	2.542	[2.282 - 2.832]***	1.705	[1.526 - 1.904]***
Thai	1.972	[1.751 - 2.222]***	1.696	[1.502 - 1.914]***	1.706	[1.510 - 1.926]***	1.451	[1.284 - 1.641]***
Indonesian	1.502	[1.203 - 1.875]***	1.297	[1.037 - 1.621]**	1.302	[1.041 - 1.628]**	1.238	[0.990 - 1.547]*
Asian Other	2.214	[2.040 - 2.402]***	1.979	[1.822 - 2.151]***	1.977	[1.818 - 2.149]***	1.765	[1.623 - 1.921]***
Hawaiian	1.953	[1.730 - 2.205]***	2.207	[1.952 - 2.496]***	2.198	[1.943 - 2.486]***	1.801	[1.590 - 2.039]***
Samoan	2.737	[2.361 - 3.173]***	2.54	[2.190 - 2.946]***	2.538	[2.187 - 2.946]***	1.949	[1.677 - 2.266]***
Guamanian	2.21	[1.862 - 2.623]***	2.013	[1.696 - 2.390]***	2.013	[1.695 - 2.390]***	1.697	[1.426 - 2.019]***
PI Other	2.736	[2.370 - 3.159]***	2.468	[2.135 - 2.853]***	2.461	[2.129 - 2.846]***	1.913	[1.650 - 2.218]***
Male	1.325	[1.294 - 1.358]***	1.335	[1.303 - 1.368]***	1.334	[1.302 - 1.367]***	1.353	[1.319 - 1.389]***
Age	1.017	[1.016 - 1.018]***	1.016	[1.015 - 1.017]***	1.018	[1.014 - 1.021]***	1.018	[1.014 - 1.022]***
Years in the U.S.								
U.S. Born			ref.		ref.		ref.	
In US 0-5 years			1.24	[1.175 - 1.308]***	0.981	[0.812 - 1.185]	1.051	[0.868 - 1.274]
In US 6-10 years			1.505	[1.428 - 1.586]***	1.563	[1.297 - 1.882]***	1.442	[1.196 - 1.739]***
In US over 11 years			1.356	[1.294 - 1.421]***	1.62	[1.375 - 1.907]***	1.54	[1.307 - 1.814]***
Years in the US * Age								
US-Born					ref.		ref.	
0-5 Years					1.006	[1.002 - 1.011]***	0.999	[0.994 - 1.003]
6-1- Years					0.999	[0.995 - 1.004]	0.995	[0.990 - 0.999]**
Over 11 Years					0.996	[0.992 - 1.000]**	0.993	[0.989 - 0.997]***

English Ability		
English Only	ref.	
English Very Well	1.287	[1.230 - 1.347]***
English Well	1.489	[1.417 - 1.564]***
Not well or not at all	1.459	[1.380 - 1.542]***
Marital Status		
Married	.ref	
Widowed	1.097	[1.010 - 1.191]**
Divorced or separated	1.275	[1.219 - 1.335]***
Never married	1.17	[1.129 - 1.212]***
Education		
College Grad	ref.	
Less than HS Grad	2.036	[1.955 - 2.121]***
HS Grad	1.708	[1.644 - 1.774]***
Some college	1.497	[1.447 - 1.549]***
Income		
More than 35,000	ref.	
Less than 10,000	1.153	[1.093 - 1.218]***
10,000-19,999	1.202	[1.144 - 1.263]***
Employment Status		
Employed	ref.	
Not in labor force	0.718	[0.664 - 0.775]***
Unemployed	0.82	[0.796 - 0.846]***

* significant at 10%; ** significant at 5%; *** significant at 1%

Figure 6. Predicted Probability of Work Disability Status by Nativity/Duration
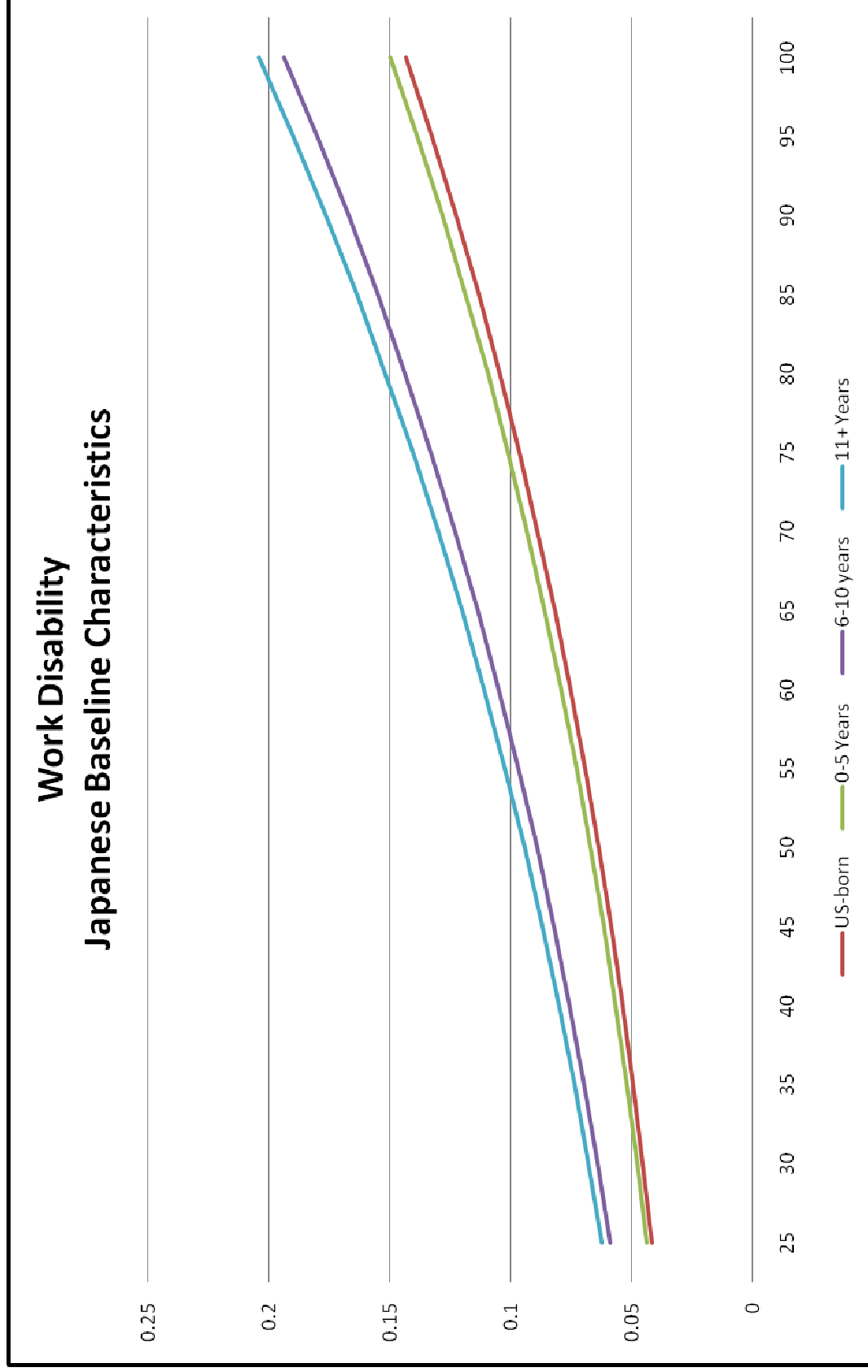
Table 8. Odds Ratios for the Effect of Asian Ethnicity, Nativity and Duration on Mobility Disability for Asian and Pacific Islander Adults

	Model 1		Model 2		Model 3		Model 4	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Asian Ethnicity								
Japanese	ref.		ref.		ref.		ref.	
indian	1.939	[1.833 - 2.051]***	1.566	[1.473 - 1.665]***	1.708	[1.602 - 1.820]***	1.895	[1.775 - 2.024]***
Chinese	1.403	[1.332 - 1.479]***	1.175	[1.111 - 1.243]***	1.293	[1.219 - 1.371]***	1.15	[1.082 - 1.223]***
Taiwanese	0.87	[0.743 - 1.019]*	0.711	[0.606 - 0.834]***	0.784	[0.668 - 0.921]***	0.785	[0.667 - 0.923]***
Filipino	2.049	[1.946 - 2.158]***	1.712	[1.619 - 1.811]***	1.903	[1.794 - 2.020]***	2.008	[1.889 - 2.134]***
Pakistani	2.879	[2.580 - 3.214]***	2.289	[2.045 - 2.562]***	2.492	[2.224 - 2.791]***	2.344	[2.088 - 2.631]***
Korean	1.652	[1.555 - 1.754]***	1.361	[1.275 - 1.452]***	1.493	[1.396 - 1.597]***	1.314	[1.227 - 1.408]***
Vietnamese	2.964	[2.801 - 3.136]***	2.351	[2.210 - 2.502]***	2.58	[2.418 - 2.753]***	1.894	[1.771 - 2.024]***
Cambodian	3.807	[3.439 - 4.214]***	3.176	[2.858 - 3.529]***	3.463	[3.113 - 3.853]***	2.096	[1.879 - 2.337]***
Hmong	4.181	[3.672 - 4.761]***	3.417	[2.992 - 3.902]***	3.724	[3.259 - 4.255]***	2.17	[1.894 - 2.487]***
Laotian	3.021	[2.715 - 3.362]***	2.506	[2.244 - 2.798]***	2.735	[2.446 - 3.058]***	1.713	[1.528 - 1.919]***
Thai	1.758	[1.541 - 2.006]***	1.455	[1.273 - 1.664]***	1.592	[1.390 - 1.822]***	1.419	[1.236 - 1.629]***
Indonesian	1.471	[1.157 - 1.872]***	1.194	[0.937 - 1.521]	1.303	[1.023 - 1.660]**	1.256	[0.982 - 1.605]*
Asian Other	2.27	[2.094 - 2.461]***	1.943	[1.789 - 2.110]***	2.153	[1.978 - 2.343]***	1.925	[1.765 - 2.098]***
Hawaiian	1.541	[1.360 - 1.747]***	1.757	[1.548 - 1.994]***	1.942	[1.704 - 2.214]***	1.751	[1.535 - 1.997]***
Samoan	2.293	[1.965 - 2.676]***	2.087	[1.788 - 2.437]***	2.326	[1.986 - 2.725]***	1.792	[1.531 - 2.099]***
Guamanian	1.713	[1.416 - 2.074]***	1.516	[1.251 - 1.836]***	1.679	[1.384 - 2.037]***	1.532	[1.259 - 1.863]***
PI Other	2.042	[1.740 - 2.396]***	1.782	[1.517 - 2.093]***	1.978	[1.681 - 2.328]***	1.571	[1.334 - 1.851]***
Male	0.99	[0.965 - 1.015]	1	[0.975 - 1.025]	1.001	[0.976 - 1.026]	1.171	[1.140 - 1.203]***
Age	1.037	[1.037 - 1.038]***	1.038	[1.037 - 1.039]***	1.054	[1.052 - 1.057]***	1.038	[1.036 - 1.041]***
Years in the US								
US-Born			ref.		ref.		ref.	
In US 0-5 years			1.517	[1.434 - 1.604]***	4.353	[3.638 - 5.208]***	2.512	[2.103 - 3.001]***
In US 6-10 years			1.653	[1.565 - 1.746]***	4.871	[4.087 - 5.805]***	3.127	[2.634 - 3.712]***
In US over 11 years			1.378	[1.314 - 1.444]***	3.368	[2.876 - 3.944]***	2.869	[2.465 - 3.340]***
Years in the US								
US-Born					ref.		ref.	
0-5 years x Age					0.98	[0.977 - 0.983]***	0.983	[0.980 - 0.986]***
6-10 years x Age					0.979	[0.976 - 0.983]***	0.982	[0.979 - 0.985]***

	Model 1	Model 2
11+ years x Age	0.984 [0.981 - 0.986]***	0.983 [0.980 - 0.985]***
English Ability		
English Only		ref.
English Very Well		1.328 [1.265 - 1.393]***
English Well		1.667 [1.585 - 1.754]***
Not well or not at all		1.668 [1.579 - 1.762]***
Marital Status		
Married		.ref
Widowed		1.435 [1.371 - 1.503]***
Divorced or separated		1.152 [1.097 - 1.211]***
Never married		1.211 [1.163 - 1.261]***
Education		
College Grad		ref.
Less than HS Grad		1.932 [1.855 - 2.012]***
HS Grad		1.525 [1.464 - 1.588]***
Some college		1.508 [1.452 - 1.567]***
Income		
More than 35,000		ref.
Less than 10,000		1.375 [1.314 - 1.439]***
10,000-19,999		1.215 [1.160 - 1.273]***
20,000-34,999		1.148 [1.106 - 1.191]***
Employment Status		
Employed		ref.
Not in labor force		1.313 [1.215 - 1.418]***
Unemployed		1.523 [1.478 - 1.569]***

* significant at 10%; ** significant at 5%; *** significant at 1%

Figure 6. Predicted Probability of Mobility Disability Status by Nativity/Duration

Mobility Disability
Japanese Baseline Characteristics