Educational gradients in five Asian immigrant populations: Do country of origin, duration and generational status moderate the education-health relationship?

Annie Ro [a,*], Arline Geronimus [b], John Bound [c], Derek Griffith [d], Gilbert Gee [e]

[a] UC Irvine, Program in Public Health, Anteater Instruction and Research Buildling (AIRB), Room 2036, 653 E. Peltason Road, Irvine, CA 92697-3957, United States
[b] University of Michigan, Population Studies Center, Institute for Social Research, 426 Thompson St, Ann Arbor, MI 48106, United States
[c] University of Michigan, Department of Economics, 238 Lorch Hall, 611 Tappan St., Ann Arbor, MI 48109, United States
[d] Vanderbilt University, Center for Medicine, Health and Society, PMB #351665, 2301 Vanderbilt Place, Nashville, TN 37235, United States
[e] UCLA School of Public Health, Community Health Sciences, 650 Charles E Young Drive South, Room 46-081c, Los Angeles, CA 90095, United States

ARTICLE INFO

ABSTRACT

Education usually shows a relationship with self-rated health such that those with highest education have the best health and those with lowest education have the worst health. We examine these educational gradients among Asian immigrants and whether they differ by country of origin, duration in the United States, and generational status. Migration theories suggest that recent immigrants from poorer countries should show a weaker relationship between education and health than US-born Whites. Acculturation theory further suggests that differences in gradients across country of origin should diminish for longer-term immigrants and the US-born and that these groups should display gradients similar to US-born Whites.

We use the March Current Population Survey (2000−2010) to examine educational gradients in self-rated health among recent immigrants (≤15 years duration), longer-term immigrants (>15 years duration), and second generation US-born Asians from China (n = 4473), India (n = 4,307), the Philippines (n = 5746), South Korea (n = 2760), and Japan (n = 1265).

We find weak or non-significant educational gradients among recent Asian immigrants across the five countries of origin. There is no indication that longer-term immigrants display significant differences across educational status. Only second generation Chinese and Filipinos show significant differences by educational status.

Overall, Asians show an attenuated relationship between education and self-rated health compared to US-Whites that persists over duration in the US and generational status. Our findings show shortcomings in migration and acculturation theories to explain these gradient patterns. Future research could use binational data or explore psychosocial factors to identify potential suppressors of educational gradients.

1. Background

Many studies find that persons who have completed more years of education have better health compared to those who have fewer years of schooling. This pattern is called an educational gradient because the best health outcomes are for those with the highest education. Those with less education have slightly worse health, and so on. The educational gradient has been found in range of health outcomes, including life expectancy, disability, chronic conditions, and self-reported health (Braveman et al., 2010). However, the beneficial role of higher educational attainment is either weakened or not present among Asian immigrants compared to US-born samples (Kimbro et al., 2008; Acevedo-Garcia et al., 2010).

Yet, much of our current knowledge relies on studies that have aggregated Asian immigrant samples, obscuring subgroup differences. Some studies have found some differences in the educational gradients in birthweight, self-rated health, work limitations, obesity, and smoking status among Asian ethnic subgroups (Kimbro et al., 2008; Madan et al., 2006; Wang et al., 1994). These investigations vary in their methodology and approach, however, limiting the generalizablity of their findings. Researchers have long called for analyses of Asian immigrants to disaggregate by country of origin, owing to their distinct migration histories, cultural orientations, and economic characteristics (Yi et al., 2015). What is more, explanations for immigrant socioeconomic (SES) gradients have focused increasingly on the characteristics of sending countries. For example, immigrants may "import" the patterns between education and health of their country of origin (Riosmena and Dennis, 2012). Alternatively, the "healthy migrant hypothesis" proposes that immigrants are positively selected on health compared to their non-migrating counterparts in the origin country. Health selection limits

* Corresponding author.
E-mail address: annie.ro@uci.edu (A. Ro).

immigrants' variability in health status and compresses health differences across educational categories (Jasso et al., 2004). With the growing interest in the role of sending countries, it is critical to conduct subgroup analyses comparing gradients across different countries of origin.

Country-level factors, such as the level of economic development or progression in the epidemiological and nutritional transitions, can underpin differences in the education and health relationship by country of origin (Acevedo-Garcia et al., 2012). For example, developing countries such as China are in the midst of a nutritional transition, which may result in a weaker relationship between education and health outcomes as the burden of chronic diseases shifts from individuals with high SES to those with low SES (Popkin, 2003). Additionally, immigrants from poorer countries are thought to have greater health selection, since the migration costs are higher (Read et al., 2005). Hence, we may expect immigrants from poorer and less developed countries to display a weaker relationship between education and health. In these instances, the gradient is "attenuated", meaning that there are smaller differences in health status across educational categories. These gradient differences by country of origin are likely to be more prominent among recent immigrants because of their limited exposure to the United States (Riosmena and Dennis, 2012).

Theories of acculturation generally predict that the health outcomes of immigrants will converge to those of their US-born counterparts over time in the United States and across generational status (Rogler et al., 1991). Accordingly, we expect differences in educational gradients across country of origin groups to diminish for longer-term immigrants. Previous research found that longer-term Asian immigrants displayed a stronger relationship between higher education and better self-rated health than recent immigrants (Acevedo-Garcia et al., 2010). Likewise, we expect second-generation US-born individuals to display an even stronger association between higher education and better health compared to immigrants, as they have the most exposure to the American social environment and have been educated in the US. Existing studies using the aggregated population of US-born Asians have shown a protective benefit of education and income across several health outcomes, even though the effect is reduced compared to US-born Whites (Kimbro et al., 2008).

In summary, we have the following hypotheses: H1: Asians in general will have attenuated gradients compared to US-born Whites. H2: There will be differences in the educational gradients across Asian countries of origin. These differences will be most pronounced among recently-arrived immigrants. H3: Among immigrants, educational gradients will be stronger with increasing duration in the US. H4: Educational gradients in health will be stronger among US-born (2nd generation) compared with foreign-born (1st generation) Asians.

2. Methods

2.1. Participants and data

We used the 2000–2010 waves of the March Current Population Survey (CPS) (Ruggles et al., 2010). The sample included foreign-born and second generation US-born single-race Asian respondents who were born in or had at least one parent born in China, India, Philippines, South Korea or Japan. Of the foreign-born, we limited to those who entered the United States after 1970 and were at least 25 years old at the time of migration. This increased the likelihood that the foreign-born completed their education in the country of origin, reducing potential confounding by place of education (Walton et al., 2009; Zhen and Xie, 2004). Second generation US-born Asians were also limited to those over 25 years old. Finally, we limited the maximum age of all respondents to 64 years, as health differences across education and duration diminish with older age (Ro and Gee, 2012). Our final sample sizes were Chinese = 4473, Asian Indian = 4037, Filipino = 5746, Korean = 2760, Japanese = 1265. No ethics review was needed

for this study, as the publicly-available version of the CPS does not contain potential identifiers and poses minimal risk of identity disclosure.

2.2. Measures

2.2.1. Self-rated health

The outcome measure was self-rated health, a summary health measure associated with mortality, health utilization behaviors, and disability (Idler and Benyamini, 1997; Benyamini and Idler, 1999; Idler and Kasl, 1995; Ferraro et al., 1997). Respondents reported their general health on a five-point scale: "Excellent", "Very Good", "Good", "Fair" and "Poor". This outcome was dichotomized into fair/poor versus all others (Acevedo-Garcia et al., 2010; Zhang et al., 2010).

2.2.2. Educational attainment

We measured education in three categories: Less than high school degree (ref.), high school graduate, and college graduate.

2.2.3. Nativity/years in the United States

This variable was divided into the following categories: 1) US-born Asians (second generation); 2) Recent immigrants: 0–15 years duration; 3) Longer-term immigrants: 16 or more years duration.

We calculated duration by subtracting the year of entry variable from the survey year. We could not identify duration for a small minority of respondents because the CPS records the year of entry for immigrants in multiple-year intervals (e.g. entering 1990–1991, entering 1992–1995). To address this problem, we used the American Community Survey to calculate the likelihood that a respondent entered the United States in a given year. For example, in the 2000 wave, respondents entering between 1984 and 1985 straddled the two duration categories. According to the ACS, 46% of these immigrants entered in 1984 and 54% entered in 1985. We created a duplicate of the observation, one of which received a weight of 0.46 to correspond to the likelihood of being in the 0–15 duration group and the other a weight of 0.54 to represent its likelihood of being in the 16 + year group. This duration weight was multiplied by the person weight in the complex survey weighting scheme for a new person weight. These straddling observations were rare (3% of Chinese, 2% of Asian Indian, 3% of Filipinos, 2% of Koreans, 2% of Japanese).

2.2.4. Cohorts

This paper controls for cohort of entry, as duration and cohort effects are confounded in cross-sectional data (Lauderdale, 2001). For example, health differences by duration category may not be due to length of residence in the United States, but because immigrants who entered the United States 10 years prior may be compositionally distinct from immigrants entering 5 years prior. We accounted for these potential compositional differences (i.e., cohort effects) by including four year-of-entry cohorts in our model: immigrants entering 1970–1979, 1980–1989, 1990–1999 and 2000–2010. These categories were created using the year of immigration variable. In instances where the year of entry range straddled two cohorts (i.e., entering between 1998 and 2000), we coded the respondents into the earlier cohort (i.e., the 1990–1999 cohort).

2.2.5. Additional variables

We controlled for gender (categorical, male reference), age (continuous), survey year (categorical, year 2000 reference), and the poverty to family income ratio (PIR) (continuous) in 1999 dollars.

2.3. Analysis

To assess educational gradients, we conducted a series of logistic regressions with poor/fair self-rated health as the outcome. The first set of models examined the relationship between education and fair/poor self-rated health for each Asian subgroup and US-born Whites.

We calculated and reported the predicted probabilities of these models. The second set of models included interaction terms for duration/nativity and education for the Asian subgroups. Following previous work, we estimated the survey year and age effects from the US-born sample (Antecol and Bedard, 2006; Hamilton and Hummer, 2011; Borjas, 1985). We conducted a Wald test of the joint significance of the interaction terms. We graphed the predicted probability of fair/poor self-rated health by education and tested the significance of the marginal effects of a high school and a college degree, compared to less than high school. All models were conducted on Stata version 13 and accounted for the complex survey design of the CPS using Joliffe's method (Jolliffe, 2003).

3. Results

Table 1 provides the sample size and characteristics of the sample. There was considerable heterogeneity among Asian subgroups. The Japanese had the lowest prevalence of fair/poor self-rated health (2%) and the Koreans had the highest (9%). Asian Indians had the highest percentage with college education (83%) and Filipinos had the lowest (46%).

3.1.1. Educational gradients by country of origin

Table 2 displays predicted probabilities of fair/poor self-rated health by educational level for each Asian subgroup and US-born Whites. These values were calculated from logistic regression models stratified by Asian subgroup and US-born Whites, regressing educational attainment on fair/poor self-rated health, controlling for gender, age, survey year, and PIR. Higher education corresponded with lower probabilities for fair/poor self-rated health for all groups. The overall probabilities for poor health for Whites were higher than all Asian subgroups at every level of education, but the differentials between educational levels were lower for Asians than for US Whites, indicating an attenuated association for Asians. For example, for US-born Whites, the difference between those with less than a high school degree and those with a college degree is 21.1 percentage points and those a high school degree is 14.9 percentage points. In contrast, the Japanese had the next highest differentials, with a 15.4 percentage point difference and 9.4 percentage point difference between those with a college degree and a high school degree compared to those with less than a high school degree.

3.1.2. Educational gradients by duration by country of origin

Table 3 displays the results of the models with interaction terms for education and duration, stratified by Asian subgroup. The odds ratios for the education variables are for the US-born. The interaction terms represent the differential effect of high school and college degrees for the 0–15 and 16 + year immigrant groups relative to the US-born. To better interpret the interactions, Fig. 1 graphs the predicted probabilities for fair/poor self-rated health for the models produced in Table 3. The significance flags on the graphs denote whether the difference in probability for fair/poor self-rated health is significantly greater than zero compared to the less than high school group. For ease of interpretation, we will primarily discuss the figures.

For the Chinese, there is an educational gradient for self-rated health that does not appear to vary greatly by nativity or years in the US. In Fig. 1, the gradient pattern across all three groups is clear. For recent immigrants, both a high school and college degree have a lower predicted prevalence of fair/poor self-rated health compared those with less than a high school education. For longer-term immigrants, the differences across educational categories are less pronounced than for recent immigrants and only a college degree has a significantly lower predicted prevalence for poor/fair self-rated health compared to the less than high school group. For the US-born, there is a clear gradient pattern,

but the high school and college degree are not statistically different from the less than high school group. In the regression model (Table 3), none of the individual interaction terms are significant, nor is the joint test interaction, underscoring the similarity across nativity and years in the US.

For Asian Indians, there is a weak relationship between education and self-rated health for all nativity groups/nativity groups. Fig. 1 indicates only a weak beneficial effect of college degree for the recent immigrants. There are no significant differences across educational categories for the longer-term immigrants. While there appears to be a gradient for the US-born, the probability for fair/poor self-rated health was not significantly lower for those with either a high school degree or a college degree compared to those with less than a high school degree.

Filipinos show significant differences in their educational patterns between immigrants and the US-born. In the regression model (Table 3), the individual interaction terms as the overall interaction test are significant, indicating that the relationship between education and self-rated health is not equivalent across all three groups. Fig. 1 shows no significant differences in self-rated health by educational level for either recent or long-term immigrants but a clear and significant difference in high school and college degrees compared to less than high school among the US-born.

US-born Koreans do not show a significant association for high school and college education on poor self-rated health. The joint test for interaction in the regression model (Table 3) is significant, suggesting that immigrants display a unique pattern. Fig. 1 indicates a small health differential for both recent and longer-term immigrants with a college degree compared to those without a high school degree, but the differences by education are more pronounced for recent immigrants. Interestingly, the US-born with a high school degree have a higher predicted probability for poor self-rated health than those without a high school degree, yet this difference is not significant.

There are no significant associations between high school or college degrees and poor self-rated health for any of the Japanese nativity/duration groups. While the graphs indicate an overall pattern of improving health with more education, none of the marginal effects for high school or college degrees are significant for any of the subgroups.

The large confidence intervals for several of the estimates are quite large, indicating instability from small estimates. We conducted a sensitivity test with education recoded as dummy variable (over and under high school graduate) and found very similar results, suggesting that our non-significant results were not purely a result of small sample sizes.

Table 1
Demographic characteristics, 2000–2010 March current population survey.

	Chinese	Asian Indian	Filipino	South Korean	Japanese
n	4473	4037	5746	2760	1265
Age (mean)	40	32	36	32	40
Male	53%	55%	55%	52%	48%
Immigration status					
≤ 15 years US residence	59%	69%	48%	51%	62%
>15 years US residence	23%	22%	33%	36%	19%
US-born	18%	9%	20%	13%	19%
Fair/poor self-rated health	6%	3%	7%	9%	2%
Median income to poverty ratio (PIR)	5.6	5.3	4.7	4.3	5.3
Education					
Less than high school	3%	3%	3%	4%	4%
High school graduate	25%	14%	51%	33%	42%
College graduate	71%	83%	46%	63%	54%

With the exception of sample n, all figures are weighted by the survey person weights.

Table 2
Predicted probabilities of fair/poor self-rated health by educational attainment, 2000–2010 March Current Population Survey.

	Chinese	Asian Indian	Filipino	Korean	Japanese	USB Whites
Less than high school	16.5%	18.0%	16.9%	21.1%	21.1%	29.4%
High school graduate	11.4%[a]	12.3%[a]	11.3%[a]	12.0%[a]	11.7%[a]	14.5%[a]
College graduate	6.3%[a]	5.7%[a]	6.5%[a]	6.3%[a]	5.7%[a]	8.3%[a]

Predicted probabilities were calculated for men, at 45 years of age, at two times the poverty limit in year 2005.

[a] In logistic regression model, odds of reporting fair/poor self-rated health was significantly lower than the less than HS baseline at the $p < 0.001$ level.

4. Discussion

This paper examined the relationship between education and self-rated health among Asian immigrants from five countries of origin: China, India, Philippines, Korea, and Japan, across duration in the United States and generational status.

Our first hypothesis was supported; in all five Asian subgroups, higher education was associated with a lower predicted probability of fair/poor self-rated health, but this relationship was attenuated compared to US-born Whites.

We found limited support for our remaining three hypotheses. Our second hypothesis was partially supported; we found differences in the relationship between educational attainment and self-rated health among recent immigrants across subgroups. Only recent Chinese immigrants displayed a significant association between education and self-rated health. Filipino and Japanese recent immigrants did not show any significant relationships between education and health. Asian Indians and Koreans only showed weak associations. These findings did not correspond to theories reflecting factors originating in the country of origin, however. If recent immigrants were importing gradients, we would have expected weaker gradients among less developed countries, such as China, as they may be still be undergoing epidemiological transitions that reduce health differences across educational attainment (Lowry and Xie, 2009; Chen et al., 2010). Health selection theory could explain the low prevalence of fair/poor self-rated health for the recent immigrants across all education levels. However, we would have expected immigrants from countries with lower economic development to have the highest health selection and by extension, the best self-rated health and the weakest educational gradients (Jasso et al., 2004). As such, the smallest differences across educational categories should have been for China, India, and the Philippines, whose 2010 per capita Gross National Income (GNI) was $2858, $1020, $1866, respectively, compared to richer countries like South Korea and Japan,

whose 2010 per capita GNI was $22,263 and $37,251, respectively (GNI per capita (constant 2005 US$), 2015). Yet the gradient patterns in our results did not correspond with economic development. Instead, the strongest evidence for a gradient was among Chinese immigrants and there was little evidence for gradients among richer countries, such as Japan, or countries where the educational gradient in self-rated health has been well established, such as South Korea (Lee et al., 2008; Lee and Shinkai, 2003). Both the importation of gradients and health selection hypotheses have largely been applied to Mexican immigrants and chronic disease outcomes. Our results suggest that they may have limited application for Asian immigrants and self-rated health. A full exploration of these theories and education gradients among Asians is an important area of future research and should utilize binational data sources.

We found no support for our third hypothesis that immigrants would display stronger educational gradients with longer duration. In fact, there were smaller differences in self-rated across educational attainment for the longer-term immigrants compared to recent immigrants. Our findings run counter to acculturation theories, which assume that with longer duration, health-protective cultural behaviors erode and gradients should look more similar to the US-born. Our results did not bear out this scenario, suggesting that gradients for longer-term immigrants may be shaped by non-behavioral factors such as stress. Longer-term Asian immigrants report higher levels of stress compared to their more recently-arrived counterparts (Uppaluri et al., 2001), which may reflect prolonged underemployment (Dooley et al., 2000) or acculturative stress. The accumulation of such stressors over US duration may undermine health benefits of educational attainment. We also cannot rule out small sample sizes contributing to our non-significant findings, although a sensitivity check with education coded in two categories yielded similar results.

Finally, we found mixed support for our final hypothesis; only second-generation Chinese and Filipinos showed any significant

Table 3
Logistic regression results for fair/poor self-rated health with duration × educational attainment interaction, by country of origin, 2000–2010 March Current Population Survey. *, **, +

	Chinese				Asian Indian				Filipino				Korean				Japanese			
	OR	95% CI			OR	95% CI			OR	95% CI			OR	95% CI		P	OR	95% CI		P
Education																				
Less than HS	Ref.				Ref.				Ref.				Ref.				Ref.			
HS graduate	0.31	0.09	1.09	+	0.26	0.05	1.42		0.18	0.07	0.48	**	3.23	0.41	25.31		0.38	0.04	3.22	
College graduate	0.23	0.07	0.77	*	0.07	0.01	0.66	*	0.09	0.03	0.27	**	0.43	0.05	3.74		0.18	0.01	2.39	
Duration																				
US-born	Ref.				Ref.				Ref.				Ref.				Ref.			
0–15 years	0.39	0.11	1.46		0.22	0.03	1.87		0.09	0.03	0.31	**	1.99	0.20	19.63		2.07	0.05	90.78	
16+ years	0.45	0.13	1.60		0.17	0.02	1.43		0.11	0.04	0.35	**	1.42	0.18	11.12		4.68	0.40	54.95	
Duration × education																				
0–15 years × HS grad	1.77	0.48	6.56		3.83	0.60	24.36		6.95	2.28	21.24	**	0.14	0.02	1.22	+	1.16	0.05	29.45	
0–15 years × college grad	1.77	0.50	6.36		5.57	0.57	54.52		8.04	2.35	27.47	**	0.49	0.05	5.09		1.64	0.05	54.83	
16+ years × HS grad	2.12	0.55	8.27		4.93	0.71	34.17		4.14	1.32	13.00	*	0.21	0.03	1.77		0.27	0.02	4.58	
16+ years × college grad	2.18	0.59	8.10		8.49	0.82	87.42	+	8.56	2.38	30.73	*	1.11	0.12	10.60		0.97	0.04	25.44	
Joint test of interaction	$p = 0.82$				$p = 0.44$				$p < 0.05$				$p < 0.05$				$p = 0.68$			

Models controlled for age, gender, survey year, cohort of entry, poverty to income ratio.

* $p < 0.05$, significance level.
** $p < 0.001$, significance level.
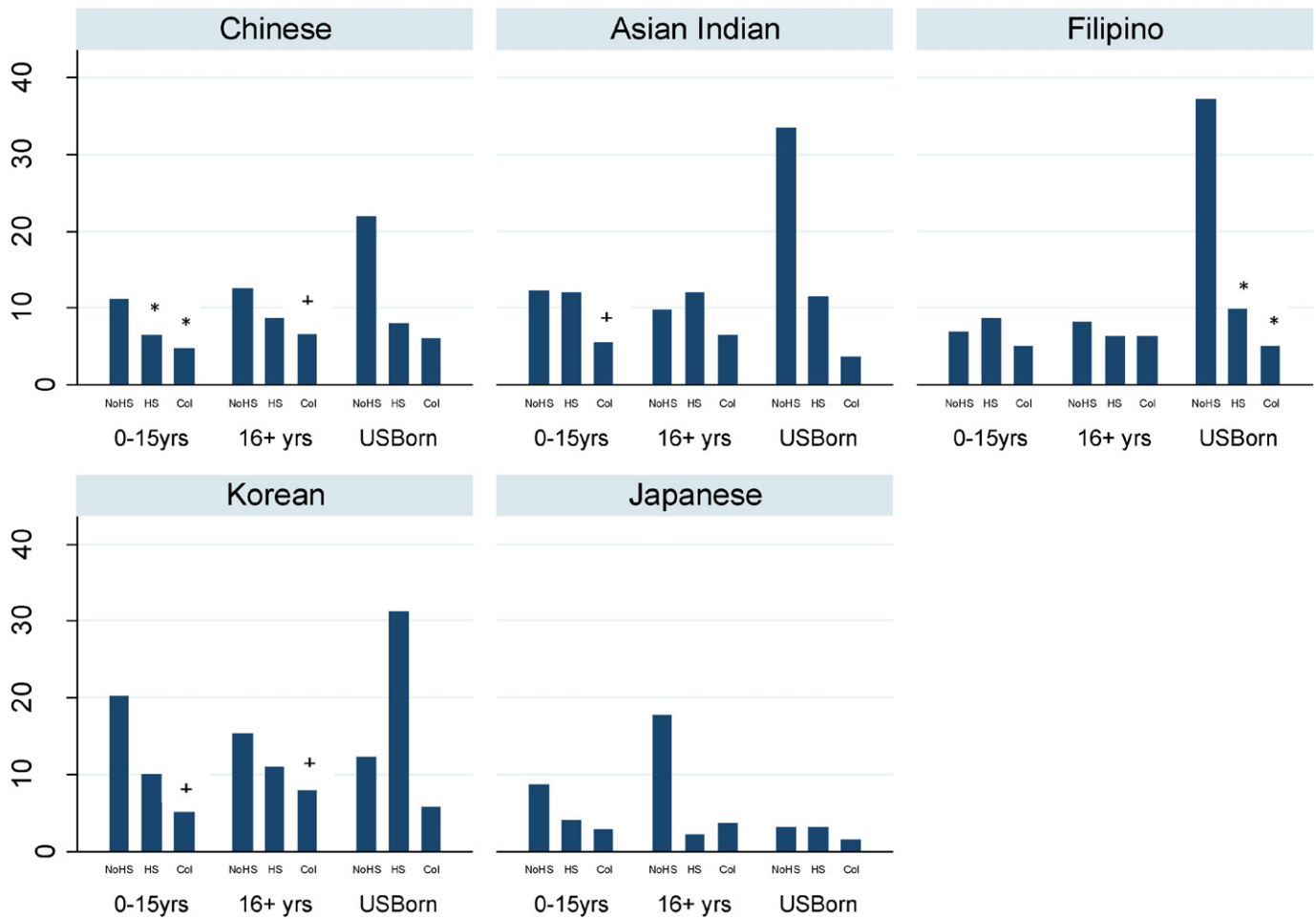+ $p < 0.10$, significance level.

Fig. 1. Predicted probabilities of fair/poor health by educational attainment, duration/nativity, and Asian ethnicity, 2000–2010 March current population survey. Predicted probabilities are calculated for less than high school (No HS), high school graduates (HS) and college graduates (Col) from the logistic model in Table 3. Predicted probabilities were calculated for men, at 45 years of age, at two times the poverty limit, at the 1990–1999 cohort (immigrants only) in year 2005. $*p < 0.05$, $+ p < 0.10$ significance level for difference in marginal effects from those with less than high school.

associations between educational attainment and self-rated health. These are also the two largest Asian subgroups, which may explain why educational gradients appear in previous work that has aggregated US-born Asian population (Kimbro et al., 2008).

The educational gradient among the US-born was especially clear among Filipinos. We suspect this may arise from their lower educational attainment compared to other groups. For example, 71% of US-born Chinese and 83% of US-born Asian Indian were college graduates compared to 46% of US-born Filipinos. Their lower educational attainment overall may have increased the health-promoting benefits of higher education.

We anticipated the clearest gradients among the US-born, as they had the most exposure to the United States and received their education here. It is unclear why there were no clear educational gradients among the US-born Korean, Japanese and Asian Indians. Overall patterns indicate a beneficial influence of education, although small sample sizes and relatively young ages could have limited our statistical ability to detect significant associations between educational attainment and self-rated health.

The paper contains some limitations. First, the data are cross-sectional, limiting temporal and causal inferences. However, we did control for year of entry cohort and period, which confound duration in cross-sectional data. Second, self-rated health is subject to biases inherent in all self-reported indicators, such as cultural differences in

health assessments. Yet self-rated health ratings appear consistent between Asians immigrants and US-born Asians (Erosheva et al., 2007) and we only compared self-rated health patterns within country of origin subgroups (i.e., Chinese recent immigrants compared to Chinese longer-term immigrants). What is more, self-rated health does not appear to vary by length of residence in the United States for Asian immigrants (Ro, 2014).

5. Conclusions

Overall, Asian immigrants show an attenuated relationship between education and self-rated health compared to US-Whites that persists over duration in the US and generational status. Our findings add to growing arguments that socioeconomic gradients, including education, must be contextualized within social circumstances (Pearson, 2008). We cannot take for fact that higher educational attainment produces health-protective benefits for all groups. For Asians, future research could use binational data to better measure sending country characteristics or consider psychosocial factors, such as stressors, to identify potential suppressors of educational gradients.

Conflict of interest statement

The authors declare that there are no conflicts of interest.

Transparency document

The Transparency document associated with this article can be found, in online version.

References

Acevedo-Garcia, D., Bates, L.M., Osypuk, T.L., McArdle, N., 2010. The effect of immigrant generation and duration on self-rated health among US adults 2003–2007. Soc. Sci. Med. 71 (6), 1161–1172.

Acevedo-Garcia, D., Sanchez-Vaznaugh, E., Viruell-Fuentes, E., Almeida, J., 2012. Integrating social epidemiology into immigrant health research: a cross-national framework. Soc. Sci. Med. 75 (12), 2060–2068 (December 2012 (12)).

Antecol, H., Bedard, K., 2006. Unhealthy assimilation: why do immigrants converge to American health status levels? Demography 43 (2), 337–360.

Benyamini, Y., Idler, E.L., 1999. Community studies reporting association between self-rated health and mortality - additional studies, 1995 to 1998. Res. Aging 21 (3), 392–401.

Borjas, G.J., 1985. Assimilation, changes in cohort quality, and the earnings of immigrants. J. Labor Econ. 3 (4), 463–489.

Braveman, P.A., Cubbin, C., Egerter, S., Williams, D.R., Pamuk, E., 2010. Socioeconomic disparities in health in the United States: what the patterns tell us. Am. J. Public Health 100 (S1), S186–S196.

Chen, F.N., Yang, Y., Liu, G.Y., 2010. Socioeconomic disparities in health over the life course in China: a cohort analysis. Am. Sociol. Rev. 75 (1), 126–150.

Dooley, D., Prause, J., Ham-Rowbottom, K.A., 2000. Underemployment and depression: longitudinal relationships. J. Health Soc. Behav. 41 (4), 421–436.

Erosheva, E., Walton, E.C., Takeuchi, D.T., 2007. Self-rated health among foreign- and US-born Asian Americans - a test of comporobility. Med. Care 45 (1), 80–87.

Ferraro, K.F., Farmer, M.M., Wybraniec, J.A., 1997. Health trajectories: long-term dynamics among black and white adults. J. Health Soc. Behav. 38 (1), 38–54.

GNI per capita (constant 2005 US$), 2015. World Bank.

Hamilton, T.G., Hummer, R.A., 2011. Immigration and the health of U.S. black adults: does country of origin matter? Soc. Sci. Med. 73 (10), 1551–1560.

Idler, E.L., Benyamini, Y., 1997. Self-rated health and mortality: a review of twenty-seven community studies. J. Health Soc. Behav. 38 (1), 21–37.

Idler, E.L., Kasl, S.V., 1995. Self-ratings of health - do they also predict change in functional ability. J. Gerontol. Ser. B Psychol. Sci. Soc. Sci. 50 (6), S344–S353.

Jasso, G., Massey, D., Rosenzweig, M., Smith, J., 2004. Immigrant health: selectivity and acculturation. In: Anderson, N., Bulatao, N., Cohen, B. (Eds.), Critical Perspectives on Racial and Ethnic Differences in Health in Late Life. The National Academies Press, Washington, DC, pp. 227–266.

Jolliffe, D., 2003. Estimating sampling variance from the current population survey: a synthetic design approach to correcting standard errors. J. Econ. Soc. Meas. 28 (4), 239–261.

Kimbro, R.T., Bzostek, S., Goldman, N., Rodríguez, G., 2008. Race, ethnicity, and the education gradient in health. Health Aff. 27 (2), 361–372.

Lauderdale, D.S., 2001. Education and survival: birth cohort, period, and age effects. Demography 38 (4), 551–561.

Lee, Y., Shinkai, S., 2003. A comparison of correlates of self-rated health and functional disability of older persons in the Far East: Japan and Korea. Arch. Gerontol. Geriatr. 37 (1), 63–76.

Lee, H.Y., Jang, S.-N., Lee, S., Cho, S.-I., Park, E.-O., 2008. The relationship between social participation and self-rated health by sex and age: a cross-sectional survey. Int. J. Nurs. Stud. 45 (7), 1042–1054.

Lowry, D., Xie, Y., 2009. Socioeconomic status and health differentials in China: convergence or divergence at older ages? Research Report, Report 09-690. University of Michigan Population Studies Center

Madan, A., Palaniappan, L., Urizar, G., Wang, Y., Fortmann, S.P., Gould, J.B., 2006. Sociocultural factors that affect pregnancy outcomes in two dissimilar immigrant groups in the United States. J. Pediatr. 148 (3), 341–346.

Pearson, J.A., 2008. Can't buy me whiteness: new lessons from the titanic on race, ethnicity and health. Du Bois Rev. 5 (1), 27.

Popkin, B.M., 2003. The nutrition transition in the developing world. Dev. Policy Rev. 21 (5–6), 581–597.

Read, J., Emerson, M., Tarlov, A., 2005. Implications of black immigrant health for U.S. racial disparities in health. J. Immigr. Health 7 (3), 205–212.

Riosmena, F., Dennis, J.A., 2012. Importation, SES-selective acculturation, and the weaker SES-health gradients of Mexican immigrants in the United States. Soc. Sci. J. 49 (3), 325–329.

Ro, A., 2014. The longer you stay, the worse your health? A critical review of the negative acculturation theory among Asian immigrants. Int. J. Environ. Res. Public Health 11 (8), 8038–8057.

Ro, A., Gee, G., 2012. Disability status differentials among Asian immigrants in the United States: the added dimensions of duration and age. Race Soc. Probl. 4 (2), 83–92.

Rogler, L.H., Cortes, D.E., Malgady, R.G., 1991. Acculturation and mental health status among Hispanics: convergence and new directions for research. Am. Psychol. 46 (6), 585–597.

Ruggles, S., Alexander, J.T., Genadek, K., Goeken, R., Schroeder, M.B., Sobek, M., 2010. Integrated Public Use Microdata Series: Version 5.0 [Machine-Readable Database]. University of Minnesota, Minneapolis. MN.

Uppaluri, C., Schumm, L., Lauderdale, D., 2001. Self-reports of stress in Asian immigrants: effects of ethnicity and acculturation. Ethn. Dis. 11 (1), 107.

Walton, E., Takeuchi, D.T., Hertinga, J.R., Alegría, M., 2009. Does place of education matter? Contextualizing the education and health status association among Asian Americans. Biodemography Soc. Biol. 55 (1), 30–51.

Wang, X., Guyer, B., Paige, D.M., 1994. Differences in gestational age-specific birthweight among Chinese, Japanese and white Americans. Int. J. Epidemiol. 23 (1), 119–128.

Yi, S.S., Kwon, S.C., Wyatt, L., Islam, N., Trinh-Shevrin, C., 2015. Weighing in on the hidden Asian American obesity epidemic. Prev. Med. 73, 6–9.

Zhang, W., McCubbin, H., McCubbin, L., et al., 2010. Education and self-rated health: an individual and neighborhood level analysis of Asian Americans, Hawaiians, and Caucasians in Hawaii. Soc. Sci. Med. 70 (4), 561–569.

Zhen, Z., Xie, Y., 2004. Asian-Americans' earnings disadvantage reexamined: the role of place of education. Am. J. Sociol. 109 (5), 1075.