Education and Health among Asian Americans in the United States*

Ying-Ting Wang

Department of Sociology and Population Research Center

University of Texas at Austin

*Paper presented at the 2010 annual meeting of the Population Association of America, Dallas, TX. I gratefully thank Robert Hummer and Catherine Ross for their helpful advice. Direct Correspondence to Ying-Ting Wang (ytwang@mail.utexas.edu) at Department of Sociology and Population Research Center, The University of Texas at Austin, 1 University Station A1700, Austin, TX, 78712-0118.

Education and Health among Asian Americans in the United States

Abstract

The author used data from the National Latino and Asian American Study (2002-2003) to examine whether a higher level of education is associated with more favorable health among Asian Americans, and also to investigate whether the effect of education on health among Asian American subgroups is different by national origin group. In ordered logistic regression models for all Asian Americans, education is modestly positively associated with physical health and strongly positively associated with mental health. Further, results of ordered logistic regression models by subgroup show that the effect of education on health and its mediators are different across subgroups. The effect of education on health is stronger for Chinese adults than for Filipino adults and Vietnamese adults. The complex pattern of the association between education and health for each subgroup indicates the importance of considering the diverse characteristics of various subgroups in the study of Asian American health.

Keywords: Education; Health; Asian American

INTRODUCTION

Many studies have demonstrated the strong impact of socioeconomic status on racial and ethnic health differentials (Hummer, Benjamins, and Rogers 2004; Williams 1990). It has also been found that indicators of socioeconomic status, such as education, income, wealth, and employment status are strongly associated with health outcomes among different populations in the United States. However, most of these studies either ignore Asian Americans or treat them as an aggregate group (Franks, Gold, and Fiscella 2003; Hummer et al. 2004; Rogers, Hummer, Nam et al. 1996), which neglects the fact that Asian Americans are a heterogeneous group in terms of nation of origin and the history of immigration to the United States. Although there are studies that focus on health outcomes *among* Asian Americans, those studies mostly focus on the impact of immigration-related factors on health (Cho and Hummer 2001; Frisbie, Cho, and Hummer 2001; Kim and McKenry 1998). The influence of socioeconomic status on health among Asian Americans has not been studied to date.

Understanding the association between socioeconomic status and health among Asian Americans subgroups is very important. First of all, health inequality is one of the main concerns of the US government. One of the two primary goals of Healthy People 2010 is to eliminate health disparities among different segments of the population (US Department of Health and Human Services 2000). Second, though the population of Asian Americans has grown dramatically, our understanding of their health is relatively poor compared to other minority groups. Third, Asian Americans are comprised of many

different ethnic groups with heterogeneous characteristics; thus, it would be less than ideal if we study Asian Americans as an aggregate group.

Therefore, the primary goal of this paper is to improve our understanding of the association between education and health among Asian Americans. Education is the main measure of socioeconomic status because, of the many indicators of socioeconomic status, education is the one used most often, and it is recognized as the most important indicator of the relationship between socioeconomic status and health (Freedman and Martin 1999; Ross and Wu 1995). I will address the following questions: 1) Does the education-health relationship for Asian American adults correspond to the previous finding that, in general, people who have more education have better health? 2) How does the education-health relationship differ among Asian American subgroups in terms of national origin and nativity?

BACKGROUND

Educational Differences in Health

Several studies have found that education remains a consistent and pervasive predictor of different kinds of health outcomes, such as life expectancy, mortality, mental health, health risks, and functional limitations. The higher the education one has, the better the health (Mirowsky and Ross 2000; Mirowsky and Ross 2003; Ross and Wu 1995; Williams 1990; Williams and Collins 1995). Prior studies have shown that education affects health outcomes indirectly through such factors as work and economic conditions, social-psychological resources, and healthy lifestyles (Mirowsky and Ross 2003; Ross and Wu 1995). First, most obviously, people who have more education have advantages in work and, thus, financial advantages. They are more likely to be employed, especially in full-time positions, and they have less economic hardship than less educated people. Compared to the less educated, they also often have more fulfilling work. These better work and economic conditions have a known positive association with well-being and health (Mirowsky and Ross 2003; Ross and Wu 1995).

Education is positively related to social support and social integration. Empirical data show that people with less education have limited access to social support and stable community ties (Mirowsky and Ross 2003; Williams 1990). Studies also show that social support is related to health outcomes (Mirowsky and Ross 2003; Ross and Van Willigen 1997). Ross and Mirowsky (2003) found that the objective existence of family relationships and the subjective sense of having someone to call on in need may increase expected longevity through reinforcing healthy habits, and by improving current health.

Moreover, people with different education levels have different health lifestyles. Studies show that people having high social status and education exercise more (Grzywacz and Marks 2001; Ross and Wu 1995; Wray, Alwin, and McCammons 2005), and people who have less education are more likely to smoke (Ross and Wu 1995; Williams 1990; Winkleby et al.1992). Besides, women who have higher education are less likely to be overweight, while high-educated men have a similar rate of being overweight compared to men who have fewer year of education (Mirowsky and Ross 2003) Overweight is a risk factor for poor health. It is related to some chronic disease, such as heart disease and diabetes (Mirowsky and Ross 2003). Smoking negatively affects health and people who smoke are more likely to report poor health (Mirowsky and Ross 2003). However, the association between drinking and education is ambiguous. Well-educated people tend to drink moderately, while poorly educated people are more likely to either abstain from alcohol or abuse it (Crum, Helzer, and Anthony 1993; Mirowsky and Ross 2003). Except drinking, well-educated people usually have a more "positive" health lifestyle then less educated people, incorporating such things as exercise, which will help maintain good health. On the other hand, poorly educated people tend to have less healthy lifestyles, which may harm their health.

The effects of education on health may be smaller for immigrants. A recent article by Walton et al. (2009) found that the educational gradient in health is small among Asian Americans. Foreign education is less rewarded in health outcome than native education (Walton, Takeuchi, Herting et al. 2009).

Health of Asian Americans and across Asian American Subgroups

There are some studies that have focused on the health outcomes of Asian Americans by different national origin group. First of all, those studies have targeted Asian Americans of different ages and it has been observed that Asian Americans have better health outcomes compared to non-Hispanic Whites. Relative to non-Hispanic Whites, elder Asian Americans as a whole have lower cancer death rates (Lauderdale and Huo 2008) and lower death rates for all subgroups (Lauderdale and Kestenbaum 2002). Asian American adults (Frisbie et al. 2001) and children (Yu, Huang, and Singh 2004) also have better health then non-Hispanic Whites. However, Cho and Hummer (2001) and Frisbie, Cho, and Hummer (2001) also found that U.S.-born Asian Americans are less healthy than their immigrant counterparts, which is consistent with previous studies on the relationship between immigration and health (Hummer, Rogers, Amir et al. 2000; Hummer, Rogers, Nam et al. 1999; Singh and Siahpush 2001).

Moreover, the results of those studies have shown that the Asian-American ethnic groups are very diverse with respect to social-demographic characteristics and health outcomes. Frisbie, Cho, and Hummer (2001) used the 1992-1995 National Health Interview Surveys and found that there is great diversity in health outcomes, age structure, education level, family income and living arrangements between Japanese, Chinese, Filipino, Korean, Asian Indian, Vietnamese, and other Asian adults; Japanese adults have the highest family income, and the proportion of Japanese adults who have less than high school education is the lowest (9.1%). Filipino adults have the highest proportion of being employed, while Japanese adults have the highest proportion of not

being in the labor force and the lowest proportion of being unemployed. Vietnamese and Other Asian adults have the most disadvantages in education and family income. Moreover, Cho and Hummer (2001) found that there is great diversity in the disability status, socioeconomic status and demographic characteristics among Asian and Pacific Islander (API) subgroups. For example, Chinese and Taiwanese adults have similar household incomes but Taiwanese adults are more educated than Chinese adults. With respect to socioeconomic status and health outcomes, Vietnamese adults are more advantaged than Other Southeast Asians, but disadvantaged when compared to all other Asian subgroups.

Furthermore, Yu, Huang, and Singh (2004) found that poverty status is substantially different among Asian-American ethnic groups' children; Asian Indian and other API children have the highest poverty rates while Filipino children have the lowest poverty rate among Asian subgroups. Asian Indian and other API children have the highest levels of reporting fair or poor health. Also, Lauderdale and Huo (2008) have found that cancer death rates are quite heterogeneous among elderly Chinese, Indian, Japanese, Korean, Filipino, and Vietnamese adults; Korean men and Chinese women have the highest cancer death rates, and Indian men and women have the lowest rates. Lauderdale and Huo (2008) concluded that "the aggregate Asian–American rate masks significant subgroup heterogeneity for many, but not all, cancer sites."

Different data sets also have different subcategories for Asian Americans, which may make it difficult to compare the health of Asian American subgroups. But in general, people from East Asia tend to have better health then people from South Asia. For

example, Japanese Americans seem to have the best health among Asian Americans while Vietnamese Americans and other Southeast Asians seems to have the worst health (Cho and Hummer 2001; Frisbie et al. 2001).

Thus, it is clear from previous literature that Asian American subgroups need to be separately examined whenever possible. Further, what is lacking in the literature are studies that examine the extent to which the health of Asian American subgroups is influenced by education, which is a powerful predictor of health. That is, the link between education and the health of Asian American subgroups remains unanswered. Is the influence of education on health mediated by work and economic conditions, social-psychological resources, and healthy lifestyles among Asian Americans? Do the mediators differ among different origin groups? I will answer these questions by first describing the association between education and health for Asian Americans and also for Asian American subgroups, and second, by examining the effects of demographic factors, socioeconomic factors, social-psychological resources, and healthy lifestyles on the education-health association among different Asian American subgroups. My overall hypothesis is that a higher level of education will be associated with more favorable health among Asian American subgroups. I also explore whether the effect of education on health among Asian American subgroups differs by national origin group because of the great diversity of Asian American profiles.

DATA, MEASURES, AND METHODS

Data

The data used in this study are taken from the National Latino American and Asian American Study (NLAAS), the first national epidemiological household survey of Asian Americans in the United States, which was part of the Collaborative Psychiatric Epidemiology Studies (Pennell, Bowers, Carr et al. 2004). It was administered between May 2002 and November 2003 to a sample of non-institutionalized Latino and Asian American adults aged 18 or older residing in households located in the coterminous United States. The final sample consist of 4649 respondents---2554 Latinos and 2095 Asian Americans. I drop all Latino cases and examine only Asian Americans in this study. The interviews were most conducted face-to-face by fully bilingual interviewers (English, Spanish, Chinese, Vietnamese, or Tagalog). Sample weights are used in the analysis due to the oversampling of specific groups as a result of the study design.

NLAAS is one of the most up-to-date comprehensive studies of Latino and Asian Americans, and it can provide important information when assessing health disparities in the United States (US Department of Health and Human Services 2000). Besides, one of the advantages of NLAAS is that, with bilingual interviewers, information of Asian immigrants who are less fluent in English is available, which may not be the case for surveys conducted in English or Spanish only.

Measures

I focused on the health of working aged Asian Americans from 25 to 64 years old, which yielded a sample size of 1659. In the NLAAS data, Asian Americans were

categorized in the following ways by self-reported race/ethnic origin: Vietnamese, Filipino, Chinese and Other Asian. Based on Census 2000 (Barnes and Bennett 2002), Other Asians may be Asian Indian, Korean, Japanese, and people from South Asian and Southeast Asian countries. Other demographic variables include age, gender, and marital status. Age is measured as a continuous variable while gender and marital status are measured as dummy variables, with female and married or cohabiting as reference categories.

Nativity is one of the important factors that is related to health outcomes. Researchers have found that U.S.-born adults are less healthy than foreign-born immigrants (Hummer et al. 2000; Hummer et al. 1999; Singh and Siahpush 2001), and the findings of Cho and Hummer (2001) and Frisbie et al. (2001) about Asian Americans also support the "healthy immigrant" literature. However, in the NLAAS, the majority of Asian American adults are foreign born. Indeed, 99.3 % of Vietnamese adults in the NLAAS are foreign born. The comparison between U.S.-born and foreign-born Asian Americans is less valid with only a few U.S.-born adults; therefore, I did not include the nativity variable in the analysis.

Two variables were available to measure health status: (1) self-rated physical health, for which the possible responses were poor, fair, good, very good, and excellent; (2) self-rated mental health, measured with the same five categories as self-rated physical health. Each category is coded into a score, with ranges from one to five. The better the health status, the higher the score assigned.

Education was a continuous variable determined by the question: “what is the highest grade of school or year of college you completed?”This was converted to number of years of education. The possible responses range from zero to seventeen or more. Education year is coded as 4 for people who reported their highest grade of school was four or less, and coded as 17 for people who reported their highest grade was seventeen or more. For people who report their highest grade of school from five to sixteen, their education years are the exact number they reported. Work status was measured with three categories: employed, unemployed and not in the labor force, with employed people as the reference group. Income was measured by annual household income in 1,000 US dollars.

Health lifestyle indicators were smoking behavior and body weight. Smoking behavior was coded as current smoker, former smoker, and never smoked or smoked only a few times. People who never smoked or smoked a few times are the reference group. Body weight was measured using body mass index (BMI). BMI is calculated as weight in kilograms divided by the square of height in meters, based on self-reported height and weight. The BMI variable was coded into four categories: underweight (BMI less than 18.5), normal (BMI=18.5-24.9), overweight (BMI=25-29.9) and obesity (BMI greater than 30). People who have normal BMI are the reference group.

Social-psychological resource indicators included variables measuring family and friend support. The family support scale was measured by three items: “how often do you talk on the phone or get together with family or relatives who do not live with you?”; “how much can you rely on spouse/ friends/ relatives who do not live with you for help if

you have a serious problem?"; and "how much can you open up to spouse/ friends/ relatives who do not live with you if you need to talk about your worries?" The friend support scale was measure by three parallel items. For the first and the second item, the possible responses were most every week, a few times a week, a few times a month, once a month and less than once a month. For the third item, the possible responses were a lot, some, don't know, little and not at all. I recoded "don't know" as a neutral response, which has three points. The points' range of each question is from one to five. Therefore, the family support scale and the friend support scale each have a range from 3 to 15, and the higher the points, the greater the social support. The Cronbach's alpha, a test of reliability, for family support is 0.69 and for friend support is 0.77. The scale for family support is fairly acceptable since 0.70 is a cutoff value of acceptable alpha, while reliability for the scale of friend support is considered to be good.

If the response of a variable was "refuse (to answer)" or "don't know", that response is coded as missing, and the only exceptions are that "don't know" was coded as the "neutral" response in the family support scale and the friend support scale. Cases with missing values in both dependent variables (physical health and mental health) were dropped, while cases with missing values in one or some of the independent variables were dropped in the regression models.

Methods

My analysis involves three phases. First, to show the heterogeneity of Asian Americans, I conduct descriptive analyses for each Asian American subgroup. Second,

since self-rated physical health and mental health are both ordinal variables, ordered logistic regression analysis is used (Gujarati 2003) to examine whether health among Asian Americans is influenced by education. I fit a series of regression models for physical health and mental health, respectively. I first estimate equations for self-reported health and education, while adding control variables in a progressive adjustment procedure (Mirowsky 1999). Model 1 includes the effect of education, age, gender and marital status. Model 2 adds controls for employment status and household income. In model 3, controls for smoking behaviors and BMI are added. In model 4, which is also the full model, I also controlled family support and friend support. Third, to examine whether the mechanisms for the effect of education on health are different among Asian American subgroups, I fit four ordered logistic regression models for both physical health and mental health for each national origin group, respectively. The series of models are the same as the models for all Asian Americans. For each subgroup, I first include demographic characteristics, then work and economic conditions, then health lifestyles, and then social support.

RESULTS

Table 1 provides descriptive statistics for the overall sample and for each Asian American subgroup. There is clear heterogeneity in the demographic and socioeconomic characteristics of Asian Americans. The average education, unemployment rate, household income, smoking behaviors, BMI and health status are significantly different across groups. Other Asians are younger and more educated, and they report more family support than Vietnamese, Chinese and Filipino adults. Since there is no information about the composition of the "other" Asian group, I cannot make further inferences about Other Asians. Therefore, throughout the rest of the analysis, I will mainly focus on Vietnamese, Filipino and Chinese Americans adults.

[Table 1 about here]

Filipinos' employment rate and household income exceed those of all other groups, and their education is almost equal to that of the Chinese, who have the highest mean education (except for Other Asians) at 14.2 years. Vietnamese are the most disadvantaged in terms of education, work and household income: their average education is 12.3 years, which is almost 2 years less than the Chinese. Almost 30% of the Vietnamese are unemployed or not in the labor force, and their median household income is only about 70% of Filipinos' median household income. These descriptive characteristics correspond to the findings of Frisbie et al. (2001) among Chinese, Filipino and Vietnamese adults.

There is also substantial diversity in health lifestyles, social support and health outcomes among groups. Chinese adults have the highest percentage of people who have never smoked or smoked only a few times (77.4%), and they also have the highest

percentage of being underweight (7.6%), which is almost 5 times higher than the rate for Filipinos. About three-quarters of Vietnamese fit in the normal weight category, while more than one-half of Filipinos are overweight or obese (54.7%). In terms of social support, excluding Other Asians, Filipinos have the highest scores of both family support and friend support, and Vietnamese have the lowest scores for each. Regarding both physical and mental health, Other Asians have the best health, and Filipinos have the second best health, while Chinese adults report the worst health. The results for health outcomes do not correspond with the findings from Frisbie et al. (2001), where Chinese adults were found to have the best self-reported health status, Filipinos the second-best health status, and Vietnamese the worst health status among these three subgroups.

To sum up, there is great diversity in the demographic and socioeconomic profiles of Asian American subgroups and in their health status, health behaviors and social support. Vietnamese are the most disadvantaged in terms of socioeconomic status and social support, but most Vietnamese have a moderate BMI. Filipinos are the most advantaged in employment status and household income, and Other Asians have the highest mean education.

[Table 2 about here]

I now test my overarching hypothesis that a higher level of education is associated with more favorable health outcomes among all Asian Americans using the models in Table 2. Table 2 shows results of ordered logistic regression models of physical health and mental health, respectively. For physical health, in model 1, the effect of education is only slightly significant when controlled for demographic characteristics. An increase of

one year of education is associated with 4.3% ($e^{.042}$) higher odds of rating one's physical health above a given category. In model 2, while the effects of work status and household income are not significant, the effect of education became insignificant after controlling for them. This result is inconsistent with the findings of Ross and Wu (1995), who showed that education is still a significant predictor of health after controlling for work and economic conditions.

Smoking behaviors, some BMI categories, and friend support are all significantly associated with physical health. The results from model 4 show that the odds of current smokers and former smokers reporting their physical health above a given category are 41.1% ($e^{-.53}$) and 34.5% ($e^{-.423}$) lower than those of people who have never smoked or only smoked a few times. Being underweight is associated with 52.2% ($e^{-.739}$) lower odds of positive health than being in the normal BMI category. Further, older people and females also reported worse physical health. Model 4 does show that gender becomes more significantly related to poorer health after controlled for social support.

Among all Asian Americans, however, the most complete models show that education is not significantly related to self-rated health. Thus, the overarching hypothesis that education is positively associated with health status is weakly supported because of the slight significance of education in model 1. The modest effect of education on physical health became insignificant after controlling for mediators, especially health behaviors and friend support, which implies that the positive association between education and physical health is mediated by smoking behaviors, BMI and friend support.

The effect of education on mental health for all Asian Americans and its mechanisms are clearer and stronger than they are for physical health. In model 1 for mental health, an increase of one year of education is associated with 10.3% ($e^{.098}$) higher odds of rating one's mental health above a given category with demographic

characteristics controlled. The education effect on health is reduced a little in model 2 and model 3, after controlling for work status, household income, smoking behaviors and BMI. In model 4, the effect of education is noticeably reduced from that in the previous model (the p-value of the education coefficient is .000 in model 1, .002 in model 2, .004 in model 3 and .026 in model 4). The effects of education on mental health appear to operate mainly through health behaviors and social support. The higher level of education one has, the more social support and better mental health one has. The overarching hypothesis that education is positively associated with health status is clearly supported in the analysis of mental health.

Marital status, smoking behaviors, some BMI categories, and both family support and friend support are significantly associated with mental health. The result from model 4 shows that people who are married or cohabiting report better mental health than their counterparts. Also, being a current smoking, being a former smoking and being underweight are all negatively associated with mental health. Further, people who are overweight actually report better mental health. The odds of overweight individuals rating their mental health above a given category is 30% ($e^{.263}$) higher than people whose BMI are in the normal category. Family support and friend support are both positively related to mental health.

Overall, my hypothesis that a higher level of education is associated with more favorable health outcomes is supported for both physical health and mental health. Education is strongly and positively associated with mental health, and the association is mediated mostly by health behaviors and social support. However, education is only modestly associated with physical health, and the association operates mostly through health behaviors and friend support. Health behaviors, especially smoking, seem to be more important mediators than work status and household income for both physical

health and mental health. Further, the effects of social support are stronger for mental health than physical health.

[Table 3 about here]

Models in Table 3 and Table 4 explore whether the effect of education on health among Asian American subgroups is different across national origin groups. Table 3 and Table 4 present ordered logistic regression models of physical health and mental health, respectively, by national origin group. As mentioned before, since information about the composition of Other Asians is missing, here I focus only on Vietnamese, Filipinos and Chinese adults.

The effects of education on physical health are very different across national origin groups based on the results for physical health presented in Table 3. For Vietnamese adults, education seems to have no effect on physical health, based on its insignificant coefficients in model 1 and model 2. However, after controlling for work status, health behaviors and social support in model 3 and model 4, education becomes modestly negatively related to physical health for Vietnamese adults ($p < 0.1$). This result is inconsistent with previous literature that states that education is positively related to health after other factors are controlled for (Ross and Wu 1995). Further, for Vietnamese adults, age, being female, not being in the labor force, being a current smoker, and being underweight are all negatively related to physical health, while being married or cohabiting and having more friend support are positively related to physical health. Currently smoking and being underweight are especially strong predictors of poor health for Vietnamese adults.

For Filipino adults, the coefficients for education are positive but not significant at all. Unlike Vietnamese adults, the effects of age, gender and marital status are not associated with Filipinos' physical health. Employment is slightly associated with positive physical health, and a higher level of household income is also associated with better physical health. The most significant factors for Filipino adults' physical health are health behaviors. Current smokers and former smokers reported worse health than people who never smoked or only smoked a few times. Further, being either overweight or obese is associated with poor physical health.

For Chinese adults, education is positively associated with physical health. Model 2 adds controls for socioeconomic characteristics; household income is positively related to health, and the effect of education is reduced in comparison to model 1. This indicates that the positive effect of education on physical health is mediated by household income; the higher the level of education one has, the higher the household income one has, and then the better physical health one has. In model 4, the effects of education become insignificant after controlling for health behaviors and social support. This suggests that the effect of education on physical health is mediated by smoking behaviors, BMI, family support and friend support. However, none of the health behaviors or the social support factors are significantly related to self-rated health for Chinese adults. In fact, in model 4, only gender is significantly associated with physical health; compared to Chinese men, the odds of Chinese women rating their health above a given category is 40% ($e^{-.513}$) lower.

[Table 4 about here]

Finally, Table 4 examines mental health for each of the three Asian American subgroups. Similar to physical health, the effects of education on mental health are very different across groups. For Vietnamese adults, education is not associated with mental health at all. In model 4, the significant factors that negatively affect mental health for Vietnamese adults are age, not being in the labor force and being current smokers; being married or cohabiting is positively associated with mental health.

For Filipino adults, education is positively associated with mental health. In model 2, adding controls for socioeconomic characteristics reduces the effect of education from model 1, which suggests that the positive effect of education on mental health is mediated by household income. In model 4, which adds controls for family support and friend support, the effect of education does not change much at all for Filipinos, which implies there is no evidence of mediators. In the full model (model 4) for Filipinos, current smokers and former smokers report worse health than people who never smoked or only smoked a few times. Further, being underweight is associated with 84.33% ($e^{-1.854}$) lower odds of reporting health above a given category than being in the normal BMI category.

For Chinese adults, education is positively and strongly associated with mental health. In model 2, which adds controls for socioeconomic characteristics, household income is positively related to health and the effect of education is reduced from model 1. This implies that the positive effect of education on mental health is partially mediated by household income. Model 4 shows that health behaviors and social support, being overweight, and having more family support are all significantly associated with better mental health. Further, the effect of education becomes somewhat weaker than in previous models, which indicates that the effect of education on mental health is partially

mediated by BMI and family support. However, education remains strongly related to mental health among Chinese adults, even in the most complete model.

In summary, the effect of education on health among Asian American subgroups is different by national origin group, as demonstrated in the analyses of both physical health and mental health. In terms of physical health, for Vietnamese adults, education is negatively related to physical health, but the effect is not very strong. For Filipino adults, education is not associated with physical health at all. For Chinese adults, the effect of education is positive on physical health, and it is mediated by household income and to some degree by health behaviors and social support. Moreover, in terms of mental health, for Vietnamese adults, the effect of education is not significant at all. For Filipino adults, education is positively related to mental health, and the relation can be partly explained by smoking behaviors and BMI, and possibly by socioeconomic status. For Chinese adults, the effect of education on mental health is strong and positive, and the effect is partially mediated by household income, BMI, and family support.

DISCUSSION

Using a nationally representative sample of Asian Americans from the NLAAS, this paper attempts to improve the understanding of Asian American's health, especially the association between education and health. Two objectives were addressed in this paper. The first was to examine whether a higher level of education was associated with more favorable health among Asian Americans, and the second was to investigate whether the effect of education on health among Asian American subgroups is different by national origin group because of the great diversity of Asian American profiles.

In the descriptive analysis in Table 1, substantial heterogeneity among Asian American adults was found, which partly corresponds with the results of Frisbie et al. (2001) that Vietnamese adults are the most disadvantaged in education and family income, and Filipino adults have the highest percentage of being employed. In terms of health status, Filipino and Other Asian adults reported better physical and mental health, while Chinese adults are the most disadvantaged in health. The descriptive results indicate the importance of taking into account the diverse characteristics of various subgroups in the study of Asian American health. That is, lumping Asian Americans into an aggregate may lead to misleading conclusions.

Findings from the ordered logistic regression analysis in Table 2 elaborate the relationship between education and Asian American adult health. My overarching hypothesis that a higher level of education is associated with more favorable health outcomes is supported for both physical health and mental health, which corresponds with the large body of literature on education and health (Mirowsky and Ross 2000; Mirowsky and Ross 2003; Ross and Wu 1995; Williams 1990; Williams and Collins 1995). In model 1, for both physical health and mental health, education is positively associated with health status, meaning the more education one has, the better health status

one has. The slightly positive effect of education on physical health is mediated by smoking behaviors, BMI and friend support. Similarly, the significant positive effect of education on mental health is mediated by smoking behaviors, BMI, family support and friend support. These findings support those in the literature stating that health lifestyle and social-psychological resources are important mediators for the positive association between education and health (Mirowsky and Ross 2003; Ross and Wu 1995).

Socioeconomic status (work status and household income) is not associated with physical health and mental health for all Asian Americans, and this finding is not consistent with previous literature (Mirowsky and Ross 2003; Ross and Wu 1995). However, when the association between education and health is analyzed separately by ethnic origin group, evidence for a significant relation between some socioeconomic status factors and health outcomes is apparent, which again indicates the importance of considering subgroups of Asian Americans.

I also explored whether the effect of education on health would be different by ethnic origin group. This was supported in the analyses in Table 3 and Table 4. Originally, I expected to find that "mechanisms" of the association between education and health outcomes would be different by ethnic origin group. However, the effect of education on health was not significant for Filipino adults' physical health, and not significant for Vietnamese adults' mental health, so no mechanisms can be discussed. Nevertheless, I still found some mediating differences across groups. For example, for Chinese adults, the positive association between education and health is mediated by household income and social support in the case of physical health, and by household income, BMI (obesity) and family support in the case of mental health. For Filipino adults, the positive association between education and mental health is mostly mediated by health lifestyle. When analyzing the association between education and health by

subgroup, a different and complex pattern of association for each subgroup appeared. Thus, it is worth emphasizing again that some different patterns may not be revealed if we treat Asian Americans as an aggregate group.

This study is subject to a number of limitations. The first limitation is that nativity was not included in the analysis due to the fact that a large majority of Asian American adults in the NLAAS are foreign born. The analysis of nativity may be possible when the data for the NLAAS II, the second wave of the NLAAS, becomes available. This will make the pooled sample size larger and possibly allow for analyses that take nativity into account. The second limitation is the ambiguity of the "Other Asian" category which was previously mentioned briefly. The descriptive analysis demonstrated that Other Asians are younger, more educated and healthier than other subgroups. However, no further inferences can be made because there is no further information about the group's composition. The third limitation is the measurement of health lifestyle. It is unfortunate that in the NLAAS, there is no measurement of exercise, which is positively related to health. Further, there are many missing cases for drinking behaviors, which are related to both education and health; therefore, I did not include variables about drinking in this study. Last, the categories of Asian Americans are not consistent across different data sets. Therefore, it is hard to make comparisons with previous literature. For example, Frisbie et al. (2001) found Japanese adults reported better health than the other seven Asian American subgroups in the 1992–1995 National Health Interview Survey. Since there is no data for Japanese adults in the NLAAS, I cannot fully compare my findings with theirs.

Despite these and other limitations, this study represents an initial effort to present a national picture of the relationship between education and health among different Asian American groups, while further considering the effects of socioeconomic characteristics,

health lifestyles and social support. As such, this study also represents an important glimpse into Asian American adult health, and more research needs to be done about this topic, especially given the continuing rapid growth and diversity of this U.S. subgroup.

APPENDIX

TABLE 1. Distributions of demographic and socioeconomic status characteristics, health behavior, social support and health status of adults aged 25-64, by origin, National Latino American and Asian American Study, 2002-2003

	VIETNAMESE	FILIPINO	CHINESE	OTHER ASIAN	TOTAL
Education in Years (Mean)***	12.3	14.1	14.2	15.0	13.9
Age (Mean)	42.7	42.7	41.6	38.4	41.4
Female (%)	54.0	53.5	52.5	50.4	52.6
Married or Cohabiting (%)	80.9	79.0	77.8	77.8	78.8
Work Status (%)					
Employed	70.2	76.1	74.3	70.5	72.8
Unemployed**	10.4	4.8	7.3	5.5	7.1
Not in the labor force	19.4	19.2	18.3	24.0	20.1
Household Income (Median in 1000 US dollars)*	42.5	81.3	71.5	69.0	65.0
Smoking (%)					
Current smoker*	17.4	15.4	11.0	11.9	13.8
Former-smoker***	14.3	23.7	11.6	15.8	16.0
Never smoke or smoke a few times***	68.3	60.9	77.4	72.3	70.2
BMI (Mean)***	22.7	26.1	23.6	25.2	24.3
BMI (%)					
Underweight (less than 18.5)***	5.1	1.4	7.6	4.2	4.8
Normal (18.5-24.9)***	75.7	44.1	63.2	51.5	59.3
Overweight (25-29.9)***	16.3	38.7	23.3	32.4	27.1
Obesity (greater than 30)***	2.9	16.0	5.9	11.9	8.8
Social Support					
Family Support[a*]	8.6	11.3	9.8	10.8	10.1
Friend Support[a]	7.6	10.4	9.5	10.7	9.5
Health					
Physical Health[b***]	3.4	3.6	3.3	3.7	3.5
Mental Health[b***]	3.7	4.0	3.6	4.1	3.9
N	413	376	491	379	1659

Notes:

a. These scales range form 3 to 15, where 3 indicates least support and 15 indicates most support.

b. These scales range from 1 to 5, where 1 indicates poor health and 5 indicates excellent health.

c. + p<0.1; * p<0.05; ** p<0.01; *** p<0.001 (These one-way Anova tests show that not all groups have the same mean or distribution)

TABLE 2. Ordered Logistic Regression of Physical Health and Mental Health of All Aisan Americans on Demographic and Socioeconomic Characteristics, Health Lifestyle and Social Support, NLAAS 2002-2003

	Physical Health				Mental Health			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Education in Years	.042 +	.036	.029	.018	.098 ***	.090 **	.084 **	.067 *
Age in Years	-.016 **	-.017 **	-.019 **	-.016 *	-.005	-.006	-.008	-.005
Female [Male]	-.249 *	-.214 +	-.301 *	-.358 **	-.372 **	-.343 **	-.396 **	-.484 ***
Married or Cohabiting [Divorced/ Seperated/ Widowed /Never Married]	.105	.053	.046	.142	.347 **	.281 +	.257 +	.372 *
Work Status [Employed]								
Unemployed		-.156	-.055	-.055		-.325	-.270	-.269
Not in the labor force		-.151	-.148	-.118		-.046	-.015	-.009
Household Income (in 1,000 US dollars)		.002	.002	.001		.002	.002	.001
Smoking [Never smoked or only smoked a few times]								
Current Smoker			-.508 **	-.530 **			-.612 **	-.638 **
Former Smoker			-.436 **	-.423 **			-.404 *	-.407 *
BMI [Normal]								
Underweight (less than 18.5)			-.776	-.739 **			-.612 **	-.542 *
Overweight (25-29.9)			.011 **	-.028			.315 *	.263 +
Obesity (greater than 30)			-.406	-.476 +			.347	.259
Family Support[a]				.012				.049 *
Friend Support[a]				.051 *				.053 *
-LL	-2251.8	-2248.0	-2216.7	-2186.4	-2144.5	-2140.1	-2105.8	-2069.6
Adjusted R2	.008	.009	.018	.021	.017	.019	.029	.037
Sample Size	1658	1658	1647	1633	1657	1657	1646	1632

Notes:

a. These scales range form 3 to 15, where 3 indicates least support and 15 indicates most support.

b. + p<0.1; * p<0.05; ** p<0.01; *** p<0.001

c. Reference categories in brackets.

TABLE 3. Ordered Logistic Regression of Physical Health on Demographic and Socioeconomic Characteristics, Health Lifestyle and Social Support by Ethnic Origin, NLAAS 2002-2003

	Vietnamese				Filipino				Chinese			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Education in Years	-.004	-.022	-.065 +	-.066 +	.053	.028	.028	.032	.096 *	.080 +	.087 *	.063
Age in Years	-.036 **	-.035 **	-.048 ***	-.044 **	-.018 +	-.015	-.017 +	-.017	-.018	-.019	-.020 +	-.017
Female [Male]	-.265	-.138	-.727 *	-.676 *	.229	.237	-.354	-.309	-.544 **	-.506 *	-.445 *	-.513 *
Married or Cohabiting [Divorced/ Seperated/ Widowed /Never Married]	.795 **	.711 *	.881 **	.969 **	.204	.137	.120	.075	-.259	-.325	-.308	-.195
Work Status [Employed]												
Unemployed		-.192	-.167	-.100		1.043 +	1.102 +	1.110		.077	.162	.109
Not in the labor force		-.623 +	-.800 *	-.674 *		-.112	-.116	-.149		-.175	-.197	-.184
Household Income (in 1,000 US dollars)		.004	.004 +	.004		.005 *	.005 *	.005 *		.003 +	.003	.002
Smoking [Never smoked or only smoked a few times]												
Current Smoker			-1.394 ***	-1.314 **			-1.068 **	-1.058 **			-.237	-.258
Former Smoker			-.662	-.493			-.920 **	-.946 **			-.042	-.080
BMI [Normal]												
Underweight (less than 18.5)			-1.387 **	-1.314 **			-1.603 +	-1.521			-.350	-.318
Overweight (25-29.9)			.009	.082			-.809 **	-.820 **			.333	.322
Obesity (greater than 30)			.228	.142			-1.191 **	-1.200 **			-.141	-.208
Family Support[a]				.024				-.044				.045
Friend Support[a]				.085 *				.001				.062
-LL	-602.4	-595.6	-577.7	-561.2	-483.4	-476.4	-450.8	-447.6	-633.7	-630.8	-625.7	-615.4
Adjusted R2	.021	.032	.060	.067	.010	.022	.065	.067	.031	.035	.040	.043
Sample Size	412	412	411	405	376	376	370	368	491	491	489	484

Notes:

a. These scales range form 3 to 15, where 3 indicates least support and 15 indicates most support.

b. + p<0.1; * p<0.05; ** p<0.01; *** p<0.001

c. Reference categories in brackets.

TABLE 4. Ordered Logistic Regression of Mental Health on Demographic and Socioeconomic Characteristics, Health Lifestyle and Social Support by Ethnic Origin, NLAAS 2002-2003

	Vietnamese				Filipino				Chinese			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Education in Years	.017	-.002	-.020	-.019	.100 *	.092 +	.107 *	.105 +	.155 ***	.137 **	.141 **	.122 **
Age in Years	-.037 **	-.035 **	-.039 **	-.036 **	.010	.013	.016	.017	-.008	-.008	-.012	-.008
Female [Male]	-.080	.060	-.264	-.241	.123	.139	-.225	-.221	-.642 **	-.675 **	-.614 **	-.680 **
Married or Cohabiting [Divorced/ Seperated/ Widowed /Never Married]	.914 **	.830 **	.875 **	.917 **	.226	.210	.211	.209	.000	-.127	-.110	-.094
Work Status [Employed]												
Unemployed		-.523	-.510	-.459		.122	.140	.133		-.004	.097	.086
Not in the labor force		-.746 *	-.790 *	-.740 *		-.136	-.144	-.148		.272	.234	.239
Household Income (in 1,000 US dollars)		.003	.003	.002		.001	.001	.001		.004 *	.004 *	.004 *
Smoking [Never smoked or only smoked a few times]												
Current Smoker			-.694 +	-.651 +			-.624	-.634 +			-.501	-.469
Former Smoker			-.340	-.282			-.650 *	-.658 *			-.261	-.367
BMI [Normal]												
Underweight (less than 18.5)			-.289	-.181			-1.843 ***	-1.854 ***			-.569	-.527
Overweight (25-29.9)			.094	.151			-.670 *	-.676			.518 +	.514 +
Obesity (greater than 30)			-.183	-.189			-.623 +	-.605			.949	.763
Family Support[a]				.030				.007				.104 **
Friend Support[a]				.034				.002				.027
-LL	-563.4	-556.2	-552.0	-543.8	-448.4	-447.7	-433.1	-430.0	-640.0	-635.6	-624.6	-608.4
Adjusted R2	.024	.037	.042	.045	.012	.014	.036	.037	.044	.051	.064	.077
Sample Size	412	412	411	405	376	376	370	368	490	490	488	483

Notes:

a. These scales range form 3 to 15, where 3 indicates least support and 15 indicates most support.

b. + p<0.1; * p<0.05; ** p<0.01; *** p<0.001

c. Reference categories in brackets.

BIBLIOGRAPHY

Barnes, Jessica S. and Claudette E. Bennett. 2002. "U.S. Census Bureau, Census 2000 brief, series C2KBR/01-16, The Asian population: 2000." Washington, DC: Government Printing Office.

Cho, Youngtae and Robert A. Hummer. 2001. "Disability status differentials across fifteen Asian and Pacific islander groups and the effect of nativity and duration of residence in the U.S." *Social Biology* 48:171-195.

Crum, Rosa, John E Helzer, and James C Anthony. 1993. "Level of education and alcohol abuse and dependence in adulthood: a further inquiry." *American Journal of Public Health* 83:830-837.

Franks, Peter, Marthe R. Gold, and Kevin Fiscella. 2003. "Sociodemographics, self-rated health, and mortality in the U.S." *Social Science & Medicine* 56:2505-2514.

Freedman, Vicki A. and Linda G. Martin. 1999. "The Role of Education in Explanining and Forecasting Trends in Functional Limitations among Older Americans." *Demography* 36:461-473.

Frisbie, Parker W., Youngtae Cho, and Robert A. Hummer. 2001. "Immigration and the Health of Asian and Pacific Islander Adults in the United States." *American Journal of Epidemiology* 153:372-380.

Grzywacz, Joseph G. and Nadine F. Marks. 2001. "Social Inequalities and Exercise during Adulthood: Toward an Ecological Perspective." *Journal of Health and Social Behavior* 42:202-220.

Gujarati, Damodar N. 2003. *Basic Econometrics, Fourth Edition*. New York, NY: McGraw-Hill. .

Hummer, Robert A., Maureen R. Benjamins, and Richard G. Rogers. 2004. "Racial and ethnic disparities in health and mortality among the U.S. elderly population." Pp. 53-94 in *Critical Perspectives on Racial and Ethnic Differences in Health in Late Life*, edited by N. B. Anderson, R. A. Bulatao, and B. Cohen. Washington, DC: National Academies Press.

Hummer, Robert A., Richard G. Rogers, Sarit H. Amir, Douglas Forbes, and Parker W. Frisbie. 2000. "Adult mortality differentials among Hispanic subgroups and non-Hispanic whites." *Social Science Quarterly* 81:459-476.

Hummer, Robert A., Richard G. Rogers, Charles B. Nam, and Felicia B. LeClere. 1999. "Race/ethnicity, nativity and U.S. adult mortality." *Social Science Quarterly* 80:136-153.

Kim, Hyoun K. and Patrick C. McKenry. 1998. "Social networks and support: A comparison of African Americans, Asian Americans, Caucasians, and Hispanics." *Journal of Comparative Family Studies* 29:313-334.

Lauderdale, Diane S. and Dezheng Huo. 2008. "Cancer death rates for older Asian-Americans: classification by race versus ethnicity." *Cancer Causes & Control* 19:135-146.

Lauderdale, Diane S. and Bert Kestenbaum. 2002. "Mortality Rates of Elderly Asian American Populations Based on Medicare and Social Security Data." *Demography* 39:529-540.

Mirowsky, John. 1999. "Analyzing Associations between Mental Health and Social Circumstances." Pp. 105-123 in *Handbook of the Sociology of Mental Health*, edited by C. S. Aneshensel and J. C. Phelan. New York: Kluwer Academic/Plenum Publishers.

Mirowsky, John and Catherine E. Ross. 2000. "Socioeconomic Status and Subjective Life Expectancy." *Social Psychology Quarterly* 63:133-151.

—. 2003. *Education, Social Status, and Health*. New York: Aldine De Gruyter.

Pennell, Beth-Ellen, Ashley Bowers, Deborah Carr, Stephanie Chardoul, Gina-qian Cheung, Karl Dinkelmann, Nancy Gebler, Sue Ellen Hansen, Steve Pennell, and Myriam Torres. 2004. *International Journal of Methods in Psychiatric Research* 13:241-269.

Rogers, Richard G., Robert A. Hummer, Charles B. Nam, and Kimberley Peters. 1996. "Demographic, Socioeconomic, and Behavioral Factors Affecting Ethnic Mortality by Cause." *Social Forces* 74:1419-1438.

Ross, Catherine E. and Mark Van Willigen. 1997. "Education and the subjective quality of life." *Journal of Health and Social Behavior* 38:275-297.

Ross, Catherine E. and Chia-Ling Wu. 1995. "The Links Between Education and Health." *American Sociological Review* 60:719-745.

Services, US Department of Health and Human. 2000, "Tracking healthy people 2010", (http://www.healthypeople.gov/About/goals.htm).

Singh, Gopal K. and Mohammad Siahpush. 2001. "All-cause and cause-specific mortality of immigrants and native born in the United States." *American Journal of Public Health* 91:392-399.

Walton, Emily, David T. Takeuchi, Jerald R. Herting, and Margarita Alegria. 2009. "Does Place of Education Matter? Contexturalizing the Education and HEalth Status Association Among Asian Americans." *Biodemography and Social Biology* 55:30-51.

Williams, David R. 1990. "Socioeconomic Differentials in Health: A Review and Redirection." *Social Psychology Quarterly* 53:81-99.

Williams, David R. and Chiquita Collins. 1995. "US Socioeconomic and Racial Differences in Health: Patterns and Explanations." *Annual Review of Sociology* 21:349-386.

Winkleby, Marilyn A., Darius E. Jatulis, Erica Frank, and Stephen P. Fortmann. 1992. "Socioeconomic-Status And Health - How Education, Income, and Ocuupation Contribute to Risk - Factors For Cardiovascular-Disease." *American Journal of Public Health* 82:816-820.

Wray, Linda A. , Duane F. Alwin, and Ryan J. McCammons. 2005. "Social status and risky health behaviors: Results from the health and retirement study " *Journal of Gerontology Series B: Psychological Sciences and Social Sciences* 60:85-92.

Yu, Stella M., Zhihuan J. Huang, and Goapl K. Singh. 2004. "Health status and health services utilization among US Chinese, Asian Indian, Filipino, and other Asian/Pacific Islander children." *Pediatrics* 113:101-107.