Why do Asian Americans academically outperform Whites? — The cultural explanation revisited[☆]

Airan Liu [a, *], Yu Xie [b, c, **]

[a] *University of Michigan, USA*
[b] *Princeton University, USA*
[c] *Peking University, China*

ABSTRACT

We advocate an interactive approach to examining the role of culture and SES in explaining Asian Americans' achievement. We use Education Longitudinal Study (ELS) 2002 baseline data to test our proposition that the cultural orientation of Asian American families is different from that of white American families in ways that mediate the effects of family SES on children's academic achievement. The results support our hypothesis, indicating that: (1) SES's positive effects on achievement are stronger among white students than among Asian-Americans; (2) the association between a family's SES and behaviors and attitudes is weaker among Asian-Americans than among Whites; (3) a fraction of the Asian-White achievement gap can be accounted for by ethnic differences in behaviors and attitudes, particularly ethnic differences in family SES's effects on behaviors and attitudes. We find that Asian Americans' behaviors and attitudes are less influenced by family SES than those of Whites are and that this difference helps generate Asians' premium in achievement. This is especially evident at lower levels of family SES.

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1. Introduction

Given their higher socioeconomic success than that of other U.S. minority groups and the population at large, Asian Americans have been characterized as a "model minority." At younger ages, this difference is manifested in Asian Americans' relatively high levels of school performance and educational attainment (Chan, 1991; Kao, 1995). Recent statistics show that, relative to U.S. Whites and other racial/ethnic groups, Asian Americans achieve higher test scores and obtain better grades (Hsia, 1988; Caplan et al., 1991; Sanchirico, 1991; Zhou and Bankston, 1998; Kao, 1995; Fejgin, 1995; Hsin and Xie, 2014), and they are more likely to complete high school and college, to obtain postgraduate degrees, and to attend first-tier universities (Xie and Goyette, 2003; Lee and Zhou, 2014). As educational achievement is highly correlated with labor market outcomes, Asian Americans' academic achievement is viewed as an important factor in their later career success and thus has been of interest to scholars in social stratification.

[☆] This study draws on survey data from the Education Longitudinal Survey 2002 (ELS) conducted by National Center for Education Statistics (NCES).
[*] Corresponding author. Population Studies Center, Institute for Social Research, 426 Thompson Street, University of Michigan, Ann Arbor, MI 48106, USA.
[**] Corresponding author. Department of Sociology, Princeton University, NJ 08544, USA.
   E-mail addresses: airanliu@umich.edu (A. Liu), yuxie@princeton.edu (Y. Xie).

Research has established two main explanations for Asian Americans' premium in academic achievement. The first explanation focuses on their advantage in structural resources. Because family socioeconomic status (SES) is perhaps the most important predictor of children's academic achievement (e.g., Duncan et al., 1972), the relatively high levels of education and income that recent Asian American immigrants have achieved are viewed as an advantage in the provision of educational resources in the home for their children (e.g., Kao, 1995; Sun, 1998; Sakamoto and Furuichi, 1997, 2002). However, studies have found that family SES alone does not fully account for Asian Americans' higher levels of educational achievement (Goyette and Xie, 1999; Kao, 1995) and, in particular, that it does not explain the academic achievement of children whose parents immigrated from Southeast Asian countries, most of whom arrived with low levels of human capital and economic resources. Moreover, it has also been observed that even Asian American children from disadvantaged family backgrounds enjoy the Asian premium in academic achievement, suggesting that access to more and better home resources is not the key to their success (Lee and Zhou, 2014).

The second explanation emphasizes the role of culture. Some scholars have argued that Confucianism exerts an influence on Asian families' strong emphasis on education (Wong, 1990; Schneider and Lee, 1990; Nagasawa and Espinosa, 1992; Stevenson and Stigler, 1992; Barringer et al., 1993; Jiménez and Horowitz, 2013). Others have posited that the selectivity of recent Asian immigrants to the U.S. contributes to their strong belief in and optimism about the value of education for social mobility (Sue and Okazaki, 1990; Kao and Tienda, 1998; Xie and Goyette, 2003). It is believed that these cultural differences from Whites shape Asian Americans' behaviors and attitudes in school and equip them with stricter work ethics and higher educational aspirations, all of which benefit their academic achievement (Hsin and Xie, 2014).

Most existing studies on Asian Americans' achievement premium treat SES and culture as two discrete factors. Implicit in this approach is an assumption that SES and culture influence Asian Americans' achievement in independent and additive ways. However, culture and SES's effects can be interactive rather than additive. Specifically, culture can serve as a moderator of the effects of family's SES on children's educational achievement, which makes family SES's effects on children's educational achievement incomparable across Asian Americans and other groups. In fact, recent qualitative work has hinted at this possibility. For example, Lee and Zhou (2014), in their most recent study, observed that even Asian American children from disadvantaged family backgrounds enjoy the Asian premium in academic achievement, suggesting that the effects of family's SES on achievement may be less significant among Asian Americans than among Whites. Nevertheless, to our best knowledge, no quantitative work has yet systematically examined the potential interactive relationship between culture's and SES's effects on Asian Americans' achievement premium.

In this paper, we propose that cultural factors and family's SES influence Asian Americans' achievement premium interactively and that the cultural orientation of Asian Americans compared to that of white Americans acts as a moderating factor in the effects of SES on educational achievement. In our work, we do not measure culture by variables pertaining to beliefs and values, as has been done in previous research, but we capture the influence of culture by looking at the relationship between family SES on the one hand and achievement and education-related behaviors and attitudes on the other hand. Drawing on prior work by psychologists Stevenson and Stigler (1992), we conjecture that SES has weaker effects on academic achievement for Asians than for Whites in the U.S. If this is true, the achievement difference between Asian Americans and Whites is larger at low than at high levels of SES.

Our study fills a gap in the current literature by examining the heterogeneous effects of family SES on children's academic achievement across Asians and Whites in the U.S. We argue that the weaker association of SES and achievement among Asian Americans relative to Whites epitomizes cultural differences and accounts for much of the observed overall achievement gap. To test our hypotheses, we analyze data from the 2006 Educational Longitudinal Studies (ELS).

2. Family SES vs. culture: two explanations for the Asian-White achievement gap

Currently, there are two main sociological explanations for the achievement differences between Asian-Americans and Whites. The first explanation attributes Asian-Americans' academic success to the socioeconomic, or the structural, advantage of their families and parents. Though most immigrants from Asia to the U.S. prior to World War II arrived to meet low-wage, low-human-capital labor needs, changes since then in immigration laws and in the demand for scientific and technical personnel have meant that more recent Asian immigrants are likely to be well-trained professionals (Cheng and Bonacich, 1984; Nee and Wong, 1985). While this selection may contribute to the educational achievement of high-SES Asian American immigrants' children (Barringer et al., 1993), it fails to account for the high levels of achievement among children whose parents immigrated from Southeast Asian countries, such as Vietnam, Laos, and Cambodia, often arriving with little economic or human capital. In addition, recent studies have found that academic differences between white and Asian American children persist even after controlling for family structural characteristics such as parental education, household income, and family composition (Harris et al., 2008).

The view that Asian Americans' advantage in educational achievement is rooted not so much in family SES as in the high value placed on education in Asian cultures has gained traction in recent studies. Researchers have presented evidence that Asian American immigrants carry their home countries' pro-educational cultural values with them and that these beliefs shape their daily home practices to the educational advantage of subsequent-generation Asian Americans (Portes and Zhou, 1993; Zhou and Bankson, 1994; Portes and Fernández-Kelly, 2008). For example, evidence indicates that, compared to parents in other U.S. racial/ethnic groups, Asian American parents are more highly motivated to make sacrifices for their children's education, to put more emphasis on educational effort and attainment, and to have higher standards for children's academic

achievement after controlling for SES (Sun, 1998; Wong, 1990; Corwyn and Bradley, 2008; Schneider and Lee, 1990). In their most recent study, Hsin and Xie (2014) also find that Asian American students outperform Whites in school because Asian American students tend to have stricter work ethics and higher educational aspirations than white students.

3. Culture's effects: intercept effects vs. interaction effects

As we have discussed above, most of the current studies treat structural (socioeconomic) factors and cultural factors as two competing explanations for Asian-Americans' superior achievement. A typical research strategy for gauging effects on educational achievement across racial/ethnic/immigrant groups in the U.S. has thus been to disentangle structural (SES) from cultural factors (values, beliefs). This approach, which generally relies on multiple regression analyses to separate out the effects of one factor by controlling for the others, is known as statistical adjustment. It implicitly assumes that the effects of structural and cultural factors are additive, with cultural factors represented by differences in the intercept by racial/ethnic/immigrant groups, i.e., intercept effects. In other words, by controlling for structural differences, the approach tests whether Asian Americans have an overall advantage in academic achievement because they have higher SES. The achievement differences that remain after controlling for SES characteristics are interpreted as suggesting cultural effects (e.g. Kao and Tienda, 1998; Hao and Bonstead-Bruns, 1998; Goyette and Xie, 1999). This way of measuring cultural difference is also called the residual approach, which is a conventional method for studying group differences in social science (Cole, 1979).

Though the residual approach has long been employed to examine the effects of culture and SES on Asian Americans' achievement premium and has yielded fruitful findings, its implicit additive assumption, without further scrutiny, prevents us from fully capturing the way in which culture produces the achievement premium for Asian Americans. In particular, it keeps us from detecting how SES and culture may impact achievement interactively and, if they do, its sociological implications.

The additive, i.e., intercept, approach assumes that (1) the effects of SES on achievement are the same for Whites and Asian Americans, and, equivalently, (2) the effects of cultural differences on achievement are constant across SES levels. In other words, it hypothesizes that cultural and SES effects are discrete and parallel to one another and can be added together to explain Asian Americans' achievement advantage. Graphically speaking, the additive, or residual, approach assumes that either A or B in Fig. 1 is true.

As the additive assumption is implicitly embedded in the residual approach, few studies have examined the assumption empirically. However, we believe that the additive assumption deserves more careful and serious consideration and
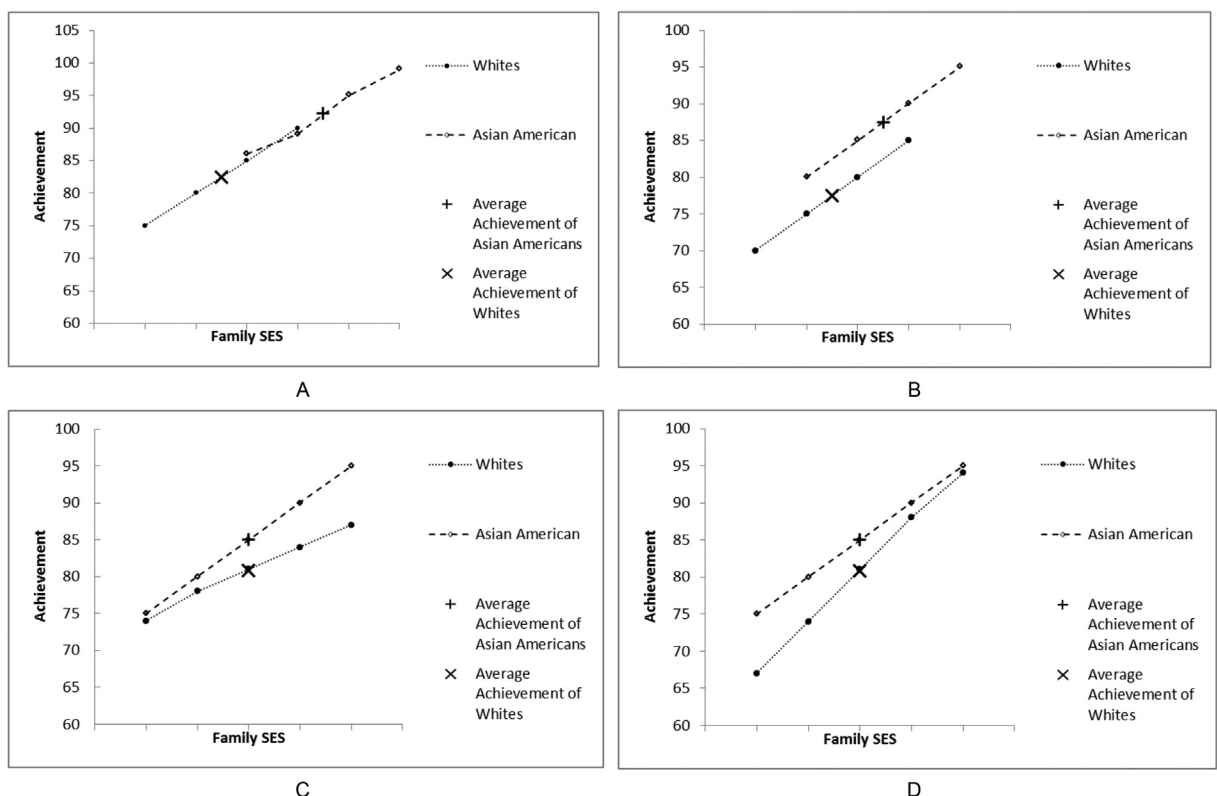

Fig. 1. Four possibilities of family socioeconomic status and achievement difference (adjustment has been made for School effects).

examination, since if it is violated, the traditional statistical adjustment strategy, the residual approach, will not adequately characterize the achievement difference between Asian Americans and Whites. One example of how the assumption does not hold is the fact that Asian-White achievement differences may be negligible at high SES but large at low SES, which is not what the traditional approach would show. Thus, a simplistic characterization of the achievement difference pattern by the traditional additive approach may prevent us from better understanding the factors and mechanisms that give rise to Asian Americans' achievement premium. For example, there may exist such an interaction pattern between SES and race that even when Asian Americans and Whites have identical SES distributions, Asians still enjoy an aggregate advantage (see C and D in Fig 1). In other words, we are interested in examining a previously overlooked sociological explanation that cultural factors may work, rather than in parallel, interactively with structural factors to produce the achievement difference. Specifically, we evaluate the hypothesis that culture produces Asian Americans' achievement premium over Whites not only by boosting Asian Americans' average educational motivation and efforts, as argued by past literature, but also by moderating family SES's effects. This approach necessitates a close examination of achievement differences between Asian Americans and Whites across SES levels, as we will show in this paper.

To better gauge the effects of culture and family SES, we distinguish two types of cultural effects on the Asian-White educational achievement gap as the intercept (or residual) effect and the interaction effect, with a particular emphasis on and examination of the latter. In this case, the intercept effect is the intercept difference between the Asian and white groups captured by the coefficient of race after statistical adjustment. The interaction effect refers to cultural differences in the strength of the association between family SES and the outcome variable of educational achievement, with the total cultural effect being a combination of intercept and interaction effects.

Broadly speaking, four potential scenarios may explain the observed Asian-White academic achievement gap (Fig. 1). The first possibility is that the achievement advantage is rooted in structural differences in family SES between Asian Americans and Whites, with Asian Americans more densely distributed around high SES levels (A in Fig. 1). The second possible scenario is that in addition to the achievement difference due to Asian-White SES distributional differences, Asian Americans maintain a culture-based achievement premium throughout the entire SES distribution (B in Fig. 1). This is what the additive approach implicitly assumes — that the effects of cultural factors on Asians' academic premium can be added to the effects of structural factors independently. The third possibility is that the effects of SES on achievement are stronger for Asian Americans than for Whites, resulting in a smaller achievement gap at the lower end of the SES distribution than at the higher end (C in Fig. 1). The fourth possibility, which is what we are particularly interested in and will test in this study, is that the effects of SES on achievement are weaker for Asian Americans than for Whites, resulting in a larger achievement gap at the lower end of the SES distribution than at the higher end (D in Fig. 1).

Our work examines whether and how structural and cultural factors work interactively to give rise to the achievement gap between Asians and Whites, focusing on the fourth scenario. By estimating both the intercept and the interaction effects, the analysis aims to more accurately identify factors contributing to the Asian American-White achievement difference and, more broadly, to further explicate causal mechanisms behind educational achievement in the U.S.

4. The sociological significance of culture as an SES moderator

Why might SES have different impacts on academic achievement for Asian Americans than for Whites? To answer this question, we must first take a step back and think about the mechanisms through which SES influences one's achievement.

Past research offers potential explanations. Ever since Blau and Duncan's (1967) pioneering empirical work found a high correlation between occupational attainment and family social standing, sociological scholars have set out to find reasons for this association. The Wisconsin Model, developed by Sewell and his colleagues (e.g., Sewell et al., 1969), elaborates and extends the basic Blau-Duncan model by incorporating social psychological factors, such as attitudes and aspirations, in explaining the association between family SES and achievement. Basically, the Wisconsin Model posits that family SES affects children's achievement by influencing their attitudes and behaviors.

Recent advancements in social science research have provided further support for this model by extending our understanding of the role of attitudes and behaviors in social stratification and achievement. For example, sociological studies have found that social-emotional attributes such as valuing hard work and having high aspirations are closely tied to children's success at school (Hsin and Xie, 2014) and that socio-psychological pathways are key in transmitting family members' characteristics to children, particularly by affecting children's educational outcomes (Heckman, 2006; McLanahan and Percheski, 2008).

Fruitful findings from other social science disciplines also shed light on the significance for cognitive and academic performance of social-psychological attributes such as motivation, locus of control, aspiration, and self-discipline. For instance, psychological studies of academic performance have shown that traits like self-discipline can make up for shortcomings in IQ (Duckworth and Seligman, 2005, 2006), while economic studies have documented that motivation and preference influence performance on cognitive and academic tests (Borghans et al., 2008; Heckman et al., 2006; Claessens et al., 2009). Given this body of work, it is reasonable to assume that children's attitudes and behaviors are important pathways through which family socioeconomic advantage or disadvantage affects their educational achievements. In other words, an SES gradient in children's academic behaviors and attitudes may account for the SES gradient observed in children's achievement.

Culture affects individuals' behaviors and attitudes. Sociologists have conceptualized culture in numerous ways, but two perspectives are predominant (Small et al., 2010). Some scholars conceptualize culture as a repository of values, beliefs and

preferences that motivate people's behaviors (Hitlin and Piliavin, 2004; Kaufman, 2004), while others view culture as a repertoire or toolkit of symbols, behavioral strategies, and decision sets that individuals make use of in their daily lives (Swidler, 1986; DiMaggio, 1997). Though these two perspectives on culture differ in whether or not it directly dictates individuals' attitudes and behaviors, they agree that culture significantly influences or shapes them.

In studying culture as a potential explanation for the Asian-white gap in educational achievement, we make use of two key theoretical features of culture. First, culture is a multilevel concept. It can account for differences in individual behaviors only if patterns in individual-level behaviors are common at the group level (Hitlin and Piliavin, 2004; Polavieja, 2015). That is to say, one can only use culture as an explanatory factor for individual-level behaviors if there is sufficient similarity among individuals belonging to the same cultural group.

Second, culture should not be defined within a single dimension by a univariate variable. Rather, it encompasses a comprehensive worldview that helps individuals understand the social world around them. Thus, culture may significantly shape or constrain how a child views his/her family socioeconomic background and how that background may facilitate or hamper his/her educational outcomes. Psychological studies have suggested that mindsets or implicit beliefs will influence children's perception of their potential and ability and thus their development and achievement (Dweck, 2006; Dweck et al., 1995). Specifically, children with an implicit belief that intelligence and ability is fixed and that socially relevant traits are unchangeable have been shown to interpret academic challenge as a sign that they lack intelligence, and their academic performance is more likely to suffer when facing adversities in life. In contrast, those with a mindset that says ability is malleable, responding to effort and the process of learning, are more resilient and can even achieve improvement under challenging conditions, such as a disadvantaged family background (Dweck, 2006; Yeager and Dweck, 2012).

Different cultures shape individuals' mindsets differently. For example, in contrast with Western society, in East Asian societies, the malleability of human ability and behavior is a central precept in Confucianism and is widely accepted (Munro, 1977). Effort is thus seen as a major avenue to improvement and achievement and is highly emphasized for success in East Asian cultures. In fact, empirical studies have corroborated these cultural differences in perception of effort, ability and achievement between East Asian and American societies. In a study of children's achievement, Stevenson and Stigler (1992) found that compared with American mothers, Chinese and Japanese mothers assigned greater importance to effort than innate ability for leading to academic success. These cultural differences in mindsets are also observed among children. While American children place more emphasis on innate ability as a key success factor, Chinese and Japanese children believe continuous effort is much more important (Stevenson and Stigler, 1992).

For our study, one important implication of the above discussion is that ethnic culture may modify the relationship between social class and academic behaviors and attitudes, accounting for Asian-White achievement differences. Past studies have well documented that children, along with their parents, differ in academic attitudes and behaviors by social class (Calarco, 2011, 2014; Khan, 2011; Lubrano, 2004; Lareau, 2011). Middle- and upper-middle-class parents and students, in contrast to their lower-class peers, are much more likely to adopt the attitudes, beliefs and practices which are beneficial to academic success. However, most of these studies have focused on White or Black populations. It is implicitly assumed that the pattern of such stratification and the strength of the relationship is more or less the same across different ethnic groups.

Due to differences in ethnic cultures, the strength of the above relationship between social class and academic attitudes and behaviors may differ across different ethnoracial groups, as between Whites and Asian Americans. In particular, as we hinted earlier and will discuss below, academically oriented attitudes and behaviors could be more differentiated by social class among Whites than among Asian Americans. The ethnoracial differences in the relationship can further translate into an overall advantage for Asian Americans over Whites, as we will show later.

In this paper, we view culture as a toolkit for individuals' behaviors (Swidler, 1986). Specifically, we propose that cultural differences between Asians and Whites modify the relationship between family SES and academic attitudes and behaviors for these two groups. In doing so, we assume that culture is a multi-level concept and is better measured at the group level.

Several cultural attributes may contribute to the ethnic difference in the relationship between SES and behaviors and attitudes between Asian Americans and Whites. To begin with, numerous studies in cultural psychology have shown that the East Asian concept of self views individuals as more malleable than does the Western Caucasian concept of self (cf. Chiu et al., 1997; Heine, 2001; Neisser et al., 1996). In East Asian cultures, individuals are expected to achieve certain social outcomes by molding themselves (Morling et al., 2002). Also, it is widely believed in East Asia that achievement is a function of consistent practice and single-minded effort rather than inborn ability or family origins. Add to these beliefs the strong emphasis that Confucianism places on education and effort-based achievement, and it is not surprising that many East Asians believe that children from a disadvantaged social background are capable of success that equals that of peers from superior social backgrounds as long as they are willing to put in persistently strong effort. In particular, many Asians subscribe to the notion that social mobility can be obtained through education (Stevenson and Stigler, 1992; Chen and Stevenson, 1995; Xie and Goyette, 2003). Though these beliefs originated in East Asia, it is possible they have spread to other Asian ethnic groups in the U.S (Hao and Bonstead-Bruns, 1998; Lee and Zhou, 2014).

The strength of SES effects on attitudes and behaviors may also be tempered for Asian Americans by the forces of selectivity in international immigration. Immigrants, a self-selected group of people who often have high motivation to achieve, are likely to expect upward mobility for themselves or their offspring in the receiving country even if they start low on the socioeconomic ladder (Ogbu, 1978; Kao, 1995). Such optimism may translate into resourceful and strategic behavior designed to overcome obstacles and advance social status. It may also be transmitted to the children of immigrants, increasing

Table 1
Descriptions of variables.

Demographic controls	
SES	SES Index from ELS. It is constructed based on mother's and father's education, mother's and father's occupation, and family income.
Immigrant generation	First Generation is the baseline group.
Intact family	Whether children live in a family with both mother and father. Non-intact family as the reference group (coded as 0).
Number of siblings	Number of Siblings the 10th grader has.
Female	Female is coded as 1. Male is the reference group (coded as 0).
Held back in school	Coded as 1 if the 10th grader had ever been held back for a grade.
Behaviors and attitudes	
Hard working	Constructed from students' responses to two questions: (1) Works as hard as possible when studies; (2) Does best to learn what studies.
Importance of good education	Student's rating on the importance of good education.
Students' educational expectation	How far in school the 10th grader wants to go.
Parents' educational expectation	How far in school parents want the 10th grader to go.
Math class behavior	Composite measurement based on students' behaviors in math class. Reported by math teacher.
Achievement	
Math test	Mathematics standardized score, ranging from 10 to 90.
Reading test	Reading standardized score, ranging from 10 to 90.
10th grade overall GPA	GPA for all 10th grade courses, ranging from 0 to 4.
10th grade academic GPA	GPA for all academic 10th grade courses, ranging from 0 to 4.

their expectations of upward social mobility via high academic achievement, regardless of their social backgrounds (Caplan et al., 1992; Zhou and Bankston, 1998).

Another cultural factor to consider, as Sue and Okazaki (1990) argue, is that Asian-Americans may face disadvantages in pursuing social status through other means but view education as an equal-opportunity, objectively measured, and valued means of upward mobility – a means that may have particular salience for Asian American families in low-SES situations (Xie and Goyette, 2003).

Another side-effect of Asian American culture that may weaken the impact of SES on academic performance is the U.S. stereotype of Asian Americans as high achievers (Jiménez and Horowitz, 2013; Lee and Zhou, 2014). This stereotype, although emanating from cultural characteristics, may magnify the culture-based expectations of Asian American parents and children for high levels of success in relation to people with loftier social standing, to native-born Americans, and to other Asian Americans. As this stereotype is mainly based on ethnoracial category rather than family background, every Asian student, regardless of socioeconomic status, is likely to be influenced by it.

In sum, the above distinct features of the culture shared by Asian Americans as an ethnic group can modify the relationship between SES and academically beneficial attitudes and behaviors. Compared with Whites, the distribution of beliefs and behaviors important to academic success may be less differentiated by social class among Asian Americans as an ethnic group.

In light of the above discussion, we argue that a significant proportion of the overall Asian-White achievement difference is attributable to cultural differences in the association between SES and educational achievement being weaker for Asian Americans than for Whites. To test our proposition, we make use of the following three hypotheses. First, certain behaviors and attitudes are important to academic success. Second, the distribution of these attitudes and behaviors by family SES differs between Asian Americans and Whites, being less stratified by family SES among Asian Americans than among Whites. In regression terms, this is equivalent to hypothesizing that the SES slope coefficients on attitudinal or behavioral outcomes are smaller for Asian Americans than for Whites. Third, the patterns suggested by the above two hypotheses give rise to the overall Asian-White difference in the relationship between family SES and achievement.[1]

5. Data and measurements

Our statistical analyses draw data primarily from the Education Longitudinal Study (ELS) of 2002. Conducted by the National Center for Education Statistics (NCES), the ELS is a nationally representative longitudinal survey of U.S. high school students with a two-stage sampling design: in the 2002 baseline survey, 750 schools were selected, and then about 15,000 10th-grade students were selected randomly from all the schools. In addition to surveying students, the 2002 ELS surveyed parents, math and English teachers, school principals, and heads of school libraries or media centers, asking questions about students' and parents' beliefs, attitudes, and behaviors, as well as students' daily behaviors in school (reported by their teachers). Also, the ELS oversampled Asian students, greatly facilitating White-Asian group comparisons for this study. Our

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[1] In the results section, we present results in deductive order. We begin by showing the ethnoracial differences in the relationship between family SES and achievement (hypothesis (3)); we then present the ethnoracial differences in the relationship between family SES and attitudes and behaviors (hypothesis (2)); finally, we show that these attitudes and behaviors are important to achievement (hypothesis (1)).

Table 2

Descriptive statistics on parents and students' demographic and socioeconomic characteristics, behaviors, attitudes, and achievement: Asian Americans and Whites from ELS 2002 10th grade.

Variable	Whole sample		Asian		White	
	Mean	SD	Mean	SD	Mean	SD
Demographic controls						
SES	0.19	0.71	0.00	0.87	0.25	0.68
Immigrant generation						
Second generation	0.09		0.46		0.03	
Third generation	0.82		0.09		0.94	
Intact family	0.67		0.70		0.67	0.47
Number of siblings	1.79	1.52	1.96	1.78	1.77	1.47
Female	0.50		0.50		0.05	0.22
Held back in school	0.09		0.07		0.50	0.50
Behaviors and attitudes						0.09	0.29
Hard working	2.76	0.78	2.90	0.76	2.74	0.78
Importance of good education	2.82	0.42	2.86	0.36	2.81	0.42
Students' educational expectation	16.12	1.70	16.24	1.61	16.10	1.72
Parents' educational expectation	16.20	1.45	16.51	1.41	16.15	1.45
Math class behavior	4.16	0.61	4.26	0.64	4.15	0.60
Achievement						
Math test	53.57	9.31	54.01	10.62	53.50	9.08
Reading test	53.10	9.55	50.54	10.06	53.51	9.40
10th grade overall GPA	2.88	0.79	2.97	0.82	2.87	0.79
10th grade academic GPA	2.76	0.87	2.88	0.89	2.75	0.86
sample size	8978		1248		7730	

Note: (1) Missing values are excluded for calculation of means; (2) Based on unweighted data.

sample was restricted to white and Asian students whose parents completed the questionnaire and were enrolled in schools with both Whites and Asians present. This yielded an analytical sample of 8978 students.

We use multivariate imputation to deal with all missing values from ELS variables of interest, which are described in Table 1. The primary dependent variables are scores on a standardized mathematics test, scores on a standardized reading test, overall GPA in the 10th grade, and academic GPA in the 10th grade. Math test score, measured by the IRT T-score provided by NECS, is a standardized transformation of the IRT ability estimates based on the population and is the key dependent variable throughout our main analysis, as it provides a more objective and norm-referenced measurement of a student's academic achievement.

For demographic control variables, we include student's gender, family SES, immigrant generation, intact family (1 = lives with both mother and father), number of siblings, and ever held back in school (1 = held back). Family SES, an index constructed by NCES, is a composite based on mother's and father's education, both parents' occupations, and family income, with each component equally weighted. It is standardized with a mean of 0 and a standard deviation of 1 for the entire sample[2] (NCES 2002).

We use five variables to measure student behaviors and attitudes toward education and academic achievement. *Hard Working* measures level of perseverance and effort from two questions self-rated by students on a four-point scale (1 = almost never, 2 = sometime, 3 = often, and 4 = almost always): How often do you work as hard as possible when you study? How often do you do your best to learn what you study? We average the ratings for the two questions for a composite score ranging from 1 to 4, with a higher score indicating higher self-rated effort. *Importance of Good Education* is measured using student ratings of this from 1 to 3, with a higher score indicating a greater value (1 = not important, 2 = somewhat important, 3 = very important). *Students' Education Expectation* and *Parents' Education Expectation* (for their children) are measures coded as expected years of schooling: less than high school graduation = 11; high school graduation or GED only = 12; attend (or complete) 2-year college or attend college with incomplete degree = 14; graduate from college = 16; obtain master's degree or equivalent and above = 18. Finally, *Behavior in Math Class* is math teacher's ratings on a five-point scale of student's classroom behaviors[3] based on questions about how often (1 = Never, 2 = Rarely, 3 = Some of the time, 4 = Most of the time, 5 = All of the time) the student (1) completes homework, (2) is absent from class, (3) is attentive in class, and (4) is tardy for the class. We average the ratings for all questions for a composite score from 1 to 5, with a higher value indicating more disciplined behavior.

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[2] As family's SES is constructed from both parents' education, occupation, and family's income, we do not take separate measurements on these as controls in our analysis.

[3] As our key dependent variable is math standardized test score, we use math teacher's evaluations on classroom behaviors.

6. Descriptive results

Table 2 presents the summary descriptive statistics for the entire sample and separately for Asian American and white students. First, although we find that Asian Americans overall have lower SES than Whites (with the average SES index score being 0 for Asian Americans and 0.25 for Whites), they enjoy an achievement premium over Whites in their scores on the math standardized test, overall GPA, and academic GPA. Asian American students have lower scores on the standardized reading test, which for many resulted from their status as first-generation Americans.

Asian Americans and Whites also differ in behaviors and attitudes related to education. Compared to white students, Asian American students give themselves higher self-ratings for hard work and place higher value on a good education. Asian American students and parents hold higher expectations for educational attainment than their white counterparts. In addition, math teachers rate Asian American students higher in disciplined class behavior than they do Whites.

In short, the descriptive statistics in the study are consistent with prior literature on Asian Americans' educational achievement advantage. Moreover, the summary statistics indicate that family SES is not an adequate explanation for Asian American students' higher academic achievement relative to that of Whites.

7. Regression analysis

To test our hypothesized explanations for the Asian American advantage, we use regression analysis with a school-level, fixed-effects model to fully control for a school's characteristics. First, we examine whether or not the effects of family SES on educational achievement differ between Asian Americans and Whites. Second, we analyze, as pathways linking family SES and academic outcomes, how the influences of family SES on school-related behaviors/attitudes, i.e., students' behaviors and attitudes as well as parents' attitudes, differ between Asian Americans and Whites. Third, we examine the relationship between these behavioral/attitude measures and students' academic achievement. In particular, we are interested in whether the observed Asian-White differences in behaviors and attitudes account for the Asian-White achievement gap. We further
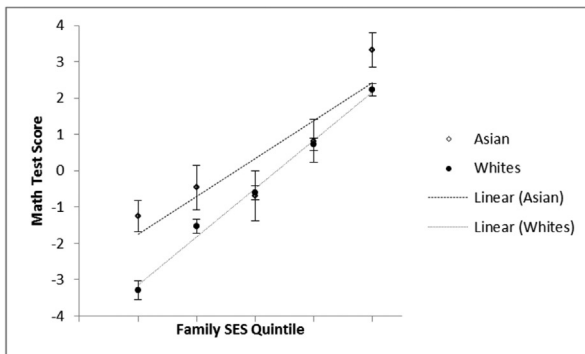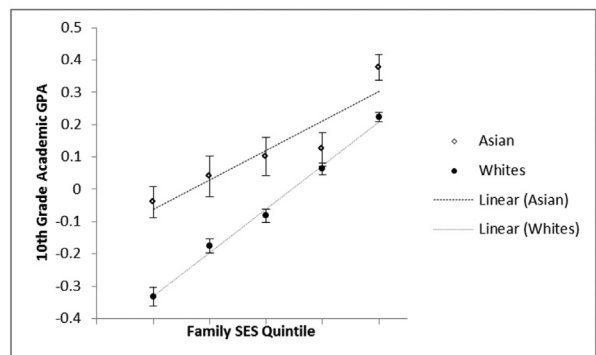

(1) Math Standardeized Test Score
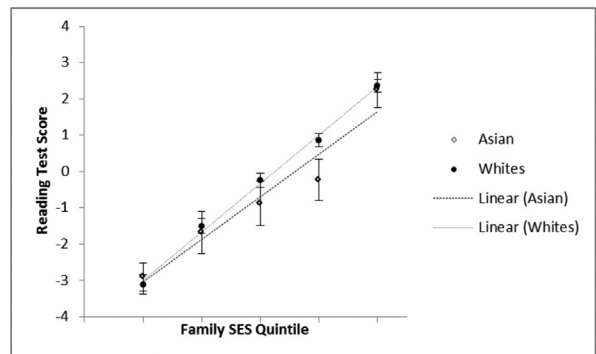
(2) Reading Standardeized Test Score
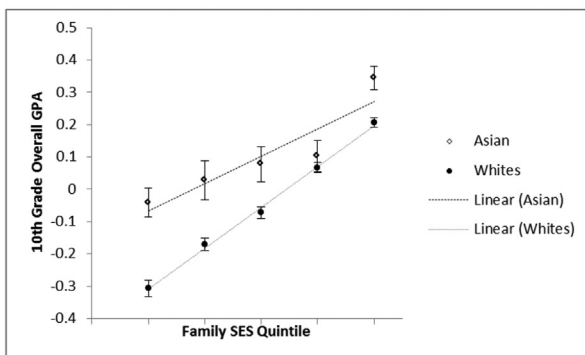
(3) 10th Grade Overall GPA

(4) 10th Grade Academic GPA

Fig. 2. Achievement and family SES: Asian Americans and Whites, ELS 2002 10th grade (adjustment has been made for school effects).

Table 3
Coefficients from school-fixed effects regression of achievement on selected variables: Asian Americans and whites from ELS 2002 10th grade.

| | 1 | 2 | 3 | 4 |
	Math test	Reading test	10th grade overall GPA	10th grade academic GPA
Asian	1.71 (0.48)***	−0.43 (0.50)	0.24 (0.04)***	0.28 (0.05)***
SES	3.73 (0.17)***	3.70 (0.17)***	0.34 (0.02)***	0.38 (0.02)***
Asian# SES	−0.95 (0.34)***	−0.38 (0.35)	−0.14 (0.03)***	−0.16 (0.03)***
2nd generation	0.50 (0.43)	1.62 (0.44)***	−0.04 (0.04)	−0.07 (0.04)
3rd generation	0.42 (0.47)	1.64 (0.48)***	−0.10 (0.04)**	−0.12 (0.05)**
Intact family	0.96 (0.19)***	1.02 (0.20)***	0.21 (0.02)***	0.21 (0.02)***
Number of siblings	−0.03 (0.06)	−0.09 (0.06)	−0.00 (0.01)	−0.00 (0.01)
Female	−1.58 (0.18)***	1.09 (0.19)***	0.27 (0.02)***	0.34 (0.02)***
Held back in school	−6.17 (0.31)***	−4.99 (0.32)***	−0.41 (0.03)***	−0.44 (0.03)***
Constant	53.06 (0.50)***	50.39 (0.52)***	2.64 (0.05)***	2.50 (0.05)***
Observations	8978	8978	8299	8288
R-squared	0.13	0.12	0.17	0.17

Note: Standard errors in parentheses, ***p < 0.001, **p < 0.01, *p < 0.05.

carry out a counterfactual analysis to answer the following question: To what degree do the Asian-White differences in family SES effects on school-related behaviors/attitudes account for the observed Asian-White achievement gap?

7.1. SES, ethnicity and academic achievement

Fig. 2 depicts the relationship between family SES and academic achievement for Asian Americans and Whites. The steeper slope for the Whites indicates a stronger positive effect for SES on achievement. The different inclinations of the fitted lines, together with Asian Americans' greater value in the intercept of the regression line, indicate that the Asian-White achievement gap varies across family SES levels − being greater at the lower than at the upper end of the distribution.

Table 3, which presents the estimated coefficients for regression models corresponding to Fig. 2, demonstrates how basic demographic control variables and the interaction between race and family SES explain the Asian-White achievement differences. Model specifications are the same across the four models, with varying dependent variables of academic achievement.

The negative and significant coefficients of the interaction terms of family SES and Asian race in Model 1 (math test as the achievement outcome variable), Model 3 (overall GPA as the achievement outcome), and Model 4 (academic GPA as the achievement outcome) confirm weaker positive effects of SES on achievement for Asian American than for white students. Though the insignificant negative interaction term in Model 2 (reading test as the achievement outcome) does not align well with our hypothesis, it may be impacted by the immigrant background of the Asian American students, as discussed above. In general, the results support our hypothesis that SES affects educational achievement less strongly among Asian Americans than among Whites.

7.2. SES, ethnicity and behaviors/attitudes

Fig. 3 depicts the relationship between family SES and measures of behaviors/attitudes regarding education for Asian Americans and Whites. The patterns of the relationship between SES and behaviors/attitudes in Fig. 3 are similar to those in Fig. 2, with the slopes of the fitted lines less steep and the intercepts greater for Asian Americans than for Whites. The differences in slope and intercept indicate that the Asians' advantage over Whites in behaviors/attitudes is greater at lower than at higher levels of family SES. In fact, at very high SES levels, Whites gain the advantage in measures of parent and student educational expectations.

Table 4 presents the results from regression analyses corresponding to Fig. 3. The five models in Table 4 have the same specification with different outcome variables for attitudes/behaviors. As highlighted in the table, the interaction term of race and family SES is negative and significant across all five models. These results support our hypothesis of a weaker effect for SES on behaviors/attitudes among Asian Americans than among whites.

### 7.3. Behaviors, attitudes, and achievement difference

To better understand how behaviors and attitudes influence academic achievement and also the extent to which the Asian American-White difference in the association between SES and these measurements accounts for the observed Asian-White achievement difference, we first turn to regression analysis and, further, carry out a counterfactual analysis. We elect to use
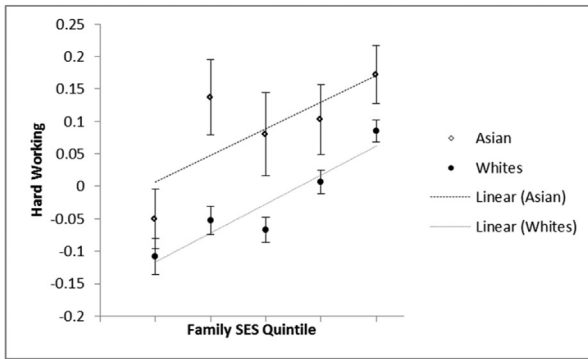
(1) Hard-Working
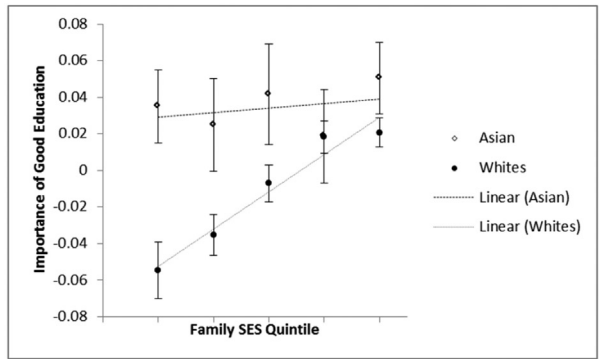
(2) Importance of Good Education
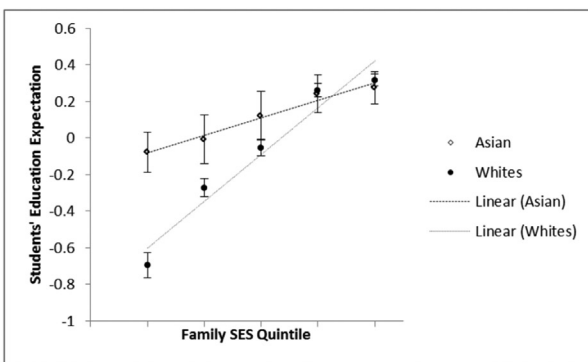
(3) Students' Education Expectation
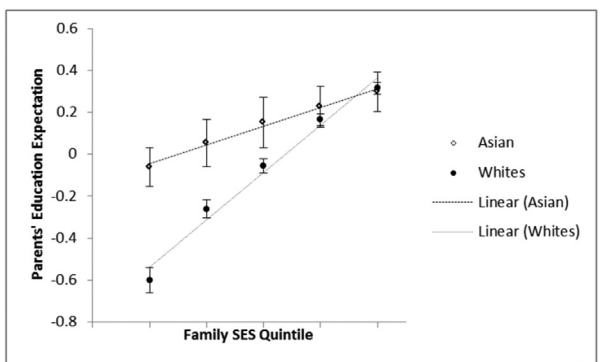
(4) Parents' Education Expectation
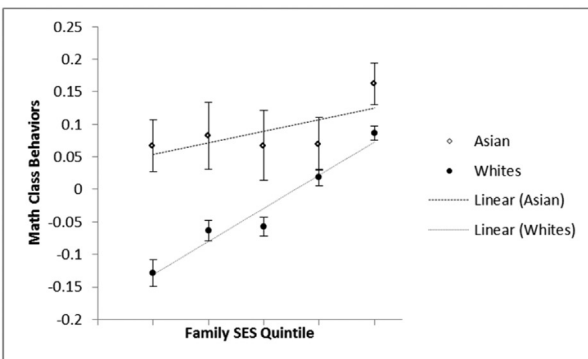
(5) Math Class Behaviors

Fig. 3. Difference in social-psychological factors and family SES: Asian Americans and Whites, ELS 2002 10th grade (adjustment has been made for school effects).

scores on the math standardized test as our main dependent variable for this part of the analysis,[4] viewing it as an objective and comparable measure of student achievement. Table 5 shows the results from this analysis.

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[4] Similar results are obtained using overall GPA and academic GPA as the outcome variables. These results are presented in the Appendix.

Table 4

Coefficients from school-fixed effects regression of behavioral and Attitudes measurements on selected variables: Asian Americans and Whites from ELS 2002 10th grade.

|	1	2	3	4	5
	Hard working	Importance of good education	Students' educational expectation	Parents' educational expectation	Math class behavior
Asian	0.15 (0.05)***	0.05 (0.02)**	0.32 (0.10)***	0.57 (0.08)***	0.19 (0.03)***
SES	0.16 (0.02)***	0.05 (0.01)***	0.67 (0.03)***	0.61 (0.03)***	0.14 (0.01)***
Asian# SES	−0.06 (0.03)*	−0.05 (0.02)***	−0.33 (0.07)***	−0.24 (0.06)***	−0.09 (0.02)***
2nd generation	−0.02 (0.04)	0.02 (0.02)	−0.07 (0.09)	0.02 (0.07)	−0.05 (0.03)
3rd generation	−0.13 (0.04)***	−0.04 (0.02)	−0.15 (0.09)	−0.06 (0.08)	−0.06 (0.03)*
Intact family	0.10 (0.02)***	0.03 (0.01)***	0.15 (0.04)***	0.06 (0.03)*	0.13 (0.01)***
Number of siblings	0.00 (0.01)	0.00 (0.00)	−0.01 (0.01)	−0.01 (0.01)	−0.00 (0.00)
Female	0.15 (0.02)***	0.12 (0.01)***	0.37 (0.04)***	0.10 (0.03)***	0.15 (0.01)***
Held back in school	−0.17 (0.03)***	−0.03 (0.02)*	−0.84 (0.06)***	−0.65 (0.05)***	−0.18 (0.02)***
Constant	2.67 (0.05)***	2.74 (0.03)***	15.93 (0.10)***	16.12 (0.08)***	4.01 (0.04)***
Observations	8978	8978	8978	8978	8978
R-squared	0.04	0.03	0.10	0.10	0.07

Note: Standard errors in parentheses, ***p < 0.001, **p < 0.01, *p < 0.05.

Table 5

Coefficients from school-fixed effects regression of math achievement on behavioral/attitudes measurements and other selected variables: Asian Americans and Whites from ELS 2002 10th grade.

	1	2	3	4	5	6	7
	Null	Hard working	Importance of good education	Students' educational aspiration	Parents' educational aspiration	Math class behavior	Full
Asian	1.45 (0.47)**	1.26 (0.47)**	1.39 (0.47)**	1.17 (0.46)*	0.74 (0.46)	0.87 (0.46)	0.30 (0.45)
SES	3.53 (0.15)***	3.31 (0.15)***	3.45 (0.15)***	2.78 (0.15)***	2.74 (0.15)***	3.12 (0.15)***	2.16 (0.15)***
2nd generation	0.38 (0.43)	0.41 (0.43)	0.35 (0.43)	0.51 (0.42)	0.39 (0.42)	0.59 (0.42)	0.65 (0.40)
3rd generation	0.32 (0.47)	0.51 (0.46)	0.39 (0.46)	0.54 (0.45)	0.44 (0.45)	0.55 (0.45)	0.77 (0.44)
Intact family	0.98 (0.19)***	0.84 (0.19)***	0.92 (0.19)***	0.78 (0.19)***	0.89 (0.19)***	0.52 (0.19)**	0.41 (0.18)*
Number of siblings	−0.02 (0.06)	−0.03 (0.06)	−0.03 (0.06)	−0.02 (0.06)	−0.01 (0.06)	−0.02 (0.06)	−0.01 (0.06)
Female	−1.59 (0.18)***	−1.81 (0.18)***	−1.80 (0.18)***	−2.05 (0.18)***	−1.73 (0.18)***	−2.11 (0.18)***	−2.40 (0.17)***
Held back in school	−6.19 (0.31)***	−5.95 (0.31)***	−6.13 (0.31)***	−5.15 (0.31)***	−5.27 (0.31)***	−5.55 (0.31)***	−4.37 (0.30)***
Hard working		1.45 (0.11)***					0.56 (0.12)***
Importance of good education			1.76 (0.21)***				−0.43 (0.22)*
Students educational aspiration				1.24 (0.05)***			0.79 (0.06)***
Parents educational aspiration					1.40 (0.06)***		0.92 (0.07)***
Math class behavior						3.45 (0.15)***	2.56 (0.15)***
Constant	53.19 (0.50)***	49.31 (0.58)***	48.34 (0.77)***	33.45 (0.98)***	30.58 (1.15)***	39.33 (0.77)***	15.12 (1.31)***
Observations	8978	8978	8978	8978	8978	8978	8978
R-squared	0.13	0.15	0.14	0.19	0.18	0.19	0.24
p-value for Asian# SES	0.006	0.010	0.013	0.124	0.067	0.064	0.791

Note: Standard errors in parentheses, ***p < 0.001, **p < 0.01, *p < 0.05.

The interaction term of family SES and Asian race is included in all seven models, and their corresponding p-values are reported in the bottom row of the table for each model.[5] The first model in Table 5 is the baseline model, with just demographic control variables. In Models 2 to 6, we add the five behavior/attitude measures separately. Model 7 is the full model, including demographic controls and all five behavior/attitude measures. The Asian American premium in academic
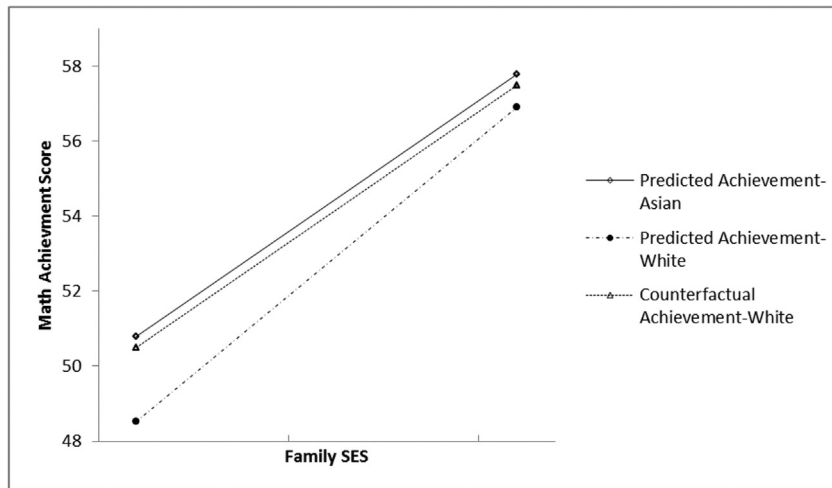
Fig. 4. Counterfactual analysis.

achievement is 1.45 in the baseline model and statistically significant. In Models 2 to 6, both the magnitude and the significance of the premium decrease as we add measures into the models. In Model 7, the full model, the estimate for Asian Americans' premium decreases to 0.3, or to one fifth of its magnitude in the baseline model, and is no longer significant. The increasing p-values indicate that the significance of the interaction of race and family SES also fades gradually across Models 1 to 7, becoming insignificant in the full model.

These changes across models have several implications. The measures of education-related behaviors and attitudes are important correlates of students' academic achievement and seem to be the main pathways for conveying the Asian American achievement premium. Further, not only do Asian Americans' higher scores in these academic achievement-related behaviors and attitudes contribute to their academic advantage, but the weaker association between family SES and these behaviors/attitudes among Asian Americans moderates the direct effect of family SES on their academic achievement − as evidenced by the larger Asian American-White achievement gap at lower SES levels.

To gauge how the Asian-White difference in the relationship between family SES and behaviors/attitudes can help explain the Asian American-White achievement difference, we carry out a counterfactual exercise. The results are displayed in Fig. 4.

The predicted achievements for Asian Americans and Whites are calculated based on the full model (Model 7) in Table 5, and the five models in Table 4. First, we predict Asians' and Whites' behaviors and attitudes from models in Table 4 using the overall sample mean for both Asians and Whites on all the variables other than Asian race and Asian race-SES interaction. Then, holding all the control variables constant other than race and race-SES interaction with overall sample mean, we enter the predicted behaviors and attitudes into Model 7 to predict the achievement for Asian Americans and Whites. By equalizing Asian-White differences in other socio-demographic factors, we observe how the Asian American-White differences in behaviors/attitudes influence the achievement gap.

We further construct the counterfactual achievement score for Whites from Model 7 in Table 5 by using similar methods to those described above and replacing Whites' predicted score on the behaviors/attitudes with Asian-Americans' score. The counterfactual score for Whites can thus be interpreted as the score that would be obtained by white students if they and their families had the same behaviors/attitudes as their Asian peers. Specifically, it helps project white students' achievement under the condition that the effects of family SES on their behaviors/attitudes were as steep as those for Asian Americans.

Fig. 4 depicts a notable difference in the predicted achievement of Asian-Americans and Whites. Given the method used to calculate the predicted achievement, the Asian American premium persists regardless of Asian-White differences in family background variables. This also supports our hypothesis that their achievement advantage is not completely dependent on their socioeconomic background. And once again, the steeper slope of the fitted line for Whites indicates a tighter relationship between family SES and achievement for Whites than for Asian-Americans.

We also note in Fig. 4 that the gap between Whites' counterfactual achievement and Asian Americans' predicted achievement is much smaller than the observed Asian American-White gap in predicted achievement. One major explanation for this discrepancy is the significant increase in Whites' counterfactual achievement at the lower SES distribution if Whites resembled Asian Americans in the relationships between family SES and schooling-relevant attitudes and behaviors. In other words, the gap between Asian Americans and Whites shrinks if Whites' achievement becomes less dependent on SES.

We are thus led to conclude that the Asian American-White differences in behaviors/attitudes, particularly in the strength of the effect of family SES on behaviors/attitudes, account for much of the observed Asian American-White achievement difference. In other words, Asian Americans enjoy a persistent achievement premium not only because they score higher in behaviors and attitudes important to academic achievement, but also because these behaviors and attitudes depend less on their family SES.

8. Sensitivity analysis

Are the results in our analysis specific to Asian Americans or generalizable to other groups? Answering this question will illuminate us as to whether the moderated relationship between family SES and achievement among Asian Americans is rooted in Asian-specific culture or is shared by other immigrants as well. To help answer this, we conducted a sensitivity analysis by replicating the regression analysis using Hispanic and white student subsamples. Appendix Table A-2.1 presents the results (as specified in Table 3) with achievement measures as the outcomes, and appendix Table A-3.1 presents the results (as specified in Table 4) with behavior/attitude measures as the outcomes.

Specifically, for standardized math and reading test scores (Model 1 and Model 2 in Table A-2.1), the interactions between family SES and race are negative, but not significant. For overall GPA and academic GPA, the interactions are negative and significant. In addition, the interaction terms are significantly negative across all five behavior/attitude measures. These results indicate that, as we found for Asian Americans, family SES has less influence on Hispanic students' academic achievement and related behaviors/attitudes than it does on white students'.

However, in contrast with the results for Asian Americans, the moderated SES effects do not consistently yield a Hispanic advantage across all measures. As previously stated, a group's residual differences are the product of both intercept effects and interaction effects. With negative intercept effects in many of the models for Hispanic students, the negative interaction effects, though they moderate the impact of SES, exacerbate their disadvantage in achievement and behaviors in math class.

In sum, the moderated relationship between family SES and students' achievement, behaviors, and attitudes is not restricted to Asian Americans. However, compared with Asian Americans, findings for Hispanics are mixed and less consistent. In particular, the moderated relationship for Hispanic students does not lead to a significant premium over that for white students, and may even exacerbate their disadvantage.

As discussed, the literature suggests that East Asian cultures have been deeply influenced by Confucianism, which emphasizes "self-malleability" and education as a pathway to social mobility – values that help East Asian students achieve academic success regardless of their social origins (Peng and Wright, 1994; Stevenson and Stigler, 1992). However, the existing literature also indicates that Asian Americans are a heterogeneous group, with Asian ethnic groups tending to vary in cultural values and behavior patterns (Goyette and Xie, 1999). To examine potential heterogeneity across Asian American subgroups, we conducted a sensitivity analysis by replicating the regression results and dividing Asian American students into two groups, East Asian (Chinese, Japanese, Korean) and Other Asian (Filipino, Southeast Asian, and South Asian),[6] with white students as the reference group. Appendix Table A-2.2 presents the results (as specified in Table 3) with standardized math and reading scores and the two GPAs as the measures for academic achievement. In Model 2, with the standardized math test score as the outcome, the interaction between Asian group and SES is significantly negative for students from the Other Asian group; however, in contrast with the results for East Asian students, the coefficient for Other Asian is also significantly negative. This suggests that, as with Hispanic students, the moderated association between SES and achievement exacerbates Other Asian students' disadvantage relative to white students. In Models 3 and 4, where the outcomes are GPA measurements, East Asian students and Other Asian students exhibit similar patterns in the results. Specifically, the intercept coefficients for ethnicity are significantly positive, while the coefficients for the interaction of SES and ethnicity are negative and significant. In Appendix Table A-3.2, we present the results (as specified in Table 4) with measures for behaviors/attitudes as outcomes. With few inconsistencies, the signs, significance, and magnitude of both the intercept coefficients for ethnicity and the interaction coefficients of ethnicity and SES are comparable between East Asian and Other Asian subgroups across all the models. These results indicate that we cannot differentiate groups within these two broad categories of Asian Americans and suggest that cultural effects on achievement are similar for all Asian American students.

9. Discussion and conclusion

Numerous studies have characterized Asian Americans as a "model minority," owing to their attainment of high socio-economic status (SES), and particularly their advantage in academic achievement (Hsia, 1988; Caplan et al., 1991; Sanchirico, 1991; Zhou and Bankston, 1998; Kao, 1995; Fejgin, 1995; Hsin and Xie, 2014). Sociological research so far has proposed two explanations for these observed premiums. The first explanation attributes Asian Americans' academic advantage to their more advantaged family backgrounds as measured by SES, while the second explanation emphasizes the role of the education- and effort-oriented culture shared by Asian Americans. However, most past studies have treated these two explanations as competing with one another. In other words, they have assumed, albeit sometimes implicitly, that SES and culture influence Asian Americans' achievement additively and independently.

In this paper, we propose an interactive rather than an additive approach to examining the role of culture and SES in explaining Asian Americans' achievement. We maintain that Asian American families have a different cultural orientation from that of white families that moderates the way family SES affects children's academic achievement. Our analyses indicate that such differences partly explain the observed achievement gap between Asian American and white students. Thus, our

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[6] East Asian includes Chinese, Japanese, and Korean; Other Asian includes Filipino, Southeast Asian, and South Asian. The sub-Asian ethnicity identification is provided by the ELS 2002 data.

study fills the gap in the current literature by examining the potentially heterogeneous effects of SES on the achievement gap between Asian Americans and Whites from a cultural perspective.

We test the hypothesis that Asian-White differences in the association between SES and achievement are products of race-based differences in the association between SES and social behavioral factors — manifested here as behaviors and attitudes deemed important to academic success. We find that the positive effects of family SES on achievement are stronger among white than among Asian American students, and that the association between SES and behaviors and attitudes is weaker among Asian-American than among white students. Furthermore, our counterfactual analysis reveals that a decent amount of the achievement difference can be accounted for by Asian American-White differences in behaviors and attitudes, particularly differences in the effects of family SES on behaviors and attitudes. All these findings support our argument that Asian Americans' behaviors and attitudes are less influenced by family SES than those of Whites are and that this difference helps generate Asians' premium in achievement — as is especially evident at lower levels of family SES.

Our findings yield policy implications as well, suggesting that differences in social behavioral characteristics, which are important for achievement, lead to achievement differences. However, these social behavioral skills are not rigidly determined by family SES, and the extent to which they are associated is malleable. This opens up the possibility of eliminating the achievement gap between different social groups through non-monetary channels — by instead working to encourage the social behaviors and attitudes that help determine academic success.

Still, we concede that the results from our study are only suggestive. One limitation is that we cannot yet uniquely attribute the explanation of our findings to Asian culture and to immigrant culture in general. Given that our sensitivity analyses suggest that the weaker association between family SES and achievement is not restricted to Asian students but is also present for Hispanic students, it is possible that this pattern is characteristic of an optimistic immigrant culture rather than Asian culture per se (Gibson and Ogbu, 1991; Kao, 1995; Caplan et al., 1992). However, the moderated relationship does not provide Hispanic students with an academic premium as it does Asian American students.

Nor can we attribute the Asian-White differences in the effects of SES solely to Confucian culture, as the moderated SES effects are also observed among Other Asian students besides East Asian students. One possible explanation for this homogenous pattern is that Asian American students, regardless of specific ethnicity, feel pressured to live up to Asian achievement stereotypes (Jiménez and Horowitz, 2013; Lee and Zhou, 2014). However, these unresolved issues lie beyond the scope of the current study.

Understanding the achievement difference between Asian American and white students will not only give us better clues about how one immigrant group has attained social mobility in the U.S., it also provide deeper insights into broader racial/ethnic inequalities in the U.S. Our findings underline the need to examine culture's role in generating group achievement differences and to examine how culture works interactively with other traditional socioeconomic characteristics to influence children's development.

Table A-2.1
Ethnicity, family SES and achievement (Hispanic and White).

	1	2	3	4	5	6	7	8
	Math test	Math test	Reading test	Reading test	10th grade overall GPA	10th grade overall GPA	10th grade academic GPA	10th grade academic GPA
Hispanic	−3.25 (0.32)***	−3.25 (0.32)***	−2.66 (0.33)***	−2.67 (0.33)***	−0.18 (0.03)***	−0.18 (0.03)***	−0.19 (0.03)***	−0.19 (0.03)***
SES	3.72 (0.15)***	3.83 (0.17)***	3.59 (0.15)***	3.71 (0.17)***	0.31 (0.01)***	0.33 (0.02)***	0.33 (0.02)***	0.36 (0.02)***
Hispanic# SES		−0.49 (0.32)		−0.50 (0.33)		−0.13 (0.03)***		−0.14 (0.03)***
2nd generation	0.97 (0.43)*	1.01 (0.43)**	1.23 (0.44)**	1.27 (0.45)**	−0.04 (0.04)	−0.03 (0.04)	−0.07 (0.04)	−0.06 (0.04)
3rd generation	0.56 (0.39)	0.65 (0.40)	1.45 (0.41)***	1.54 (0.41)***	−0.12 (0.04)**	−0.1 (0.04)**	−0.16 (0.04)***	−0.13 (0.04)***
Intact family	0.98 (0.18)***	0.96 (0.18)***	0.94 (0.19)***	0.92 (0.19)***	0.21 (0.02)***	0.21 (0.02)***	0.21 (0.02)***	0.21 (0.02)***
Number of siblings	−0.01 (0.06)	−0.01 (0.06)	−0.1 (0.06)~	−0.1 (0.06)*	−0.01 (0.01)	−0.01 (0.01)	−0.00 (0.01)	−0.01 (0.01)
Sibling miss	−1.03 (0.38)**	−1.02 (0.38)***	−0.91 (0.40)*	−0.9 (0.40)**	−0.11 (0.04)**	−0.11 (0.04)***	−0.12 (0.04)**	−0.12 (0.04)***
Female	−1.41 (0.17)***	−1.42 (0.17)***	1.21 (0.18)***	1.21 (0.18)***	0.28 (0.02)***	0.28 (0.02)***	0.35 (0.02)***	0.35 (0.02)***
Held back in school	−5.45 (0.27)***	−5.45 (0.27)***	−4.48 (0.28)***	−4.48 (0.28)***	−0.36 (0.03)***	−0.36 (0.03)***	−0.39 (0.03)***	−0.39 (0.03)***
Constant	52.44 (0.43)***	52.33 (0.44)***	50.36 (0.45)***	50.25 (0.46)***	2.66 (0.04)***	2.63 (0.04)***	2.52 (0.04)***	2.49 (0.05)***
Observations	9613	9613	9613	9613	8844	8844	8831	8831
R-squared	0.16	0.16	0.13	0.13	0.16	0.16	0.16	0.16
Number of sid	731	731	731	731	708	708	707	707

Standard errors in parentheses.

Table A-2.2
Ethnicity, Family SES and Achievement (Asian subgroups and White).

	1	2	3	4	5	6	7	8
	Math test	Math test	Reading test	Reading test	10th Grade overall GPA	10th Grade overall GPA	10th Grade Academic GPA	10th Grade Academic GPA
East Asian	2.36 (0.48)***	2.63 (0.50)***	0.32 (0.49)	0.40 (0.51)	0.17 (0.04)***	0.22 (0.05)***	0.20 (0.05)***	0.26 (0.05)***
Other Asian	−1.41 (0.48)**	−1.23 (0.48)**	−2.04 (0.49)***	−1.99 (0.50)***	0.09 (0.04)*	0.11 (0.04)**	0.11 (0.05)*	0.13 (0.05)***
SES	3.50 (0.15)***	3.72 (0.17)***	3.65 (0.15)***	3.71 (0.17)***	0.31 (0.01)***	0.34 (0.02)***	0.34 (0.01)***	0.38 (0.02)***
East Asian# SES		−0.63 (0.45)		−0.19 (0.46)		−0.13 (0.04)***		−0.13 (0.05)***
Other Asian# SES		−1.21 (0.40)***		−0.31 (0.41)		−0.14 (0.04)***		−0.17 (0.04)***
2nd generation	0.48 (0.41)	0.59 (0.41)	1.55 (0.42)***	1.58 (0.43)***	−0.04 (0.04)	−0.03 (0.04)	−0.07 (0.04)	−0.05 (0.04)
3rd generation	−0.46 (0.44)	−0.37 (0.44)	0.98 (0.45)*	1.00 (0.45)**	−0.15 (0.04)***	−0.14 (0.04)***	−0.18 (0.04)***	−0.16 (0.04)***
Intact family	0.98 (0.19)***	0.96 (0.19)***	0.98 (0.20)***	0.97 (0.20)***	0.21 (0.02)***	0.20 (0.02)***	0.21 (0.02)***	0.20 (0.02)***
Number of siblings	−0.02 (0.06)	−0.03 (0.06)	−0.08 (0.06)	−0.08 (0.06)	−0.00 (0.01)	−0.00 (0.01)	−0.00 (0.01)	−0.00 (0.01)
Female	−1.54 (0.18)***	−1.53 (0.18)***	1.09 (0.18)***	1.09 (0.18)***	0.27 (0.02)***	0.27 (0.02)***	0.34 (0.02)***	0.34 (0.02)***
Held back in school	−6.40 (0.31)***	−6.39 (0.31)***	−5.01 (0.32)***	−5.01 (0.32)***	−0.40 (0.03)***	−0.40 (0.03)***	−0.44 (0.03)***	−0.44 (0.03)***
Constant	53.90 (0.47)***	53.77 (0.47)***	51.02 (0.49)***	50.98 (0.49)***	2.70 (0.04)***	2.68 (0.04)***	2.56 (0.05)***	2.54 (0.05)***
Observations	9224	9224	9224	9224	8533	8533	8521	8521
R-squared	0.14	0.14	0.12	0.12	0.16	0.16	0.17	0.17
Number of sid	720	720	720	720	699	699	698	698

Standard errors in parentheses; ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

Table A-3.1
Family SES, behaviors and attitudes (Hispanic-White).

	1	2	3	4	5
	Hard working	Importance of good education	Students' educational expectation	Parents' educational expectation	Math class behavior
Hispanic	0.09 (0.03)***	0.03 (0.02)*	−0.06 (0.07)	0.11 (0.05)*	−0.10 (0.02)***
SES	0.16 (0.02)***	0.05 (0.01)***	0.69 (0.03)***	0.63 (0.03)***	0.13 (0.01)***
Hispanic# SES	−0.10 (0.03)***	−0.06 (0.02)***	−0.19 (0.07)***	−0.11 (0.05)**	−0.05 (0.02)**
2nd generation	−0.04 (0.04)	−0.02 (0.02)	−0.02 (0.09)	0.14 (0.07)*	−0.07 (0.03)**
3rd generation	−0.13 (0.04)***	−0.05 (0.02)**	−0.21 (0.08)**	−0.10 (0.07)	−0.09 (0.03)***
Intact family	0.08 (0.02)***	0.03 (0.01)***	0.14 (0.04)***	0.04 (0.03)	0.13 (0.01)***
Number of siblings	0.00 (0.01)	−0.00 (0.00)	−0.02 (0.01)*	−0.01 (0.01)	−0.01 (0.00)
Female	0.19 (0.02)***	0.12 (0.01)***	0.42 (0.04)***	0.16 (0.03)***	0.15 (0.01)***
Held back in school	−0.15 (0.03)***	−0.03 (0.01)**	−0.73 (0.06)***	−0.60 (0.05)***	−0.19 (0.02)***
Constant	2.67 (0.04)***	2.77 (0.02)***	15.95 (0.09)***	16.13 (0.07)***	4.06 (0.03)***
Observations	9613	9613	9613	9613	9613
R-squared	0.04	0.03	0.10	0.09	0.07
Number of sid	731	731	731	731	731

Standard errors in parentheses; ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$.

Table A-3.2
Family SES, behaviors and attitudes (Asian subgroups-White).

	1	2	3	4	5
	Hard working	Importance of good education	Students' educational expectation	Parents' educational expectation	Math class behavior
East Asian	0.10 (0.05)**	−0.01 (0.03)	0.22 (0.10)**	0.36 (0.09)***	0.13 (0.04)***
Other Asian	0.12 (0.05)**	0.04 (0.02)	0.09 (0.10)	0.39 (0.08)***	0.12 (0.03)***
SES	0.15 (0.02)***	0.05 (0.01)***	0.69 (0.03)***	0.62 (0.03)***	0.14 (0.01)***
East Asian# SES	−0.05 (0.04)	0.00 (0.02)	−0.24 (0.09)**	−0.19 (0.08)**	−0.09 (0.03)***
Other Asian# SES	−0.04 (0.04)	−0.06 (0.02)***	−0.42 (0.08)***	−0.27 (0.07)***	−0.08 (0.03)***
2nd generation	−0.07 (0.04)*	0.01 (0.02)	−0.02 (0.08)	0.10 (0.07)	−0.07 (0.03)**
3rd generation	−0.15 (0.04)***	−0.05 (0.02)**	−0.22 (0.09)**	−0.10 (0.07)	−0.11 (0.03)***
Intact family	0.09 (0.02)***	0.03 (0.01)***	0.17 (0.04)***	0.05* (0.03)	0.14 (0.01)***
Number of siblings	0.00 (0.01)	0.00 (0.00)	−0.01 (0.01)	−0.01 (0.01)	−0.00 (0.00)
Female	0.16 (0.02)***	0.12 (0.01)***	0.38 (0.04)***	0.11 (0.03)***	0.15 (0.01)***
Held back in school	−0.19 (0.03)***	−0.04 (0.02)**	−0.86 (0.06)***	−0.67 (0.05)***	−0.20 (0.02)***
Constant	2.71 (0.05)***	2.76 (0.02)***	15.98 (0.10)***	16.15 (0.08)***	4.05 (0.03)***
Observations	9173	9223	9147	9154	9188
R-squared	0.04	0.03	0.10	0.10	0.07
Number of sid	718	720	719	719	719

Standard errors in parentheses; ***p < 0.001, **p < 0.01, *p < 0.05.

Appendix. Sensitivity analysis tables

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