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The Effect of Asian Ethnic Community Size on the Asian-White
Achievement Gap in the U.S.

By

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Abstract

This study seeks to examine the effect of the size of Asian ethnic communities on the Asian-White achievement gap between 2013 and 2017 in U.S. school districts. Ordinary least squares regressions were used to assess this relationship, while controlling for other district characteristics that have been empirically shown to have an association with the gap. It was found that inconsistent with the model minority theory, Asian Americans do not always have an academic advantage over time. The present study also does not directly support the selective assimilation theory, as larger Asian ethnic communities in a district are not associated with a greater Asian-White gap. However, a negative and significant relationship was found between the size of Asian ethnic communities and the academic achievement of White students.

Introduction

The academic achievement gap, or the “disparity in school performance tied to race and ethnicity” (Johnston and Viadero 2000, 5), has been widely discussed among policymakers, scholars, and educators. Despite the volume of existing literature that examines the racial/ethnic gap among students, Asian Americans have been understudied, overlooked and often seen as overachieving as a group (Pang et al. 2011). Studies that are inclusive of the Asian American student population have also grouped them with Whites and compared to Black and/or Hispanic counterparts (e.g., Condrón et al. 2013; Flores 2007).

As of 2012, among all 234.7 million adults in the U.S., Asian Americans account for 9.35 million (25%) of the first generation, or the foreign-born immigrant population and 2.36 million (12%) of the second generation, or the native-born, immigrant population. However, they only make up 0.89 million (0.5%) of the third and higher-generation population (Pew Research Center 2012). Studies that focus on the model minority myth in their discussion of the perception of the expectations for Asian Americans make conflicting claims. While some suggest that the idea has contributed to the outstanding performance of Asian American students (Hsin and Xie 2014), others contend that the label is inaccurate in that they do not consistently outperform their peers (Wong and Halgin 2006). When examined as broader immigrant communities, Asian and Hispanic children follow divergent paths in their academic performance in the U.S. (Kao and Tienda 2005; Pong et al. 2005), suggesting that Asian Americans should be viewed separately in their experiences.

The literature on modes of incorporation among Asian Americans has put forth a debate as a result of the divergent theories scholars draw on. First, according to the classic assimilation theory, immigrants follow a straight-line pattern in their convergence to the majority society in

norms and values (Gordon 1964), as the mainstream society holds the resources that promote the socioeconomic advancement for immigrants (Kroneberg 2008). Gordon viewed “Anglo-conformity” as the most productive mode of adaptation for immigrants to the U.S. (Rumbaut 1997, 926). This theory thus suggests that being part of a co-ethnic community would impede the learning outcomes among minority students. On the other hand, the selective, or segmented assimilation theory posits that ethnic communities, rather than the mainstream norms and values, serve as an important source of social capital for second generation immigrants (Portes and Zhou 1993). In the context of academic outcomes, the selective assimilation theory proposes that without full integration into the dominant culture, a larger co-ethnic community would yield higher educational achievement among Asian Americans than that of their White peers (Zhou and Bankston 1998). The present study seeks to test the selective assimilation theory by examining the effect of Asian co-ethnic community on the district level Asian-White achievement gap, while controlling for other potentially significant factors.

The racial/ethnic achievement gap has also been studied as a dynamic process as children progress through school. For example, Fryer and Levitt (2004) found that the gap between White and Black children starts growing upon school entry. Similarly, Dobbie and Fryer (2009) observed a diminishing advantage among disadvantaged children enrolled in early childhood intervention programs such as Head Start¹ and the Abecedarian Project². There has been limited research on the Asian-White achievement gap as a dynamic process. As one of the few studies

¹ a program of the United States Department of Health and Human Services that aims to provide early childhood education, health, nutrition, and parent involvement services and resources to low-income children and their families. For more information, see <https://eclkc.ohs.acf.hhs.gov/programs/article/head-start-programs>.

² a controlled experiment in North Carolina, led by the Frank Porter Graham Child Development Institute, to study the effect of early childhood education on the school readiness among children from low-income homes. For more information, see <https://abc.fpg.unc.edu/abecedarian-project>.

that viewed the gap dynamically, Hsin and Xie (2014) found that Asian Americans do not enter school with discernable advantage, but an advantage grows over time.

The present work seeks to address two questions. First, how does the Asian-White achievement gap change for the same cohort of students as they progress from 3rd through 8th grade? Second, how does having a larger co-ethnic community influence the Asian-White achievement gap? To answer these questions, this study focuses on student performance in grades 3 through 8, where all states are required to administer annual standardized testing on both mathematics and English Language Arts (ELA) under federal legislation (Fahle et al. 2018).

This study relies on four sources of data. First, student performance is evaluated using data from the Stanford Education Data Archive (SEDA) (Version 3.0), which spans all 50 states and 10 consecutive school years, from 2008-2009 to 2017-2018. The data includes Asian American and White student performances by race, the difference between which will be calculated for analysis. Second, to account for the effect of other district-level predictors of the achievement gap, data is collected on variables that address socio-demographic characteristics of school districts using the American Community Survey–Education Tabulation (ACS-ED). This data documents aggregate factors of demographic, social, economic and housing characteristics. Third, school district financial data was adapted from the Local Education Agency (School District) Finance Survey Data, where district expenditures and revenues are reported. Together with the Local Education Agency (School District) Universe Survey Data, expenditures and revenues were used to calculate per-pupil funding as additional variables that are associated with student outcomes.

This study seeks to add to the existing literature in two ways. First, while the Black/White and the socioeconomic (SES) gap have been treated dynamically, the Asian-White gap has not been examined as a function of time to the same extent. By looking at changes across consecutive school years, the present study hopes to understand the trend over time, which can have important implications on whether such differences were pre-existing or if they were brought forth during schooling. Second, unlike most previous studies that used individual students as the unit of analysis, the present study aims to examine the effect of having a large co-ethnic community on the observed achievement gap on the school district level.

Literature Review

Past literature has examined the opportunity gap, or achievement gap, between students from different racial/ethnic groups. Many past studies have focused on the performance differences between African American students and their White peers (e.g., Condrón et al. 2013; Fryer and Levitt 2005). A few studies grouped Asian American school-aged children with their White counterparts as a non-stereotyped student population. For example, McKown and Weinstein (2008) stated that “African Americans and Latinos are the targets of negative stereotypes about intellectual ability. In contrast, European Americans and Asian Americans are the targets of neutral or positive stereotypes about intellectual ability” (239). However, more scholars are studying Asian Americans in isolation in the context of academic achievement. There has been empirical support that point to Asian American students following a different academic path than other immigrant minority groups (Pong et al. 2005), and that many individual, family and community factors that mediate the Black-White gap fail to address the Asian-White gap to the same extent (Lee and Zhou 2014).

Much of the observed performance differentials is left to the cultural explanations. Among the literature that examined the role of ethnic culture on their outstanding academic achievement, Asian Americans' high performance has been attributed to attachment to their ethnic communities (Kroneberg 2008). Although the absolute performance of Asian American students has been examined, it remains unclear whether ethnic communities also have an impact on the relative advantage of these students in aggregate. The present study seeks to investigate the effect of ethnic communities on the Asian-White achievement gap on the school district level.

Asian Americans are the fastest growing racial group in the U.S. (Paik et al. 2014), with an 81% upsurge in its population between 2000 and 2019 (Budiman and Ruiz 2021). Contrary to abundant evidence almost uniformly suggesting that Black and Hispanic students consistently underperform their White counterparts, empirical results are divergent with regards to the academic advantage of Asian American students. For example, Pang et al. (2011) found that Asian American ethnic groups such as Chinese, Korean and Japanese Americans scored higher than White Americans in both math and reading in seventh grade, while students who identify as Pacific Islanders score significantly lower on both subjects than Whites. Wong et al. (1998) found no significant differences between the grades and SAT scores of Asian American students and those of their non-Asian American peers.

However, Konstantopoulos (2009) suggested that Asian American students perform at higher levels than the majority group, especially in math, while also demonstrating an academic advantage in reading to a lesser extent. Hsin and Xie (2014) showed uniformly higher academic performance among Asian students relative to Whites, even after disaggregating them into East Asians, Filipinos, Southeast Asians, and South Asians. As two of the largest immigrant

populations in the U.S., Asian American and Hispanic students have been grouped in analysis in empirical studies based on their shared immigrant status. Fuligni (1997) concluded that children of immigrant families exhibit higher levels of academic effort as a result of their strong motivation and perception of the value of education.

However, Asian and Hispanic immigrant students follow different trajectories in approaching their schooling in the U.S. (Pong et al. 2005). For instance, Hao and Bonstead-Bruns (1998) found a greater indirect effect of ethnic background on the academic achievement of immigrant Chinese and Korean students than that of immigrant Mexican students. While ethnic background has a direct positive influence on the performance of Chinese American students, its impact is negative on the performance of Mexican American students (Pong et al. 2005). Additionally, while Hispanic, Black and White students with immigrant parents performed as well as their native-born counterparts, Asian immigrant students outperformed their peers with native-born parents (Kao 1995). This advantage is also demonstrated when compared to their foreign-born peers who benefit from a stronger tie to parental expectations and ethnic beliefs in education. The academic success of native-born children of immigrant parents can be attributed to both the cultural optimism of their parents and their advanced English skills (Kao and Tienda 1995).

As much as one third of the observed Black/White achievement gap can be explained by socioeconomic characteristics (Clotfelter et al. 2009). While signals of high status and cultural capital have implications for the transmission of advantage and disadvantage among White and Black students in the U.S., these two aspects cannot similarly account for patterns of the academic success of immigrant children (Lee and Zhou 2014). Immigrant students' academic success can be explained by family attributes such as having highly educated and professional

parents to a very limited extent (Fuligni 1997). Compared to socioeconomic factors, beliefs of education and immigration status explain a larger portion of the Asian-American academic advantage (Hsin and Xie 2014).

Model Minority Myth

William Peterson coined the term “model minority” (11) to describe the accomplishments of Japanese Americans in the 1960s with a positive connotation (Peterson 1966). Since then, Asian Americans have been portrayed in both media and scholarship as diligent and often associated with upward social mobility and economic success on par with that of their White counterparts (Wong and Halgin 2006). The model minority stereotype refers “to the idea that Asian Americans are relatively problem free, hardworking and persever[ing]” (Kiang et al. 2017, 1). Due to the divergence in empirical findings with respect to the academic advantage among Asian Americans, studies have shown a range of support and dismissal of the model minority theory. Studies that endorse the theory have found uniform outperformance among Asian American students (e.g., Hsin and Xie 2014). Wang (2008) even found Asian children to be performing better than White children on literacy, mathematics, and fine motor skills as early as during their pre-kindergarten years.

On the other hand, scholars are presenting counterevidence towards the theory. Pang et al. (2011) refuted the model minority myth by showing that there exists significant heterogeneity in the relative performance among Asian American and Pacific Islander (AAPI) students compared to White students. Wong et al. (1998) found the model minority label to be a bane rather than a blessing for Asian Americans, not only inaccurate in depicting the experience of the ethnic group but also hindering their access to necessary attention and assistance. The pressure to live up to the standards can also lead to unreasonably and unrealistically high expectations for

Asian Americans (Kiang et al. 2017). Biased views of Asian American students are also present among educators. In their effort to examine teachers' judgments of normal and abnormal child behavior in a classroom setting, Chang and Sue (2003) noted that overcontrolled behaviors among Asian Americans were perceived to be more typical of the race compared to under-controlled behaviors. The opposite was found in teachers' perceptions of Caucasian students.

The unacknowledged needs of some Asian Americans who are not exhibiting traits of the model minority are leading to limited support at the local, state, and federal levels (Paik et al. 2014), further hampering their access to educational opportunities and success. Goodwin (2010) argued that a curriculum that views Asian Americans collectively as the model minority "upholds a false and racialized standard" (3125) for all AAPI students, failing to address the nuanced performance differentials and needs among them.

Co-ethnic Communities, Selective Assimilation, and Ethnic Capital

In their theoretical framework of *Modes of Incorporation*, Portes and Rumbaut (2001) included reception of co-ethnic communities as one of the three key features that characterize the process through which immigrants integrate at their destinations, alongside reception by government policy and society. Ethnic communities can be evaluated through multiple measures as they can include broad contextual factors, ranging from the political and economic relations of the sending and receiving sites to the size and structure of these ethnic enclaves (Portes and Zhou 1993). On the level of individual students, Portes and Hao (2004) argued that class and ethnic composition of schools that immigrant children attend have an impact on their academic outcomes. Similarly, Rumberger and Thomas (2000) suggested that school composition is one of the key indicators of average student performance and dropout rate on the school level, again pointing to the importance of including composition in studying academic success.

Portes and Zhou (1993) first formulated the selective assimilation theory. The theory views ethnic communities as a source of social capital for second generation immigrants. It posits that if their families are well-situated in the ethnic communities in the host society, the children would benefit from these co-ethnic ties in their outcomes of adaptation, such as educational and occupational performances. Racial minorities are able to turn their ethnic resources into what Zhou and Kim (2006) phrased as “a sense of collective dignity” (6), even in the presence of discrimination (Paik et al. 2014). Even within undesirable neighborhood circumstances, maintaining cultural and ethnic values allow immigrants to demonstrate solidarity (Zhou and Bankston 1994).

The classic assimilation theory suggests a unilineal assimilation among immigrants to the host society (Gordon 1964). The straight-line mode of assimilation does not fit the experience and process of the current second-generation immigrant children, for whom the classic mode of integration into the mainstream culture serves only as an alternative (Portes and Rumbaut 2005). The selective assimilation theory claims that an ethnic community serves as a key source of social capital for immigrant children (Portes and Zhou and Bankston 1994; Rumbaut 2005; Kroneberg 2008; Paik et al. 2014). Portes (1998) defined social capital as “the ability of actors to secure benefits by virtue of membership in social networks or other social structures” (6). Pong et al. (2005), for example, suggested that this social capital can be beneficial when parents of immigrant children become well integrated into their ethnic network in the community, they can learn from others about their children’s’ performance at school. Due to the subjectivity of the information that is transmitted through ties, the cultural norms are at play here; the children will be subject to these values traditionally held by members of this network (Pong et al. 2005).

In other words, selective assimilation argues that having a larger co-ethnic community positively contributes to higher educational achievement among Asian American students compared to their native-born White peers (Zhou and Bankston 1998). Zhou and Kim (2006) argued that the ethnic community should not be considered only through the shared ethnic identity among its members, but also with respect to the cultural aspects as a result of their ethnicity and immigrant status. Kroneberg (2008) and Portes and Rumbaut (2005) showed that having close ties to one's own ethnic community is associated with positive adaptation outcomes among immigrant children.

Lee and Zhou (2014) argued that having co-ethnic communities gives rise to access to both tangible and intangible resources for immigrant children. Tangible resources include jobs, housing as well as self-employment opportunities among adults, while intangible resources can be a strong social network as well as role models who serve as frames of achievement for the youth (Lee and Zhou 2014). In their study of supplementary education in the Chinese and Korean ethnic communities, Zhou and Kim (2006) tied their observations to the model minority myth, as the higher-than-average cultural expectations lead Asian parents to turn to extracurricular opportunities that facilitate higher academic performance. Similarly, Paik et al. (2014) also pointed out that educational services found in these co-ethnic communities not only help school-age children gain an academic edge, but also reinforce the cultural values shared by community members. Rather than framing these resources as the often-cited Bourdieusian cultural capital, migration scholars have suggested that migrants rely on their migration-specific cultural capital (Erel 2010), or ethnic capital (Lee and Zhou 2014).

In sum, the selective assimilation theory posits that modes of incorporation have a “*direct impact*” on the academic performance among second-generation immigrants, even after

controlling for variables of individual, family and school characteristics (Kroneberg 2008, 151). The present study seeks to test the theory on the school district level, controlling for factors that have empirically been found to have an effect on school test scores, such as family SES, school funding and student residential mobility.

Family Socioeconomic Status (SES)

Measures of family SES have been shown to be associated with the academic performance of individual students. Parental affluence becomes an increasingly important factor in explaining child achievement as they develop (Uhlenberg and Brown 2002). Family wealth was also found to be significantly associated with higher quality home environment and better parenting practices, such as a safer and cleaner home and parents' greater engagement and time spent with children in various activities (Yeung and Conley 2008). Parents in urban and migrant areas, who are more likely to have the lowest levels of education and the highest level of poverty, usually fail to positively contribute to their children's educational outcomes (Ostrander 2015). As family income is predominantly used alone in measuring SES, household wealth has been overlooked and is more unequal than the income disparity. Reardon (2011) pointed out that families with higher income also have access to more socioeconomic and social resources that could positively impact the child's educational outcomes. Similarly, Rothstein (2004a) suggested that because children with similar family incomes might still occupy different social class ranks, it is crucial to not limit the measure of family socioeconomic status to parental income.

On the school level, higher SES schools tend to have higher average performance than lower SES schools (Konstantopoulos and Hedges 2006). In their testing of the selective assimilation theory, Kroneberg (2008) constructed the measure of the socioeconomic profile of the community through the percentage of parents who report as self-employed and the average

level of education among all parents and found strong association between these measures and test performance among children. Self-employment has been shown to be significantly related to both personal wealth and educational level, especially within ethnic minority communities (Bates and Dunham 1993). In Louisiana, peer family social status has a significant effect on the child's academic achievement that is only slightly smaller than the effect of their own family social status (Caldas and Bankston 1997). Importantly, Caldas and Bankston (1997) measured this family social status through both mean parental education and occupation levels, suggesting the importance of accounting for family SES factors beyond the family income and the poor/non-poor dichotomy.

School Funding

Since the Coleman Report, there has been an ongoing debate over the importance of school funding on test score among school-aged children (Jackson et al. 2015). The Coleman Report suggested that schools played little role in explaining the disparity in student performance (Coleman et al. 1966). It is still unclear whether the role of school funding is a reproductive, exacerbatory, or equalizing one in the presence of the existing gap (Downey and Condron 2016). Studies have come to divergent conclusions in this regard. Payne and Biddle (1999) found poor school funding and child poverty to have an effect on student achievement, both independently of each other and from other factors. Ostrander (2015) emphasized the importance of proper school funding, as schools with less adequate resources have limited options and are faced with challenges in improving their infrastructure that enhance student learning. Additionally, under the Common Core, schools are receiving funding determined by their standardized test performance, which perpetuates the fact that poorly funded schools continue to perform less well as a result of their insufficient funding to make changes (Ostrander 2015). Leachman et al.

(2017) found that state-level k-12 funding cut during the 2007-2009 recession impeded reforms that have been widely acknowledged to promote student achievement. Similarly, Jackson et al. (2015) pointed to the significance of exogenous spending in enhancing student performance through measures of school inputs such as reduced class size and higher teacher salaries. Beyond improvements in school performance, increased per pupil spending on students from both nonpoor and low-income families has implications for life outcomes among students, such as educational attainment, wages, family income, civic participation and lowered chances of adult poverty (Jackson et al. 2015; Neymotin 2010).

On the other hand, Grubb and Allen (2010) showed that increased funding and academic outcomes are weakly correlated and that factors such as advanced teaching approaches, strong school leadership as well as classroom climate together play a greater role in shaping student outcomes on the school level. Likewise, Neymotin (2010) argued that in Kansas, changes in financing-related policies have little positive effect on student performance, as the schools that are receiving extra funding might not be the ones that are in the most need. Other factors such as teacher and administrator abilities as well as parental involvement may also play a role in the effectiveness of resources beyond allocation (Neymotin 2010). Overall, despite the presence of literature that dismisses the role of proper school funding on improving student achievement outcomes, these studies point to the existence and significance of the factors that are found to be more strongly associated with the outcomes. Such factors as means to school reform that are effective in improving student performance are nonetheless enabled by increased funding, although in some cases the funding is improperly distributed to schools and/or used. Thus, it is still crucial to control for school funding when examining the achievement gap.

Housing

Housing conditions of students in the context of achievement differentials should also be taken into account, although there has been significantly less scholarship along this vein. Rothstein has contributed much to the literature on the role of housing on student performance. He showed that beyond measures of family SES such as household income, differences in accumulated family wealth are also important predictors of student achievement (Rothstein 2004b). Specifically, White students are more likely than Black students with similar parental income levels to have access to adequate housing (Rothstein 2004b). The lack of access to stable housing could result in student mobility, which in turn lowers student performance at school (Rothstein 2004a). Yeung and Conley (2008) suggested that housing wealth of a primary residence is a key indicator of family wealth, as it smoothes out consumption during times of financial constraints, reduces parental stress and leads to positive parenting practices. On average, housing costs approximately 2.4 times as much near a high-scoring public school as near a low-scoring public school across some of the largest metropolitan areas in the U.S. (Rothwell 2012). Kane et al. (2003) found an association of one standard deviation difference in the mean test score of a school and 18-25 percentage point difference in house value within its boundaries.

The Dynamic Achievement Gap

Previous literature has examined the achievement gap as an evolving process as children progress through school. Fryer and Levitt (2005) found that Black students not only enter school with lower preexisting performance, their disadvantage becomes more pronounced during the first four years of schooling. By the fourth grade, the gap in reading achievement can be as large as 0.24 standard deviations between White and Black children (Bali and Alvarez 2004). The

persistent Hispanic-White gap has also received scholarly attention, although found to appear later in development (Bali and Alvarez 2004) and smaller in size (Clotfelter et al. 2009).

The performance differences between Asian American and White students have not been treated as a dynamic process to the same extent. Among the limited number of studies that did so, Hsin and Xie (2014) found that Asian Americans do not enter school with a discernible academic advantage compared to their White peers, which only starts to exhibit in 5th grade and peak in 10th grade. Looking at high school math achievement, Kotok (2017) found comparable performances before 9th grade and similar gains between Asian American and White students throughout high school, while Asians experienced relatively greater gains.

The Present Study

Despite the volume of literature that has empirically examined the relationship between being part of an ethnic community and student's academic achievement, the present study hopes to address the effect of ethnic communities on the relative performance of Asian American students beyond the individual level. With the above considerations, the present study seeks to answer the following questions on the level of school districts: 1) do Asian American students uniformly outperform their White peers throughout all school years and across different subjects? 2) how does having a larger ethnic community impact the Asian-White gap, after controlling for other contextual factors, such as family SES, district funding, and housing mobility? Due to the large presence of counterevidence for the model minority theory, I hypothesize that Asian American children do not exhibit higher levels of achievement than their White peers uniformly as they progress through school. By virtue of the *Modes of Incorporation* framework, I hypothesize that in districts where Asian Americans underperform Whites, having a larger ethnic community is associated with a significant shrinking in the gap and that in

districts where Asian Americans outperform Whites, the academic advantage is broadened in the presence of large ethnic communities.

Data

The Stanford Education Data Archive (SEDA 4.0)³

SEDA is part of the Educational Opportunity Project at Stanford University, a database that provides reliable information on educational conditions and outcomes within the U.S. The source data SEDA is built on comes from the *EDFacts* initiative of the U.S. Department of Education. States are responsible for reporting student performance in aggregate within their boundaries and in accordance with their own standards and benchmarks for performance levels. SEDA data files are available at different levels of aggregation, including schools, school districts, counties, commuting zones, metropolitan areas, and states (Reardon et al. 2021). For the purpose of this study, a geographic school district is used as the unit of analysis. A geographic school district is defined as the aggregate of all public schools that were located within the 2019 Elementary and Unified School District Boundaries⁴ published by the National Center for Education Statistics (NCES). SEDA includes data on the average academic performance of students enrolled in 3rd through 8th grade during the school years of 2008-09 to 2017-18 in both mathematics and Reading Language Arts (RLA).

Two reporting scales were developed for the SEDA data, cohort scale (CS) and grade cohort scale (GCS). The CS scale was standardized within grade and subject, with a reference group of the averaged performance of the cohorts who were in 4th grade in 2009, 2011, 2013 and

³ Version 4.0 is updated with data for 2016-2017 and 2017-2018 school years. For more information, see <https://edopportunity.org/>

⁴ For more information, see <https://nces.ed.gov/programs/edge/Geographic/DistrictBoundaries>

2015. The measured academic achievement is reported in standard deviations and is to be interpreted as effect size relative to the reference group when in the same grade. The data on the school district level contained the same categories of information for the two scales. The CS data was used for the present study because student performances on this scale are comparable across states and years and is recommended for research purposes (Reardon et al. 2021). In addition, although the CS scale does not allow for absolute comparisons across grades, it fulfills the aim of this study to compare student performances in the same grade level over time.

American Community Survey–Education Tabulation⁵ (ACS-ED)

ACS-ED is an annual nationwide survey that collects and provides reliable information on social, economic, housing, and demographic data about the U.S. population. ACS-ED data files are available for the nation, states⁶ and school districts. ACS-ED is a collaborative effort between the Census Bureau and the National Center for Education Statistics (NCES) and is tailored to report the community characteristics of school districts. Since it is updated based on the American Community Survey (ACS) five-year estimates, it also reports data over five-year periods. The ACS-ED data files are available on total populations, school-age children, and the parents of school-age children in the school district. A child is determined as relevant to a school district if they live within its boundaries at the time of data collection. Because the focus of this analysis is students enrolled in public schools, only data on relevant children enrolled in public schools and their parents were used.

ACS-ED data was used in this study for data on the control variables as well as on multiple measures of the size of ethnic communities. The control variables of family SES and

⁵ For more information, see <https://nces.ed.gov/programs/edge/Demographic/ACS>.

⁶ 50 U.S. states, the District of Columbia, and Puerto Rico

housing conditions were identified in this data. Specifically, family SES was further broken down into parental educational attainment, median family income, and self-employment rate. Housing conditions were identified through school-aged child residential mobility and median home value.

Local Education Agency Finance Survey⁷ (F-33)

The Local Education Agency (School District) Finance Survey features school district level fiscal data. This annual survey is part of the Common Core of Data (CCD), the Department of Education's primary database for public elementary and secondary education in the U.S. The survey reports detailed revenues and expenditures for the fiscal year. F-33 data across fiscal years 2013-2017 were used for the analysis for consistency with the five-year span of the ACS-ED data.

Local Education Agency (School District) Universe Survey Data⁸

To calculate the per-pupil expenditures and revenues, student membership data was adopted from the CCD's Local Education Agency (School District) Universe Survey Data. The survey provides information about school districts' directory information, student membership by grade, race/ethnicity and sex, as well as student counts of those with disabilities and/or who are English learners.

⁷ For more information, see https://nces.ed.gov/ccd/data/txt/sdf17_1a_layout.txt.

⁸ For more information, see <https://nces.ed.gov/ccd/pubagency.asp>

Methods

Dependent Variable

The Asian-White gap is operationalized as the difference in standardized test scores between Asian-American students and White students in the same school district. In the SEDA data, the racial/ethnic achievement gaps by subject are pre-calculated by subtracting the average test score of one racial/ethnic subgroup from that of another. For example, the White-Asian gap in a district was calculated by taking the difference between the average score of students who identify as Asian and that of students in the same grade level who identify as White. In this analysis, all observations with no reported or calculable White-Asian gap were excluded from the study. The sign has been reversed for all observations to represent the Asian-White gap and for consistency with the rest of the analysis.

Independent Variables

Size of Asian ethnic communities were determined through multiple measures that were available in the ACS-ED⁹ data. First, the percentage of students identified as Asian (CDP05_25pct) was adapted from the survey of demographic characteristics of children (CDP05). It is important to note that because the *EDFacts* data does not differentiate between students who identify as Asian and those as Pacific Islanders, the SEDA data reports both groups together as “Asian”. For consistency, the percentage of students identified as Pacific Islanders (CDP05_33pct) was combined with CDP05_25pct. Second, the percentages of parents in the same districts who identify as Asian (PDP05_30pct) or Pacific Islander (PDP05_38pct) were adapted from the survey of demographic characteristics of parents (PDP05) and then combined

⁹ For a complete list of available data tables, see <https://nces.ed.gov/programs/edge/Demographic/ACS>.

likewise. Then, the nativity of students was adapted from the survey of social characteristics of children (CDP02) through the percentages of school-aged children born in Asia (CDP02_47pct) or Oceania (CDP02_49pct). Finally, the nativity of parents was adapted from the survey of social characteristics of parents (PDP02) using the same items (PDP02_76pct and PDP02_78pct, respectively).

Data on student population on the school district level was collected for academic years 2013-2017. For the 13-14, 14-15, and 15-16 school years, the original data included total numbers of K-12 students in each district. However, there was no aggregate count for years 16-17 and 17-18. For these years, the student counts in K-12 were calculated through adding the number of student in each disaggregated category of grade, race/ethnicity and sex. The average per-pupil expenditure and revenue was calculated on a yearly basis, by dividing the total expenditures and revenues by the total enrollment of students, respectively (National Science Foundation).

Control Variables

Parental educational attainment is defined as the highest degree completed by a parent of a relevant child. In ACS-ED, data were tabulated for individuals 18 years of age or older at the time of the survey. Individuals enrolled in school at the time reported their highest degree received/grade attended. Educational attainment was adapted from PDP02, measured through the percentage of parents with a Bachelor's or higher degree (PDP02_38pct).

Family income is defined as the sum of all sources of income among all members of a family in the past 12 months. The incomes of family members who were not residing with the rest of the family were also accounted for. Types of income and benefit considered included but

are not limited to: “wage or salary income, net self-employment income, interest, dividends, or net rental or royalty income or income from estates and trusts” and all other income such as unemployment compensation that are considered “other kinds of periodic income other than earnings”¹⁰. The reported income was also adjusted for inflation. The dollar values of individual income using the monthly Consumer Prices Indices (CPI). The measure of median family income (DP03_86est) was taken from the total population tabulation because it uses the family as the unit of analysis, rather than the single worker used in the parent population data. All median family incomes estimated at or above \$250,000 were recoded as \$250,000, since the exact original amounts are not displayed in the ACS data.

Self-employment rate is defined as the proportion of parents in the workforce who report themselves as “self-employed in own not incorporated business, professional practice, or farm”¹¹. The question of self-identified class or worker was asked of individuals 15 and above and who had worked in the past 5 years at the time¹². Self-employment in the school district was adapted from the survey of economic characteristics of parents (PDP03), measured through the percentage of parents who identify as “Self-employed in own not incorporated business workers”¹³ (PDP03_45pct).

School-aged child residential mobility is defined as the proportion of students in a district that have experienced any change in primary residence in the past year. The measure was adapted from the survey of social characteristics of children (CDP02), measured by the percentage of children living in a different household in the U.S. (CDP02_22pct) and the

¹⁰ U.S. Census Bureau, *American Community Survey and Puerto Rico Community Survey 2017 Subject Definitions*, 84.

¹¹ U.S. Census Bureau, *American Community Survey 2017 Subject Definitions*, 57.

¹² For those who were employed and working a single job at the time, the person’s job during the previous week was used. For those working more than one job, the job they worked the greatest number of hours was used. For those unemployed at the time but held jobs in the past 5 years, their most recent job was used.

¹³ U.S. Census Bureau, *American Community Survey 2017 Subject Definitions*, 57.

percentage of children whose primary residence one year ago was abroad (CDP02_27pct). Since both capture residential instability within the past 12 months, the two measures were combined to reflect student residential mobility.

Home value was adapted from the survey of housing characteristics of children (CDP04), measured by the median value of owner-occupied units in U.S. dollars (CDP04_84est). In the survey, the reported value of a home is the respondent's estimate of the selling price of the property. All home values estimated at or above \$2,000,000 were recoded as \$2,000,000, since the original amounts are not displayed in the ACS data.

Regression Analysis

Ordinary Least Squares (OLS) regression analysis was used to estimate the effect of the size of co-ethnic communities on student achievement outcomes after controlling for other school district characteristics. A regression analysis was used for the purpose of this study because it permits the identification of the independent effect of each predictor variable on the response variable. In this analysis, the response, or dependent variable in the regression is the measure of student achievement in standardized test score. The predictor, or independent variables are the size of co-ethnic communities and district-level characteristics. In addition, the analysis was conducted separately for the subjects of mathematics and RLA. The model is for school district k on subject b :

$$Test\ Score_{k,b} = \beta_0 + \beta_1 CSize_k + \beta_2 Inc_k + \beta_3 PEd_k + \beta_4 SEmp_k + \beta_5 HMob_k + \beta_6 HVal_k + \beta_7 TRev_k + \beta_8 TExp_k + \varepsilon_{k,b} \quad (1)$$

Where *Test Score* is the standardized test score; *Csize* is the estimated size of co-ethnic communities for Asian/Asian American populations in the school district; *Inc* is the median

family income in the past year; *Ped* is the percentage of parents with a Bachelor's degree or higher; *Semp* is the percentage of self-employed parents ; *Hmob* is the percentage of children who experienced residential mobility in the past year; *Hval* is the median estimated home value of owner-occupied housing units with school-aged children in the district. *Trev* is the total revenues of the district and *Texp* is the total expenditures, both averaged over the five years of analysis. Log transformation was performed on the terms of median income, median home value, total revenues and total expenditures before added to the regression models.

In Neymotin's (2010) study of the relationship between school funding and student achievement, a cross-sectional OLS was also employed, after controlling for variables that describe both school districts and the districts' populations. Importantly, the analysis is based on the standard assumption that school district characteristics serve as a proxy for a district's quality (Neymotin 2010). As each of the characteristics has been empirically shown to be associated with student achievement outcomes, the measured relationship between test score and size of co-ethnic community would be biased if these observable characteristics are omitted from the analysis.

Several previous studies that are quantitative in their analyses of the effect of ethnic communities relied on the strength or density of ethnic communities. On the individual level, Zhou and Bankston (1994) evaluated the Vietnamese youth's involvement in their ethnic community through measures of whether Vietnamese was spoken at home, student's own ethnicity, ethnicity of close friends and the likelihood of endogamy. On the community level, Kroneberg (2008) measured density of ethnic communities through the percentage of parents who self-report as socializing mainly with others of the same national origin. Due to the lack of an existing measure of the size of an ethnic community that is widely applied, the four available

proxies of the same construct are used in separate regressions. The four measures were not combined into one in the analysis because they capture different populations in the communities: school-aged children and their parents. Additionally, because the data does not provide information on the correspondence in parent and child nativities, both first- and second-generation Asian American students were included here. Based on (1), the four specified models are as follows:

$$Test\ Score_{k,b} = \beta_0 + \beta_1 SPctAsian_k + \beta_2 Inc_k + \beta_3 PEd_k + \beta_4 SEmp_k + \beta_5 HMob_k + \beta_6 HVal_k + \beta_7 TRev_k + \beta_8 TExp_k + \varepsilon_{k,b} \quad (2)$$

$$Test\ Score_{k,b} = \beta_0 + \beta_1 SPctBorn_k + \beta_2 Inc_k + \beta_3 PEd_k + \beta_4 SEmp_k + \beta_5 HMob_k + \beta_6 HVal_k + \beta_7 TRev_k + \beta_8 TExp_k + \varepsilon_{k,b} \quad (3)$$

$$Test\ Score_{k,b} = \beta_0 + \beta_1 PPctAsian_k + \beta_2 Inc_k + \beta_3 PEd_k + \beta_4 SEmp_k + \beta_5 HMob_k + \beta_6 HVal_k + \beta_7 TRev_k + \beta_8 TExp_k + \varepsilon_{k,b} \quad (4)$$

$$Test\ Score_{k,b} = \beta_0 + \beta_1 PPctBorn_k + \beta_2 Inc_k + \beta_3 PEd_k + \beta_4 SEmp_k + \beta_5 HMob_k + \beta_6 HVal_k + \beta_7 TRev_k + \beta_8 TExp_k + \varepsilon_{k,b} \quad (5)$$

Additionally, to better understand how Asian American students and White students differ in how the size of Asian ethnic communities might impact the two groups. Regressions were run using the same models and separately for the two subjects. The general model for a racial group r in school district k on subject b is as follows:

$$Test\ Score_{r,k,b} = \beta_0 + \beta_1 CSize_k + \beta_2 Inc_k + \beta_3 PEd_k + \beta_4 SEmp_k + \beta_5 HMob_k + \beta_6 + \beta_7 TRev_k + \beta_8 TExp_k + \varepsilon_{r,k,b} \quad (6)$$

Based on (6), the specified models are as follows:

$$Test\ Score_{r,k,b} = \beta_0 + \beta_1 SPctAsian_k + \beta_2 Inc_k + \beta_3 PEd_k + \beta_4 SEmp_k + \beta_5 HMob_k + \beta_6 HVal_k + \beta_7 TRev_k + \beta_8 TExp_k + \varepsilon_{r,k,b} \quad (7)$$

$$Test\ Score_{r,k,b} = \beta_0 + \beta_1 SPctBorn_k + \beta_2 Inc_k + \beta_3 PEd_k + \beta_4 SEmp_k + \beta_5 HMob_k + \beta_6 HVal_k + \beta_7 TRev_k + \beta_8 TExp_k + \varepsilon_{r,k,b} \quad (8)$$

$$Test\ Score_{r,k,b} = \beta_0 + \beta_1 PPctAsian_k + \beta_2 Inc_k + \beta_3 PEd_k + \beta_4 SEmp_k + \beta_5 HMob_k + \beta_6 HVal_k + \beta_7 TRev_k + \beta_8 TExp_k + \varepsilon_{r,k,b} \quad (9)$$

$$Test\ Score_{r,k,b} = \beta_0 + \beta_1 PPctBorn_k + \beta_2 Inc_k + \beta_3 PEd_k + \beta_4 SEmp_k + \beta_5 HMob_k + \beta_6 HVal_k + \beta_7 TRev_k + \beta_8 TExp_k + \varepsilon_{r,k,b} \quad (10)$$

Results

Summary Statistics

The original SEDA data contained 1,295,398 records across 12,832 school districts across the U.S. Observations with no available information on the achievement differences between Asian American and White students were excluded from the analysis. 447,996 observations across 6,798 school districts were used in the analysis. Among the 843,974 excluded observations, 825,361 (97.8%) were also missing information on the number of Asian students the standardized tests were administered to and thus not allowing for an account of the Asian composition in the associated districts. However, among the 18,613 records missing Asian test information but not counts of Asian students, the average Asian student composition is 4.44%. Among the 447,996 observations included in the study, the mean proportion of Asian students taking standardized tests is also 4.44%, meaning that attrition was likely not due to systematic underrepresenting of Asian American students.

Figure 1 illustrates the mean Asian-White achievement gap by grade level for math and RLA as students progressed from 3rd grade through 8th grade. The math gap and the RLA gap both generally exhibited upwards trends, with the exception that the RLA gap reduced in size between 7th and 8th grade. Overall, the math gap was greater than the RLA gap. On average, the math gap was 0.247 standard deviations, while the average RLA gap was 0.129 standard deviations.

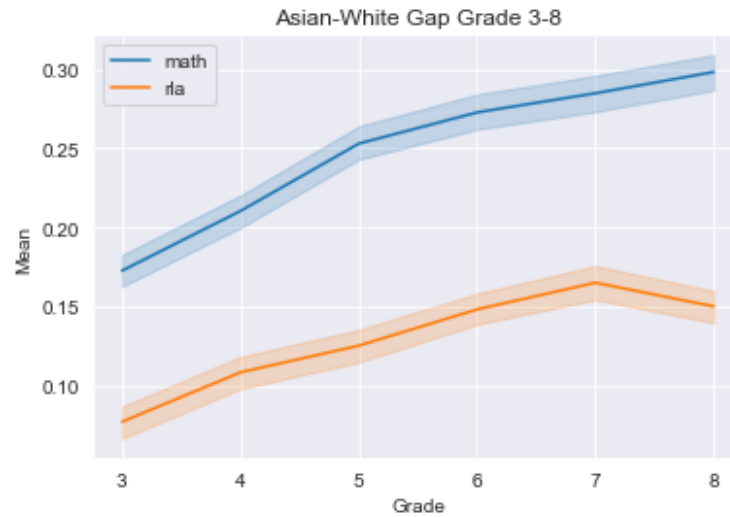


Figure 1. The Asian-White Achievement Gap, Grade 3-8

Figure 2 shows the Asian-White achievement gap between 2009 and 2018 for both subjects. Both the math gap and the RLA gap have generally widened over time. Between 2009 and 2012, the RLA gap remained close to 0. Between 2012 and 2015, the RLA gap increased from 0.01 in 2012 to 0.16 standard deviations. Similarly, the growth of the gap in math was the most significant between 2011 and 2015, rising from 0.12 to 0.27 standard deviations. Both gaps plateaued between 2015 and 2018, although the math gap continued to grow slightly between 2017 and 2018. Again, the math gap (0.241 standard deviations) is nearly twice the size of the RLA gap (0.123 standard deviations) on average.

As the difference in achievement between Asian American and White students widened over time, the two groups were showing similar trends in their absolute performances. Table 1 displays the absolute performances of Asian American and White students as they progressed through 8th grade. Asian American students exhibited growth in their performance in both math (0.62 to 0.78 standard deviations) and RLA (0.48 to 0.53 standard deviations).

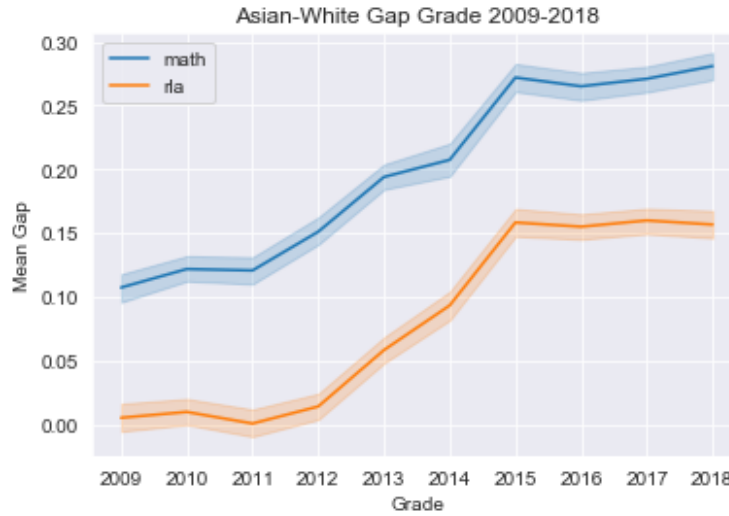


Figure 2. The Asian-White Achievement Gap, 2009-2018

White students, on the other hand, showed similar levels of math achievement between 3rd and 8th grade, while their RLA performance in fact declined from 0.28 to 0.24 standard deviations. Overall, Asian students showed improved math performance when the performance in math was consistent among White students. When the RLA performance among White students declined as they progress through school, that of Asian students still improved.

Table 1: Student Performance across Grades 3-8

Grade	Asian Math	White Math	Asian RLA	White RLA
3	0.62	0.25	0.48	0.28
4	0.66	0.24	0.50	0.27
5	0.70	0.23	0.51	0.26
6	0.73	0.24	0.52	0.25
7	0.76	0.25	0.53	0.24
8	0.78	0.26	0.53	0.24

Table 2 shows the absolute performances of Asian Americans and Whites in both math and RLA over the years of 2013-2017. As the Asian math performance lowered from 0.72 in 2013 to 0.70 standard deviations in 2017, the White math performance has also lowered, from 0.20 to 0.16 standard deviations. However, with respect to RLA performance, White students showed a slight overall decrease from 0.2 to 0.19 standard deviations, while the RLA scores of

Asian students improved from 0.51 to 0.59 standard deviations. When compared over the five-year span, White students show declined math performance and stagnant RLA performance.

Asian students also exhibited a lower performance in math but with overall higher RLA performance over time.

Table 2: Student Performance over Time

Year	Asian Math	White Math	Asian RLA	White RLA
2013	0.72	0.20	0.51	0.20
2014	0.78	0.18	0.56	0.20
2015	0.62	0.13	0.52	0.16
2016	0.68	0.15	0.58	0.19
2017	0.70	0.16	0.59	0.19

Table 3 shows the distribution of the school district characteristics from the ACS-ED survey data and the F-33 survey data. Across the school districts in this analysis, on average, 2.31% of students and 2.78% of parents of school-aged children identify as Asian, while 22.45% of foreign-born students and 24.08% of foreign-born parents were born in Asia. Districts with the largest Asian concentration have up to 73.4% of students identifying as Asian, 100% foreign-born students born in Asia, 79.3% of parents identifying as Asian, and 100% foreign-born parents born in Asia.

On average, 12.25% of students in a district moved between houses in the past 12 months with a low of 0% and a high of 54.50%. 6.93% of parents of school-aged children identifies as self-employed, ranging from 0% to 39.50% across all districts. Approximately 27.47% of parents held a bachelor's or higher degree on average, while that percentage in some districts was as high as 96.4% and as low as 0%. The average median income is \$69,955, while some districts had a median income of more than \$250,000 and others as low as \$21,267. The average median home value in a district is \$205,350, with a high of \$2,000,000 or above and a low of \$0. The per-pupil revenues of school districts averaged at \$13,052.63, with some districts having

revenues as high as \$61,611.92 and as low as \$2085.61, averaged across the years of 2013-2017.

The average per-pupil expenditures of school districts was \$12,999.79, with some district expenditures as high as \$63,723.84 and as low as \$1809.21, averaged across the years of 2013-2017. These characteristics are used as control variables in the regression analysis.

Table 3: School District Characteristics

	min	max	mean	std
asian_pct (%)	0.00	73.40	2.32	5.69
asian_born (%)	0.00	100.00	22.49	34.93
move_us (%)	0.00	54.50	12.26	6.76
parent_asian_pct (%)	0.00	79.30	2.79	6.64
self_emp (%)	0.00	39.50	6.92	4.86
parent_asian_born (%)	0.00	100.00	24.06	31.77
bachelors (%)	0.00	96.40	27.52	17.59
median_income (U.S. dollars)	21267	250000	70031	26835
home_val (U.S. dollars)	0	2000000	205750	195706
exp_per_pupil (U.S. dollars)	1809.21	63723.84	12999.79	4866.82
rev_per_pupil (U.S. dollars)	2085.61	61611.92	13052.63	4740.94

Regression Analysis on Achievement Gaps

Table 4 displays the cross-sectional regressions on the Asian-White achievement gap in math between 2013 and 2017. Across all four models, the same district control characteristics were used with different measures of the size of Asian ethnic communities in the district—the percentage of students who identify as Asian (*percent asian*), the percentage of foreign-born students born in Asia (*percent asian born*), the percentage of parents who identify as Asian (*parent asian pct*), and the percentage of foreign-born parents born in Asia (*parent asian born*).

In all four models, the percentage of parents of school-aged children with a bachelor's or higher degree (*bachelors*) was significant in its relationship with the Asian-White achievement gap in math. Specifically, *bachelors* is positively correlated with the gap, meaning that the Asian-White gap in math would be wider in a district with more highly educated parents. Median home value (*home value*), another indicator of SES, was also uniformly positively associated with the gap, although with no statistical significance. None of the measures of Asian ethnic

community size was statistically significant in the analysis. In other words, the size of ethnic communities in the district does not have a direct effect on the Asian-White gap in math achievement.

Table 4: Regressions on Math Achievement Gap

	<i>Dependent variable: Asian-White gap in math</i>			
	Model 1	Model 2	Model 3	Model 4
percent asian	0.000 (0.000)			
percent asianborn		-0.000 (0.000)		
parent asian pct			0.000 (0.000)	
parent asian born				-0.000 (0.000)
bachelors	0.001*** (0.000)	0.002*** (0.000)	0.001*** (0.000)	0.002*** (0.000)
home value	0.016 (0.027)	0.027 (0.024)	0.012 (0.027)	0.026 (0.024)
median income	-0.038 (0.069)	-0.048 (0.068)	-0.035 (0.069)	-0.043 (0.068)
moved last year	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)	-0.000 (0.001)
self employed	-0.001 (0.002)	-0.002 (0.002)	-0.001 (0.002)	-0.002 (0.002)
per pupil expenditures	0.051 (0.119)	0.047 (0.119)	0.051 (0.119)	0.049 (0.119)
per pupil revenues	-0.063 (0.124)	-0.054 (0.124)	-0.063 (0.124)	-0.057 (0.124)
Observations	654	654	654	654
R^2	0.927	0.927	0.927	0.927
Adjusted R^2	0.926	0.926	0.926	0.926
Residual Std. Error	0.090(df = 643)	0.090(df = 643)	0.090(df = 643)	0.090(df = 643)
F Statistic	815.069*** (df = 8.0; 643.0)	815.434*** (df = 8.0; 643.0)	815.744*** (df = 8.0; 643.0)	814.812*** (df = 8.0; 643.0)

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 5 displays the cross-sectional regressions on the Asian-White achievement gap in RLA between 2013 and 2017. Across all four models, the same district control characteristics were used with different measure of the size of Asian ethnic communities in the district. In all four models, *bachelors* and *home value* were both positively correlated with the Asian-White gap. In the math achievement model, *home value* was also positive across all four models but not

significant. Other district characteristics were not significant in any of the models. Interestingly, *median income*, although not significant, was negative in its relationship with the gap in both subjects.

Table 5: Regressions on RLA Achievement Gap

	<i>Dependent variable: Asian-White gap in RLA</i>			
	Model 1	Model 2	Model 3	Model 4
percent asian	-0.000 (0.000)			
percent asian born		-0.000*** (0.000)		
parent asian pct			0.000 (0.000)	
parent asian born				-0.000** (0.000)
bachelors	0.001** (0.000)	0.001*** (0.000)	0.001** (0.000)	0.001*** (0.000)
home value	0.065*** (0.024)	0.063*** (0.022)	0.061** (0.025)	0.061*** (0.022)
median income	-0.044 (0.062)	-0.048 (0.061)	-0.041 (0.062)	-0.036 (0.061)
moved last year	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
self employed	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)
per pupil expenditures	0.087 (0.108)	0.078 (0.107)	0.087 (0.108)	0.084 (0.107)
per pupil revenues	-0.130 (0.112)	-0.118 (0.111)	-0.131 (0.112)	-0.128 (0.111)
Observations	650	650	650	650
R^2	0.924	0.925	0.924	0.925
Adjusted R^2	0.923	0.924	0.923	0.924
Residual Std. Error	0.081(df = 639)	0.080(df = 639)	0.081(df = 639)	0.080(df = 639)
F Statistic	777.614*** (df = 10.0; 639.0)	793.547*** (df = 10.0; 639.0)	777.647*** (df = 10.0; 639.0)	785.021*** (df = 10.0; 639.0)

Note:

*p<0.1; **p<0.05; ***p<0.01

Two of the four different measures of the size of ethnic communities were significant in their relationship with the achievement gap in RLA. However, the magnitude of these effects is relatively small. One percentage point increase in the proportion of Asian-born students (Model 2) or one percentage point increase in the proportion of Asian-born parents (Model 4) lowers the RLA achievement gap by less than 0.001 standard deviations.

Regression Analysis on Achievement Levels

Table 6 shows the cross-sectional regressions on the math achievement among Asian American students between 2013 and 2017. The same district characteristics were included across the models. Like the general models in Table 4 and Table 5, the only difference among these models was the independent variable used to measure the size of Asian ethnic communities in the district. Table 7 displays the regressions on the Asian RLA performance. None of the four measures was significant in their correlation with Asian achievements in either subject.

Overall, having a larger Asian ethnic community does not enhance the math or RLA performance among Asian American students in the district. An additional percentage of Asian students in the district lowers the average Asian math test score by 0.002 and RLA test score by 0.001 standard deviations, holding all other variables constant. An increase of one percentage point in the percentage of parents who identified as Asian lowers both the Asian math and RLA achievements by 0.001 standard deviations. An increase of one percentage point in the percentage of Asian-born parents is associated with a decrease of 0.001 standard deviations in the Asian math achievement.

The percentage of parents with a bachelor's or higher degree (*bachelors*), median home value (*home value*) and per-pupil revenues (*per pupil revenues*) were positive and significant across all four models on both subjects. On the other hand, student residential mobility (*moved last year*), percentage of parents who are self-employed (*self employed*) and per-pupil expenditures (*per pupil expenditures*) were uniformly negatively correlated with the math and RLA performances among Asian students with significance. Asian American students achieve higher levels of math and RLA performance in a district with more highly-educated parents, higher median home value and greater per-pupil revenues. Their math and RLA achievements

are lowered in districts with a higher percentage of students who moved between households, more self-employed parents, and greater per-pupil expenditures.

In general, the same district level predictors explained more variability in the math performance compared to the RLA performance among Asians, as evidenced by the different R-squared values (0.685 and 0.647, respectively).

Table 6: Regressions on Asian Math Achievement

	<i>Dependent variable: Asian Math Achievement</i>			
	Model 1	Model 2	Model 3	Model 4
percent asian	-0.002 (0.001)			
percent asian born		-0.000 (0.000)		
parent asian pct			-0.001 (0.001)	
parent asian born				-0.001 (0.001)
bachelors	0.017*** (0.001)	0.018*** (0.001)	0.017*** (0.001)	0.018*** (0.001)
home value	0.265*** (0.093)	0.219*** (0.084)	0.240** (0.095)	0.216** (0.084)
median income	-0.003 (0.240)	0.033 (0.237)	0.021 (0.240)	0.045 (0.236)
moved last year	-0.010*** (0.003)	-0.010*** (0.003)	-0.010*** (0.003)	-0.010*** (0.003)
self employed	-0.035*** (0.006)	-0.033*** (0.006)	-0.034*** (0.006)	-0.034*** (0.006)
per pupil expenditures	-1.225*** (0.419)	-1.233*** (0.419)	-1.224*** (0.419)	-1.229*** (0.419)
per pupil revenues	1.274*** (0.435)	1.273*** (0.435)	1.268*** (0.435)	1.265*** (0.435)
Observations	654	654	654	654
R^2	0.685	0.685	0.685	0.685
Adjusted R^2	0.681	0.681	0.681	0.681
Residual Std. Error	0.320(df = 645)	0.320(df = 645)	0.320(df = 645)	0.320(df = 645)
F Statistic	175.378*** (df = 8.0; 645.0)	175.075*** (df = 8.0; 645.0)	174.969*** (df = 8.0; 645.0)	175.145*** (df = 8.0; 645.0)

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 7: Regressions on Asian RLA Achievement

	<i>Dependent variable: Asian RLA Achievement</i>			
	Model 1	Model 2	Model 3	Model 4
percent asian	-0.001 (0.001)			
percent asian born		0.000 (0.000)		
parent asian pct			-0.001 (0.001)	
parent asian born				-0.000 (0.001)
bachelors	0.012*** (0.001)	0.012*** (0.001)	0.012*** (0.001)	0.012*** (0.001)
home value	0.430*** (0.083)	0.389*** (0.075)	0.410*** (0.085)	0.388*** (0.075)
median income	0.083 (0.216)	0.130 (0.213)	0.104 (0.217)	0.126 (0.213)
moved last year	-0.010*** (0.003)	-0.010*** (0.003)	-0.010*** (0.003)	-0.010*** (0.003)
self employed	-0.027*** (0.006)	-0.025*** (0.005)	-0.026*** (0.006)	-0.026*** (0.005)
per pupil expenditures	-1.395*** (0.374)	-1.389*** (0.375)	-1.396*** (0.374)	-1.397*** (0.375)
per pupil revenues	1.165*** (0.389)	1.152*** (0.390)	1.161*** (0.390)	1.159*** (0.390)
Observations	650	650	650	650
R^2	0.647	0.647	0.647	0.647
Adjusted R^2	0.643	0.642	0.642	0.642
Residual Std. Error	0.284(df = 641)	0.284(df = 641)	0.284(df = 641)	0.284(df = 641)
F Statistic	147.021*** (df = 8.0; 641.0)	146.665*** (df = 8.0; 641.0)	146.677*** (df = 8.0; 641.0)	146.605*** (df = 8.0; 641.0)

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 8 displays the regressions on the math achievement among White students. Table 9 shows the regressions on the White RLA achievement. The size of Asian ethnic communities was significant in all of the four models on both subjects for White students. Overall, having a larger Asian ethnic community in the district is associated with lower performance among White students. One percentage point increase in the proportion of Asian students in the district lowers the average White test scores in math by 0.005 and RLA by 0.004 standard deviations, holding all other variables constant. One percentage point increase in the percentage of Asian-born students lowers the White math and RLA achievements by 0.001 standard deviations. An

increase of one percentage point in the percentage of Asian parents lowers the White test scores in math by 0.004 and RLA by 0.003 standard deviations. Finally, one percentage point increase in the proportion of Asian-born parents is associated with a drop in math achievement by 0.003 and RLA achievement by 0.002 standard deviations.

Table 8: Regressions on White Math Achievement

	<i>Dependent variable: White Math Achievement</i>			
	Model 1	Model 2	Model 3	Model 4
percent asian	-0.005*** (0.001)			
percent asian born		-0.001*** (0.000)		
parent asian pct			-0.004*** (0.001)	
parent asian born				-0.003*** (0.000)
bachelors	0.011*** (0.001)	0.012*** (0.001)	0.011*** (0.001)	0.012*** (0.001)
home value	-0.024 (0.055)	-0.150*** (0.049)	-0.008 (0.056)	-0.162*** (0.049)
median income	0.482*** (0.141)	0.572*** (0.140)	0.468*** (0.141)	0.620*** (0.137)
moved last year	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)	0.001 (0.002)
self employed	-0.007* (0.004)	-0.003 (0.004)	-0.007* (0.004)	-0.006 (0.004)
per pupil expenditures	-0.054 (0.246)	-0.088 (0.247)	-0.058 (0.245)	-0.080 (0.243)
per pupil revenues	0.438* (0.255)	0.446* (0.257)	0.439* (0.255)	0.417* (0.253)
Observations	654	654	654	654
R^2	0.757	0.754	0.757	0.762
Adjusted R^2	0.754	0.751	0.754	0.759
Residual Std. Error	0.188(df = 645)	0.189(df = 645)	0.188(df = 645)	0.186(df = 645)
F Statistic	250.652*** (df = 8.0; 645.0)	247.492*** (df = 8.0; 645.0)	251.450*** (df = 8.0; 645.0)	257.679*** (df = 8.0; 645.0)

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 9: Regressions on White RLA Achievement

	<i>Dependent variable: White RLA Achievement</i>			
	(1)	(2)	(3)	(4)
percent asian	-0.004*** (0.001)			
percent asian born		-0.001*** (0.000)		
parent asian pct			-0.003*** (0.001)	
parent asian born				-0.002*** (0.000)
bachelors	0.010*** (0.001)	0.011*** (0.001)	0.010*** (0.001)	0.011*** (0.001)
home value	0.112** (0.046)	0.011 (0.042)	0.119** (0.047)	0.002 (0.041)
median income	0.280** (0.120)	0.358*** (0.119)	0.274** (0.121)	0.394*** (0.117)
moved last year	0.002 (0.002)	0.002 (0.002)	0.002 (0.002)	0.001 (0.002)
selfemployed	-0.002 (0.003)	0.001 (0.003)	-0.002 (0.003)	-0.001 (0.003)
per pupil expenditures	-0.043 (0.208)	-0.074 (0.209)	-0.045 (0.209)	-0.067 (0.206)
per pupil revenues	0.267 (0.217)	0.281 (0.218)	0.266 (0.217)	0.256 (0.215)
Observations	650	650	650	650
R^2	0.779	0.777	0.779	0.783
Adjusted R^2	0.776	0.774	0.776	0.781
Residual Std. Error	0.158(df = 641)	0.159(df = 641)	0.158(df = 641)	0.156(df = 641)
F Statistic	282.533*** (df = 8.0; 641.0)	279.414*** (df = 8.0; 641.0)	281.855*** (df = 8.0; 641.0)	289.725*** (df = 8.0; 641.0)

Note:

*p<0.1; **p<0.05; ***p<0.01

The percentage of parents with a bachelor's or higher degree (*bachelors*) and median family income (*median income*) were consistently positive and significant across all models on both subjects. In other words, White students achieve higher levels of math and RLA performance in a district with more highly-educated parents and higher median family income.

In two of the models, on the other hand, median home value (*home value*) was negative and significant in their relationship with the White math achievement, when the percentage of Asian-born students or Asian-born parents was used. *home value*, interestingly, was positive with significance in two of the models predicting White RLA achievement, when the percentage of Asian students or Asian parents in the district was used. Additionally, while *per pupil revenues*

remained significant in its positive relationship with White math achievement, it did not exhibit any significance for RLA.

The average math performance among White students would be higher in a district with more highly educated parents, lower median home value, higher median family income, a lower percentage of self-employed students, and higher per-pupil revenues. *bachelors*, *home value* and *median income* were also significant in explaining the academic performance among White students in RLA. Unlike the case with Asian achievements, the same district level predictors explained more variability in the White student performance in RLA ($R^2 = 0.779$) compared to that in math ($R^2 = 0.757$).

Discussion

The present study aimed to test the model minority theory, which posits that Asian Americans display uniformly higher academic performance compared to students of other races/ethnicities (Kao 1995; Kiang et al. 2017). As students progressed from 3rd through 8th grade, the gap in both math and RLA performances exhibited overall upwards trends, suggesting that Asian American students consistently showed an academic advantage in their math and RLA performances. Although the achievement gap in both subjects has widened over students' time at school, when examined as a function of time, Asian American students did not always exhibit an academic advantage in RLA. Despite that the average Asian-White gap remained non-negative during 2013-2017, Asian American students did not show a consistently higher performance relative to their White peers in RLA. This partly refutes the model minority theory, as the Asian academic advantage was not always present across both subjects, although more pronounced and consistent in math achievement.

The finding is in congruence with previous studies that supported Asian academic advantages to a limited extent. For example, Pang et al. (2011) showed that when studied as a group, AAPI students outperform White students in math while underperforming in reading. Kao (1995) found that Asian Americans have higher math scores but only comparable reading scores relative to Whites. Although Asian American students never underperformed their White peers on average in this study, their advantage in RLA did not persist. This finding conflicts with studies that fully endorsed the model minority theory (e.g. Clotfelter 2009; Fuligni 1997; Konstantopoulos 2009). Although the results generally support that the Asian-White gap was more pronounced in math than reading, Konstantopoulos (2009) found a consistent pattern in the positive gap that supported the model minority theory, which was not the case in this study.

With respect to the achievement gap as a dynamic process, there is no consensus on the timing of the onset of distinguishable academic achievement in the literature. Hsin and Xie (2014) found that Asian American children enter school with no discernable academic advantage, which only becomes visible from 5th grade onward. In contrast, Wang (2008) argued that Asian American children are already exhibiting higher performance on measures of literacy, math, and motor skills as early as during their Pre-K years. In this study, starting in 3rd grade, the Asian-White achievement gap in math and RLA were 0.17 and 0.08 standard deviations, respectively. Although this does not point to the emergence of academic differentials prior to formal schooling, it provides evidence that the observed differences may have begun to show earlier than 5th grade.

Another goal of the present study was to test the selective assimilation theory, which claims that minority children who are well-situated in their ethnic communities have access to resources that enhance their educational and occupational outcomes (Portes and Zhou 1993). The

size of Asian ethnic communities in a given district does not seem to exhibit any significance in predicting the Asian-White math and ELA achievements. When examined separately, Asian American students and their White peers were affected differently by the presence of Asian ethnic communities in the district. Overall, the size of Asian ethnic communities does not bear any significance in explaining the Asian performance in math or RLA, while negatively associated with the performance of White students on the same subjects. That is, in the same district where all other characteristics are the same for both groups, having larger Asian ethnic communities does not affect the academic achievement of Asian American students but compromises that of White students.

These results do not lend direct support to the selective assimilation theory, in that a positive and significant relationship was not found between the size of Asian ethnic communities in a district and the Asian-White achievement gap in either subject. On the other hand, however, the ethnic community size was negatively associated with the performance of White students in both math and RLA. A difference in the proportion of students who identify as Asian of 10 percentage points can mean a performance difference among White students as much as 0.05 standard deviations in math and 0.04 standard deviations in RLA.

While the present study does not provide evidence for the Asian American academic advantage to be explained by the selective assimilation theory, it does point to the fact that White students' performance can be inversely compromised by a larger presence of Asian ethnic communities, especially when measured by the proportion of students or parents who identify as Asian. The present study does not provide any explanation for this observation and future studies should further examine the effect of the presence of minority student groups on White students' academic achievement. Student composition has been examined in association with the Black-

White achievement gap. Controlling for school characteristics, schools with the highest concentration of black students exhibited the greatest Black-White achievement gap in mathematics (Bohrnstedt et al. 2015). Additionally, the mechanism through which White student performance is impacted by the presence of a larger Asian American student body should be further studied. Bankston and Caldas (2000) found the Black-White gap to be greater in districts with fewer White students enrolled in public schools.

Another finding of the present study is the extent to which the performances of Asian American and White students can be explained by the same set of district level variables. For Asian students, most factors that contribute to the overall SES of the district, student housing mobility, and district funding were significant and consistent in their relationship with their achievement in both subjects. However, only parental education and median income remained significant in their correlation with White math and RLA achievements. Furthermore, while median home value negatively predicts White math achievement, it positively predicts their RLA achievement.

Limitations

The study is not without limitations. First, the SEDA data does not disaggregate Asian American students further into ethnic groups, not allowing for analyses of the relationship between the size of ethnic communities and student achievement by their ethnicity. In the ACS-ED sample, approximately 23% of students who identified as Asian were Asian Indians, 24% Chinese, 20% Korean and 2% Japanese. The remaining 31% of the Asian student population was composed of 13% Filipino, 9% Vietnamese and 19% students who identified as Other Asian. Pang et al. (2011) found that in math, Chinese Americans, Korean Americans, Japanese

Americans, Vietnamese Americans, Asian Indian Americans and Other Asian Americans outperformed their White peers, while Filipino Americans scored significantly lower than Whites. Inter-ethnic heterogeneity in reading test scores was also identified (Pang et al. 2011). In districts a single ethnicity dominates the Asian student population, the educational experiences and outcomes of students from smaller ethnic groups may be masked and underrepresented (Tran and Birman 2010). Thus, investigating the effect of the size of ethnic communities on the relative performance of students of specific ethnic groups may yield divergent findings.

Second, the inclusion of control variables on the school district level is by no means exhaustive. When also accounting for other potential factors significant in their relationship with the Asian-White achievement gap, the size of Asian ethnic communities may exhibit reduced significance.

Conclusion

The primary goal of the present study was to explore the effect of co-ethnic community size on the Asian-White achievement gap in mathematics and Reading Language Arts (RLA) on the school district level. To that end, district characteristics were included in the analysis as control variables. Using linear regression models, it was found that the size of Asian ethnic communities in a school district does not have an effect on the achievement differences between Asian American and White students on both subjects. This does not provide direct support for the selective assimilation theory, positing that stronger attachment to the co-ethnic community leads to better educational outcomes among minority students than native-born Whites (Zhou and Bankston 1998).

Although Asian American students do not seem to benefit from a greater presence of other Asian students and parents, there is evidence that White performance on math and RLA are

negatively correlated with the size of Asian ethnic communities in the district. Additionally, although Asian American students are exhibiting higher academic achievement relative to their White peers, this advantage does not persist. This partly refutes the model minority theory, by which Asian American students consistently outperform White students. Asian American students and White students are affected differently in their academic performance in both subjects. It is possible that these academic achievements by race are accounted for by different sets of factors, at least on the district level.

Unlike previous studies that examined the extent to which individual students are involved in their ethnic communities to measure how much they are influenced by their culture and structure, this study showed that the mere presence of a larger co-ethnic community in the district is not associated with a wider Asian-White performance gap. In other words, the size of these Asian co-ethnic communities is not nearly as crucial in addressing the academic advantage among Asian American students as other characteristics, such as how individual students are positioned in these ethnic networks and what types of resources they have access to.

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