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Who Benefits from Income Inequality? An International Examinationof the Relationship Between Income Inequalityand Student Achievement

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ABSTRACT

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This study directly tests the relationship between income inequality and student mathematics achievement. Furthermore, I examine the degree to which the relationship between income inequality and student achievement is moderated by student SES. To test these relationships, I created a database of national wealth measures and linked it with student achievement data from the 2009 Programme for International Student Assessment (PISA). The results of multilevel models indicated that income inequality is negatively related to student achievement scores. Additionally, this relationship is not moderated by student SES, indicating that the relationship between income inequality and student achievement is the same for both low- and high-SES students. The results of this study suggest that nations seeking to improve student achievement can do so by decreasing income inequality.

Keywords: income inequality, student achievement, socio-economic status, international, education, PISA

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Concern about income inequality continues to grow throughout the world, especially as it has reached its highest level in 30 years within wealthy nations (OECD 2014a). According to a recent survey conducted by the Pew Research Center (2014), the majority of citizens living in the US and Europe say that the growing gap between the rich and the poor is a serious threat to the world today. This growing concern lies not just with inequality itself, but also with its reaching effects.

Of particular concern is how income inequality is related to educational outcomes in a nation. For example, scholars have expressed concern that income inequality could be reproduced through systems of education, which would be manifested in increasingly unequal educational outcomes for children (Duncan and Murnane 2014). Educational outcomes are particularly important because they influence the youngest members of society and because they have been linked to economic growth, development of human capital, and equal opportunities for citizens within nations (Duncan and Murnane 2014; Hanushek, Woessmann, Jamison, and Jamison 2008; Reardon and Bischoff 2011; World Development Report 2006). Even though educational outcomes have been linked to nations' economic and social wellbeing, less is known about how the income inequality observed within nations contributes to educational outcomes. While it is often presumed that countries with high income inequality also exhibit low achievement scores of students and have high disparities in academic achievement, these relationships have not been tested directly.

To examine the relationship between income inequality and educational achievement outcomes, I link income inequality measures for 42 high-income countries with educational outcomes from the Programme for International Student Assessment (PISA). First, I examine the

relationship between income inequality and the achievement scores of individual students. Second, I investigate how income inequality relates to the achievement scores of students from different socioeconomic backgrounds. Specifically, I examine whether income inequality creates disparities in terms of educational achievement, with high-SES students gaining advantages and low-SES students experiencing disadvantages as a result of income inequality. The results demonstrate that national income inequality is associated with lower student achievement. Furthermore, this negative relationship is consistent for all students, indicating that high-SES students in unequal countries do not benefit from income inequality and low-SES students do not face disproportionate disadvantages. Rather, students from all SES backgrounds benefit from living in a more equal nation, regardless of their socio-economic status.

LITERATURE REVIEW

Income Inequality

Inequality, defined as the presence of unequal conditions and opportunities for individuals in different social statuses, creates concern when considering extreme differences between the rich and the poor (Ryscavage 1999). Every country has an income gap between its rich and poor citizens. This inequality creates a hierarchy of power and privilege and is therefore a type of structural inequality where the privileged group presumably receives benefits from being at the top of the uneven distribution while those at the bottom of the distribution experience disadvantages related to their position in the socio-economic hierarchy (Acker 2006; Sen 1992; Yitzhaki and Lerman 1991). Some researchers identify universal social and economic benefits associated with income inequality (Brooks 2014; Epstein and Soloman 2011; Garrett 2010) while others emphasize how inequality contributes to structural barriers that perpetuate

social injustices that either benefit or harm individuals of varying SES (Duncan and Murnane 2014; Fischer et al. 1996; Reardon 2011; Reardon and Bischoff 2011).

Potential benefits of inequality

Regardless of the benefits or drawbacks of income inequality, it is a common feature in modern societies and, in varying degrees, exists in all nations. Given its prevalence, some scholars promote the argument that it may serve a beneficial purpose in societies (Brooks 2014; Epstein and Soloman 2011; Garrett 2010). Income inequality is often characterized as an extension of economic structures that provide incentives for increased innovation from individuals and businesses, including more opportunities to take risks and the potential to create wealth (Castells-Quintana and Royuela 2014; World Development Report 2006). For example, Epstein and Soloman (2011) suggest that entrepreneurs Bill Gates and Steve Jobs were both able to make important technological advances because their capitalist-oriented society appropriately incentivized risk taking and innovation. In turn, everyone in the society reaps the benefits associated with the mass production of innovative, affordable technology.

Additional arguments also suggest that income inequality may not necessarily disadvantage citizens in a nation by permeating into other structures and spheres within a nation. For example, during a period of rapid economic growth in the mid-1900s, the incomes of most families in the United States increased; this growth benefited both individual citizens and the nation as a whole. While income inequality still existed between the rich and the poor, the poor still experienced economic growth as well as increased rates of intergenerational social mobility. This economic growth has been described as a "rising tide that lifted the boats of the rich and poor alike" (Duncan and Murnane 2011:3). Furthermore, the gap between the rich in the poor did not increase during this period of time (Duncan & Murnane 2011). Countries currently

experiencing similar national economic growth may find similar patterns of inequality; however, even the poorest citizens may experience opportunities for growth during such economic expansions. Thus, income inequality by itself may not necessarily be related to inequality in other spheres of life.

Potential harms of inequality

While some degree of income inequality may be beneficial to nations and potentially lead to outcomes that improve the situations of even the least advantaged members of a society, the vast majority of social scientists agree that extreme income inequality is harmful to nations and their citizens. For example, the persistence and growth of inequality is associated with decreasing economic growth and efficiency within a nation (Marrero and Rodriguez 2012). Inequality also leads to an increase in unfair competition, poor social relationships, and a decrease in trust and cooperation among individuals in a nation (Shigerhiro, Kesebir, and Diener 2011; Wilkinson 1996). High crime rates, including increased homicide rates, assault, and burglary have been linked to large income gaps between the rich and the poor (Elgar and Aitken 2011; Kawachi, Kennedy, and Wilkinson 1999). These high crime rates funnel resources to incarceration and guard labor, taking away resources from potentially more productive uses, such as investments in education (Choe 2008; Jayadev and Bowles 2006; Kawachi, Kennedy, and Wilkinson 1999).

While the relationship between income inequality and educational achievement outcomes has not been directly tested, social scientists have demonstrated that educational outcomes are often related to the structural conditions associated with income inequality. In their seminal work, *Schooling in Capitalist America*, Bowles and Gintis (2002; 1976) argue that the economic and social inequalities observed in societies are reproduced in schools. Therefore, unequal

educational outcomes are mere reflections of the inequalities in the underlying economic and social structures inherent in a society. Even though education and schooling are often thought of as equalizing mechanisms that bridge gaps in opportunities and outcomes between more- and less-advantaged students, their influence is limited (Downey, von Hippel, and Broh 2004). For example, unequal educational outcomes between rich and poor students are observed when children enter kindergarten and persist as children advance through school. These differences are attributed to divergences in young children's social context and personal resources (Alexander, Entwisle, and Olson 2005; Duncan and Magnuson 2011), thereby demonstrating that the inequalities students' families face within the broader society are perpetuated in educational outcomes and opportunities.

These educational inequalities can become problematic for all citizens in a nation. Research shows that socio-economically segregated schools result in lower achievement scores for students across the SES distribution, meaning that students perform better in schools with more SES diversity (Khoo and Khoo 2005). Because high income inequality perpetuates income segregation in schools, it is possible that students across all SES backgrounds experience educational disadvantage related to income inequality (Reardon and Bischoff 2011). Additionally, educational inequalities can lead to low social mobility and fewer opportunities for the success of individual students (Duncan and Murnane 2014; Reardon and Bischoff 2011; Neuman and Celano 2006). When educational pathways to social mobility and individual economic success are blocked by inequality of opportunity, a nation's economic growth can be stunted (Hanushek et al. 2008). However, when an increasing proportion of students obtain more education, nations experience an increase of human capital, which, in turn, leads to sustainable development and a decrease in poverty (World Development Report 2006).

Given the lack of literature suggesting that inequality may disadvantage all citizens, especially when considering student achievement, it is important to examine this relationship. I tested this relationship directly for 42 high-income countries that participated in the 2009 PISA. I examine the degree to which national income inequality is related to the achievement scores of the individual students. In doing so, I hypothesize the following:

H1: A nation's income inequality will have a negative relationship with student academic achievement scores.

Student Socio-Economic Status

While the social science literature frequently demonstrates how income inequality is associated with negative societal-level outcomes, it often does not directly identify the degree to which those at the top of an unequal income distribution benefit from their privileged position in society (Smeeding 2005). Indeed, if anyone is likely to benefit from the exclusivity and opportunity that wealth affords in unequal societies, it is high-SES citizens (Acker 2006; Sen 1992; Yitzhaki and Lerman 1991). One privilege associated with high-SES individuals is the ability to be a strong political voice and having more control over policy decisions (Smeeding 2005). Such policy decisions are often more beneficial to those controlling the decision, the wealthy, than to other members of society (Page, Bartels, and Seawright 2013). Thus, power is derived from occupying high-status positions within an unequal society. This political power is clearly manifest in the area of education policy.

Income inequality can also contribute to unequal educational opportunities for rich and poor students (Reardon and Bischoff 2011). According to Lucas' theory of effectively maintained inequality (2001), socioeconomically advantaged actors will secure advantages (especially educational advantages) for themselves and their children, wherever and whenever

advantages are possible to procure. This means that rich families not only have more access to educational resources but also more access to power in the policy-making decisions that could create policies that favor the wealthy (Smeeding 2005). For these reasons, rich families are generally able to access better schools and better resources to prepare their children for educational success (Shanks, Kim, Loke, and Destin 2009). Students from higher-income families usually attend schools with more resources, better teachers, and more funding, all of which contribute to higher test scores, greater likelihood of college attendance, and improved employment opportunities. On the other end of the income distribution, poor students and their families are likely to encounter structural barriers that block their access to educational resources and opportunities. As such, they often attend schools with fewer and lower quality physical and personnel resources. As a result, they do not enjoy the same educational benefits that often contribute to future educational and economic success as well as upward mobility (Reardon and Bischoff 2011). The greater the income inequality in a nation, the more drastic the differences are between the educational opportunities available to high- and low-income students (Duncan and Murnane 2014).

Because the lived experiences associated with income inequality are dependent upon one's position within the income distribution as well as the size of the distribution itself, I hypothesize that if any citizens were to experience educational advantages as a result of higher levels of income inequality, it would be high-income students. And consequently, low-SES students would perform better in more equal nations.

H2: A nation's relationship between income inequality and student academic achievement will be different for high- and low-income students.

This proposed hypothesis tests whether income inequality provides educational advantages to the wealthy or if income inequality influences students from all SES backgrounds. This hypothesis examines whether student socio-economic status acts as a moderator in the relationship between income inequality and student achievement.

Significance of Study

This study examines two research questions. The first, investigating whether or not income inequality influences student achievement, provides insight into whether the instability of the economic sphere permeates into other national structures, specifically the educational sphere. The second question investigated by this study examines whether the influence of income inequality on student achievement is different for students according to their socio-economic status. This question examines what educational advantages the wealthy may have when living in an unequal nation. The results of the models testing my hypotheses have important policy implications, as the overlapping of national structures can provide insight on how to improve educational policy most effectively.

METHOD

Data

To examine how income inequality influences student achievement, I first created an international database that includes wealth, inequality, and economic wellbeing indicators for all countries that participated in the 2009 PISA. These measures were compiled from a variety of sources, including the Organisation for Economic Co-operation and Development (OECD) and the World Bank, with the most complete data reported for years 2007 to 2009.[1] These measures

[1] When compiling the international database, most country-level data were available for high-income countries in 2009. When country-level information was unavailable, data from previous years were used as supplements.

indicate each nation's level of inequality, level of wealth, and whether the nation has high-income status (as designated by the World Bank).

To link the information in the aforementioned international database with educational outcomes, I utilized the 2009 administration of the Programme for International Students Assessment (PISA).[2] Administered and distributed every three years by the OECD, the PISA monitors the cross-national student achievement of 15-year old students in math, reading, and science (OECD 2011). In addition to providing internationally comparative data on student achievement, PISA also includes background information on participating students and schools. PISA includes representative samples within the participating countries and administrative regions that request participation in the PISA (OECD 2014b). Through stratified sampling techniques, PISA provided samples within participating countries and administrative regions that are representative of each country's population of 15-year old students (OECD 2012b). Sampling was completed systematically within nations, by targeting schools with 15-year-old students, and then approximately 35 students were sampled within each school.

Sample

Though 73 countries participated in the 2009 PISA, the analytic sample was restricted to 42 countries designated as high-income countries by the World Bank and for which wealth and inequality data can be linked.[3] Focusing the analyses on only high-income countries is useful

[2] Data from the 2009 PISA administration was selected over the more recent 2012 administration because accurate country-level wealth and inequality indicators were more available for 2009.

[3] Countries include Australia, Austria, Belgium, Canada, Chile, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong-China, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Macao-China, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Qatar, Russia, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Trinidad and Tobago, United Arab Emirates, United Kingdom, United States, and Uruguay. Even though the United Arab Emirates is in the PISA sample and is considered a high income country, it was excluded from the sample because national inequality measures were not available.

when testing the relationship between income inequality and educational outcomes because all included countries are considered similar in terms of economic development and also in their ability to foster democratic ideals in education (World Bank 2015). Within these 42 countries, 10,863 schools and 309,273 students were sampled.

As is the case with most large datasets, PISA includes cases with missing data. While all achievement information was complete for each participating student, between zero and four percent of cases were missing data on various student-level background measures. To recover cases for which student background identifiers were missing, regression imputation was used.[4]

Measures

To examine the hypotheses discussed above, I used student math achievement as the outcome measure. Measures of national income inequality and student socio-economic status represent the key independent variables in the models predicting student achievement. Several student and country-level control variables were included as well. Descriptive information for all key independent variables and control variables are included in Table 1.

[Table 1 About Here]

[4] Regression imputation has been characterized as providing the best, simple solution for addressing missing data; however, a known weakness of regression imputation is that it tends to underestimate the variance in the imputed data (Howell 2008). While more complex solutions for dealing with missing data—such as multiple imputation or maximum likelihood estimation—have been suggested as superior ways of recovering missing cases without introducing biased parameter estimates or reducing variability (Little and Rubin 2014; Rubin 1987), these options were not compatible with our complex modeling strategy that includes weighted multilevel modeling using predicted values as outcomes. Furthermore, some scholars have reported that such complex missing data strategies are not necessary when using mixed models (Twisk, de Boer, de Vente, and Heymans 2013). To test the sensitivity of the results to various methods of treating missing data, I also ran models using complete case analysis as well as non-nested models with multiple imputation. All models yielded similar results, suggesting that my statistical models were not sensitive to the treatment of the small amount of missing data in the PISA.

Key variables

When examining the relationship between income inequality and student achievement, I specifically focused on mathematics achievement because it is the subject mostly likely taught in a similar and sequential manner across international contexts (Akiba, LeTendre, & Scriber 2007). As with most large-scale assessments, multiple test booklets are distributed among students; however, this creates a potential for measurement error (von Davier, Gonzalez, and Mislevy 2009). To account for this, PISA uses five plausible values to measure math achievement instead of using one definitive score. These plausible values were drawn from the probability distribution of each student's performance based on their score from their assigned test booklet and represent alternative estimates of the student's math score (OECD 2012b). In my analyses, all five plausible value outcomes for each student were appropriately weighted, and simultaneously estimated using specialized estimation procedures (Raudenbush et al. 2011).

The key independent variable, national income inequality, was measured by the Gini coefficient. As a measure of the distribution of household income within a nation, the Gini index estimates how the nation's actual income distribution varies from an equal distribution (World Bank 2014b). This measure ranges from 1 to 100, with the value 1 indicating that all citizens have equal wealth and the value 100 indicating that one person holds all of the wealth of that nation. The Gini coefficient for nations in this sample range between 23.75 and 51 (Avakov 2010; OECD 2015; World Bank 2014b).

I included socio-economic status (SES) as a key student-level independent variable because it is considered one of the major predictors of student achievement (Hampden-Thompson and Johnton 2006; Sirin 2005). My measure of student SES is derived from PISA's Index of Economic, Social, and Cultural Status (ESCS), a composite of parental income, parental

education status, and home possessions (OECD 2012b). The measure was grand-mean-centered based on the countries included in my analyses and therefore has a mean of zero and a standard deviation of one.

To test my second hypothesis, I moderated the relationship between income inequality and student achievement using this student SES measure. By using student SES as a moderator, I was able to examine whether this relationship varies for students based on their socio-economic status. Referred to as an interaction, student SES is multiplied by the Gini coefficient to demonstrate whether or not student socio-economic status moderates the relationship between inequality and achievement.

Control variables

To appropriately estimate the relationship between income inequality and academic achievement, it was necessary to include control variables that might also account for variation in student achievement. Because I specifically tested the relationship between student- and country-level indicators on student outcomes, I included student- and country-level control variables.[5]

Student-level control variables included variables related to the student's demographic characteristics. Gender was a dichotomous variable, with females coded 1 and males coded 0. Because all of the students are the same age (15 years old), grade level was included to control for the student's opportunity to learn math, as students in lower grade levels have not been

[5] Ideally the analyses would have also included school-level control variables; however, not all schools and countries completed the school questionnaires, resulting in high levels of missing data that could not be responsibly imputed. Preliminary analyses demonstrated that even though school-level controls were meaningful predictors of student achievement, including them did not alter the estimation of the coefficients of interest in this study. Therefore, in an effort to recover schools within countries with high levels of missing data on most school-level variables, the nesting of students within schools is accounted for, but school-level controls are not included in the final models.

exposed to as much math instruction as students in higher grades. This variable was dummy coded for grades 7 through 12, with the tenth grade used as the reference group. [6]

Immigration status was measured with a series of 3 dummy variables: whether the student was native to the test nation, a second-generation immigrant (meaning that the student had at least one parent born outside of the country with the student born inside of the test country), or a first generation immigrant (meaning that the student was born outside of the test nation).. The category excluded from analysis was the native student category.

Language spoken at home was a dichotomous variable with 1 indicating that the language spoken in the home was different from the test language and 0 indicating that the language spoken in the home was the same as the test language. Family structure was included as a set of dummy variables that represent the following categories regarding residential parents: neither the child's mother nor father lives in the home, either the child's mother or a father lives in the home, or both the child's mother and father live in the home. Two parents living in the home was used as the reference group in multivariate analyses. To account for the student's opportunity to learn in the classroom, minutes spent learning math in school each week was included as a control variable. This continuous variable ranges from zero to 1,000 minutes per week.

Although all of the nations in this sample are considered high income, there is variance of wealth within these nations. To control for the effect of national wealth on achievement scores, I included a measure of per capita Gross Domestic Product (GDP). While GDP represents the sum of goods and services generated within a nation over the course of one year, per capita GDP

[6] In some schools, none of the students sampled reported their grade level, even though they answered most of the other questions on the student questionnaire. Presumably, these students attended schools that did not follow the standard grade structure, and therefore, no students in the school reported their grade. To account for this specialized type of missing data, these students were assigned to a "no grade" category.

represents the nation's gross domestic product divided by the nation's population (World Bank 2014a). I use per capita GDP instead of GDP because it considers the nation's wealth according to the number of citizens in the nation.

Analyses

I first examine descriptive data to identify patterns between nations. Specifically, I explored the distributions of average income inequality, wealth, achievement, and student SES for high-income nations included in the sample. Additionally, I considered the average values across all countries for each of these variables in order to compare them to the averages observed in each nation included in the sample.

To address how income inequality is associated with the academic achievement of individual students, I ran multilevel models where students are nested within schools and schools are nested within countries. Because student observations are not truly independent of one another when dealing with nested hierarchies, students who share the same school and the same country are likely to experience shared variance in their outcomes. Therefore, multilevel models are used to adjust for this non-independence of observations (Raudenbush and Bryk 2002). These models were estimated using HLM version 7.01. Within this software, I used HLM's plausible value estimator to accurately estimate each model using each of the five plausible values that represent student math achievement in the PISA data (Raudenbush et al. 2011). Additionally, I used PISA's specified student and school sampling weights within the models to create appropriate estimates that account for sampling error within each individual country (OECD 2012b).

The level-1 portion of the multilevel models was estimated using the following equation:

(1) $Y_{ijk}=\pi_{0jk} + \pi_{1jk}SES_{ijk} + \pi_{2jk}$ STUDENT BACKGROUND$_{ijk} + e_{ijk}$,

where Y_{ijk} represents the math achievement of student *i* who attended school *j* and lived in country *k*, and π_{0jk} is the mean achievement score of students who attended school *j* and lived in country *k*. SES_{ijk} is a continuous measure indicating the student's socio-economic status. STUDENT BACKGROUND$_{ijk}$ represents the regression coefficients of each of the student-level control variables. These variables include gender, grade level, immigration status of student, language spoken in the home, family structure, and opportunity to learn math in school. Finally, e_{ijk} is the random student effect, or a measure of how student *ijk*'s math achievement score deviates from the mean.

The level-2 portion of the multilevel models used the equation below:

(2) $\pi_{0jk} = \beta_{00k} + r_{0jk}$,

with β_{00k} representing the within school average score, and r_{0jk} being the random school effect, or the deviation of school *jk*'s achievement score.

The level-3 portion of the models was estimated using the following equation:

(3) $\beta_{00k} = \gamma_{000} + \gamma_{1k}GINI_{00k} + \gamma_{2k}GDP\ PER\ CAPITA_{00k} + u_{00k}$,

where $GINI_{00k}$ represents the Gini coefficient of country *k*. GDP PER CAPITA$_{00k}$ represents the GDP per capita of country *k*, and is included as a country-level control variable.

To test the degree to which the expected relationship between income inequality and student achievement varies for students with different socio-economic backgrounds, I estimated a secondmultilevel model. To test this hypothesis, I used models identical to the first two levels described above; however, the level-3 portion of the multilevel model used the equation below:

(4) $\beta_{00k} = \gamma_{000} + \gamma_{1k}GINI_{00k} + \gamma_{2k}GDP\ PER\ CAPITA_{00k} + \gamma_{2k}GINI_{00k} * SES_{ijk} + u_{00k}$.

In this model, $GINI_{00k} * SES_{ijk}$ represents the cross-level interaction between national income inequality and student socio-economic status.

RESULTS

To discuss the results in an organized manner, I separate the results into three categories. First, I describe the descriptive results by comparing various national indicators between nations. Second, I interpret the results of the multilevel models. Third, I contextualize these results by using the regression coefficients from the first model to examine expected values based on national inequality and student SES.

Descriptive Results

Before examining the multivariate models that test my hypotheses, I examined descriptive data for each nation (see Table 2). Table 2 includes inequality, wealth, achievement, and student SES data for each nation. For the high income countries included in this study, the average Gini coefficient was 32.8, indicating a moderate level of income inequality. To more concretely contextualize country-level income inequality (as is measured by the Gini coefficient), countries with average income inequality include Canada, Spain, New Zealand, and Greece. Examples of countries with low income inequality include Denmark, Norway, Slovenia, and Iceland, which register Gini coefficients about 8 points lower than average. High income inequality countries include Chile, Uruguay, and Russia, with Gini coefficients approximately 12 points higher than the sample average.

[Table 2 About Here]

Though not in the tails of having the highest or lowest income inequality, both the United States and Finland frequent headlines in media discussions about international student achievement and about income inequality (Gautney 2011; OECD 2014; Steil and Menendian 2014; Darling-Hammond 2010). A frequent benchmark in international comparisons of student achievement, the United States often receives criticism related to its low student achievement

scores. Although it is one of the wealthiest nation in this sample, the U.S. suffers from above average income inequality (Gini=37.86) and below average achievement (Math Average=487). Finland, however, has below average inequality (Gini=26.02) and above average student achievement (Math Average=541). These trends are interesting in light of their wealth per capita measures being similar (U.S.=46,999 and Finland=44,838).

The relationships between country-level variables in each nation reveal counter-intuitive trends. While one would assume that nations with high achievement scores would also have low inequality and high levels of wealth, this table demonstrates that this trend does not exist. When comparing income inequality (as is measured by the Gini coefficient) to GDP per capita (a measure of a country's wealth), countries with low income inequality exhibit a wide range of wealth; thus, more equal nations are not necessarily more or less wealthy. However, less equal nations tend to have lower levels of country wealth. Additionally, these descriptive analyses demonstrate that student SES varies in relationship to country wealth and inequality in ways that are not necessarily intuitive. For example, the average student in Qatar yields an SES value that is among the highest of all high-income countries; however, the country as a whole yields high income inequality coupled with very low student achievement. Opposite from what one observes in Qatar, the average student in Hong Kong – China register the lowest SES levels observed in this study; however, it is also associated with low inequality and high achievement. Other countries display similar inconsistencies; however, no patterns emerge for how these various national and student-level factors work together to predict student achievement. Therefore, descriptive comparisons of high income countries do not necessarily demonstrate clear relationships between income inequality, student SES, and student achievement. To better

explore these relationships, multivariate analyses that appropriately account for country- and student-level contexts are necessary.

The Relationship between Income Inequality & Achievement

To test the first hypothesis—that income inequality is negatively related to student math achievement—I ran a multilevel model that regressed national income inequality and student SES on mathematics achievement, while holding constant other country- and student-level factors that were likely to be related to the outcome. The coefficients for all control variables were of the magnitude and in the direction anticipated (see Table 3, Model 1). National wealth, measured by GDP per capita, significantly influenced achievement, as every thousand dollar increase in national wealth was related to a .55 point increase in math achievement ($p<.01$). On average, females scored 19 points lower than males ($p < .001$). As expected, 15-year old students in higher grades performed higher than students in lower grades ($p < .001$). Native students scored about 6 points higher than first generation immigrants ($p <.01$) and about 11 points higher than second generation immigrants ($p < .01$). Students who spoke the test language at home typically had achievement scores about 9 points higher than students who did not ($p < .05$). No significant difference in achievement scores was observed between students who had one or two parents in home; however, students living in non-parental family structures scored about 26 points lower than students who lived in a two-parent home ($p < .001$). Lastly, students with teachers who spent more instructional time on mathematics registered higher achievement scores. About 25 additional minutes spent on math per week (about 5 additional minutes per school day) was associated with a 1-point increase in achievement ($p <.05$).

[Table 3 About Here]

Of greatest importance, both key independent variables included in the model—student SES and national income inequality—also yielded significant results. A standard deviation increase in student SES was associated with a 14.91 point increase in math achievement ($p <$ .001). Thus, student SES accounted for about 15 percent of a standard deviation in student achievement, indicating a moderate effect size.[7] As hypothesized, income inequality was negatively related to student achievement. A one unit increase in the Gini coefficient was associated with a 2.17 point decrease in student math achievement scores. In terms of effect size, income inequality accounted for 14 percent of a standard deviation in student achievement. Interestingly, the effects associated with national income inequality and student SES were approximately the same size but moved in opposite directions, indicating that achievement outcomes associated with a standard deviation increase in one can be offset by a standard deviation decrease in the other.

Student SES as a Moderator

Given that both income inequality and student SES were significantly related to academic achievement but in opposite directions, it was necessary to further explore the potential for student SES to moderate the relationship between income inequality and student achievement. As initially hypothesized, if anyone were to benefit from income inequality, it would likely be high-SES students. To better understand this relationship, I ran an additional multilevel model that included a cross-level interaction between national income inequality and student SES (see Table 3, Model 2).

[7] Effect sizes or standardized regression coefficients were calculated by multiplying the regression coefficient by the product of dividing the standard deviation of the relevant independent variable by the standard deviation of the dependent variable.

For the predictors that were included in both models, the results of Model 2 were nearly identical to those presented in Model 1. Furthermore, the interaction between national income inequality and student SES yielded a small coefficient (-.02) that was not statistically significant.[8] This suggests that the effect of national income inequality does not differ for students from different SES backgrounds as I hypothesized that it might. Subsequently, I conclude that high-SES students do not benefit educationally from income inequality. In fact, income inequality is related to lower student achievement for high- and low-SES students alike.

Achievement Differences by Levels of Income Inequality

To provide a visual representation of the results presented in Model 1, I used the regression coefficients to plot student achievement scores for the highest and lowest income inequality values observed in my sample of high-income countries. Furthermore, to demonstrate how student SES is related to income inequality and student achievement, I plotted these values for each SES decile (see Figure 1). As is evident in Figure 1, students who occupy lower SES deciles tend to have lower achievement than the students who occupy higher SES deciles, regardless of whether they live in more or less equal nations. Additionally, at each SES decile, the average student achievement in the most equal nation is 59 points above the achievement in the least equal nations. This indicates that on average, students perform better on tests of achievement when living in an equal nation. As a 39 point difference on the PISA mathematics assessment is equivalent to about one year of schooling (OECD 2010), this 59 point gap between

[8] To test the robustness of this finding, I ran additional models to test possible interactions between income inequality and various SES cut-points. Nearly all of these subsequent models yielded small and statistically insignificant results associated with these interactions. One of these additional model suggested that there may be a very small achievement advantage (.02 points) for the top 1 percent of high SES students who live in unequal countries; however, analyses on such a small group of students may not provide reliable results and are therefore not explored further in this paper.

student achievement in equal and unequal nations represents about a year and a half of schooling, indicating that a 15-year old student living in an unequal nation is anticipated to be more than one grade level behind a similarly situated student in an equal nation.

[Figure 1 About Here]

Differences in achievement by income inequality and student SES

To further demonstrate the magnitude in which income inequality can influence achievement, I estimated math scores for typical low-, average-, and high-SES students[9], based on the regression coefficients from Table 3, Model 1 (see Figure 2). Specifically, I demonstrate differences in achievement for each SES group based on differing values of country-level income inequality: countries with high income inequality (one standard deviation above the sample mean, or a Gini coefficient of 38.33), average inequality (equal to the sample mean, Gini coefficient = 32.78), and low inequality (a Gini coefficient of one standard deviation below the sample mean, 27.23). Therefore, Figure 2 represents how achievement scores of students occupying various SES backgrounds would be expected to change based on their exposure to various hypothetical income inequality conditions. In this figure I also include the inequality observed in the United States (Gini=37.86) as a comparative benchmark because its income inequality has been the focus of social movements and highlighted in reports concerning growing income inequality internationally (Gautney 2011; OECD 2014; Steil and Menendian 2014). Income inequality in Finland (Gini=26.02) is also included because of the attention it has received in the media for its notably high achievement score in this 2009 wave of PISA (Darling-Hammond 2010; Sahlberg and Hargreaves 2011).

[9] Average-SES students are represented by the sample mean. Low-SES and High-SES students are represented by the values for one standard deviation below and above the sample mean for SES, respectively.

[Figure 2 About Here]

As expected, Figure 2 shows that after holding constant student background and country-level factors, high-SES students outperform average- and low-SES students by about 14 and 29 points, respectively. However, of most importance to this study, this figure allows for comparisons of students from differing SES backgrounds and differing exposure to income inequality. For example, low-SES students who are exposed to low income inequality are expected to score about 540 points on the PISA mathematics examination. This outcome is similar to the expected score of average-SES students who experience average income inequality (543 points) as well as the expected score of high-SES students in a nation with high income inequality (545 points). Thus, the scores of low-SES students in low inequality nations are expected to be about on par with those of high-SES students in high inequality nations. This demonstrates the importance of national income inequality in terms of its ability to offset the effect of student SES—a factor that has been demonstrated as one of the most important determinants of student achievement (Hampden-Thompson and Johnston 2006; Sirin 2005).

As has already been observed, high-SES students consistently outperform their average- and low-SES counterparts; however, their success within their nation may not be indicative of their success on the international stage. For example, a high-SES student in a low inequality nation is expected to score about 569 points, one of the highest achievement scores presented in Figure 2. However, the same high-SES student in a high inequality nation is expected to score 545 points, only slightly better than low-SES students in low inequality nations. As student SES is one of the most important determinants of student achievement, one would expect a high-SES student to have similar achievement scores across different inequality contexts. However, the results described in Figure 2 suggest that the atmosphere of inequality in which a student lives

can offset the effect of student SES, in this case creating a 24-point difference. Given that my models account for national wealth and student-level background factors, this difference is surprising. While my analyses do not necessarily explain why a student who occupies the same SES status and resides in a similarly wealthy nation would experience this drastic change in achievement, it may be that expectations for achievement are based on relative, within-nation frames of success (Lee and Zhou 2013). In unequal nations, the students to which high-SES students compare themselves to may have lower levels of achievement than they might in more equal nations. Thus, the definition and expectation of high-performance may be lower in high inequality nations than in low inequality nations.

The cases of the United States and Finland

As is evident in Figure 2, the expected scores of students in high income inequality countries are similar to the scores expected for students in the United States. This implies that income inequality in the U.S. is quite high and therefore could be an important contributor to its overall low PISA scores when compared to other high income countries. Based on the results presented here, if the U.S. adopted policies that decreased income inequality to align more closely with the average level of inequality observed in these high-income countries, it could expect about a 12-point increase in achievement scores for students. Because the United States has typically lagged behind other high income countries in terms of national-level PISA achievement outcomes, especially in mathematics, this expected increase could bring the achievement of U.S. students more in alignment with the average achievement of other high income nations. If the U.S. were to engage in more rigorous efforts to remedy income inequality, higher achievement could be expected. Given the wealth and affluence of the United States, it is sufficiently well-resourced to accomplish this.

Figure 2 also includes a comparison of Finland. The expected scores of students in Finland are comparable to the expected scores of students living in nations with low income inequality. This is expected, as Finland has one of the lowest values of income inequality in this sample of high income nations. Finland is renowned for its unique and innovative educational policy(Darling-Hammond 2010; Sahlberg and Hargreaves 2011); however, while these innovations are noteworthy, few discussions have underscored the context of equality that provides the foundation for Finland's educational success. The results of this study suggest that perhaps the low income inequality in Finland provides a conducive atmosphere where education policy can be more effective.

As is described above, the United States and Finland are examples of more extreme versions of income inequality. Nevertheless, the results observed in Figure 2 are applicable to all countries included in this sample, meaning that nations experiencing an increase or decrease in income inequality can expect a fluctuation in student achievement scores. Furthermore, levels of income inequality in a nation are equally important in predicting achievement as student SES.

DISCUSSION

The results of this study suggest that global concerns for increasing income inequality and its far reaching effects are well founded. As this study demonstrates, national income inequality, a macro-level social structural condition, is directly and negatively related to the individual-level academic achievement of children. Thus, holding constant students' backgrounds, those living in more equal countries are likely to attain significantly higher achievement scores than students living in less equal countries. In other words, income inequality limits students' ability to reach their academic potential, regardless of their background.

These results cast doubt on arguments that are frequently used to justify income inequality. For example, one popular and frequently referenced argument is that citizens benefit from the competitive and innovative environment associated with the macro-level economic and social conditions that also facilitate high levels of income inequality (Brooks 2014; Epstein and Soloman 2011; Garrett 2010). Others suggest that even though income inequality might not be beneficial for the masses, it may secure privileges (including exclusive educational privileges) for high-SES families; therefore, income inequality is useful and worth perpetuating for those who can take advantage of it (Acker 2006; Sen 1992; Shanks et al. 2009; Smeeding 2005; Yitzhaki and Lerman 1991). However, the results of this study suggest that, in terms of the educational achievement outcomes of 15-year old children, income inequality is not beneficial for anyone regardless of SES background. This means that high- and low-SES students face equivalent disadvantages as a result of living in unequal nations.

My direct assessment of this relationship is both timely and important, as income inequality continues to grow in many countries (OECD 2014a) and educational outcomes have simultaneously been linked to increased individual social mobility and well-being, national economic growth, and a decrease in national poverty (Hanushek et al. 2008; Neuman and Celano 2006). While this previous research has indicated that student achievement can influence national, macro-level structures, this study highlights the influence of national income inequality on student achievement. Building on previous research, these results indicate a cyclical relationship between national and student outcomes, as national inequality is reflected in student achievement which in turn affects other national outcomes. Thus, decreasing national inequality can enhance student achievement, and this increased achievement has been linked to improved indicators of national well-being.

Achievement and Income Inequality

The results of this study also inform larger debates within the education and sociological literature. Historically and presently, schools are thought to provide all students—regardless of background and upbringing—the opportunity to realize their potentialities (Dewey 1942:275). However, in their formative work, *Schooling in Capitalist America*, Bowles and Gintis (2002; 1976) suggest that the structure of schools and schooling mirrors that of the larger society. Therefore, schools serve as mechanisms for perpetuating the inequalities that are already present within a nation. For Bowles and Gintis, the inequality observed in societies is reproduced in schools.

I find partial evidence for Bowles and Gintis' argument, as this study demonstrates that societal inequality is perpetuated in school-based outcomes. While definitively determining the directionality of the relationship between societal and school inequality is beyond the scope of this study, I do find that the inequality observed in societies is strongly related to school-based achievement outcomes for individual students. As such, this study supports Bowles and Gintis' theory that income inequality may affect educational outcomes; however, this study does not support their specific argument that high levels of income inequality perpetuate high levels of educational inequality. Instead, these results indicate that high levels of income inequality influence students of all SES backgrounds equally. As my results suggest, low-SES students do not experience additional educational disadvantages while living in a nation with high income inequality (beyond the disadvantages associated with their individual backgrounds). Furthermore, high-SES students do not receive additional educational benefits as a result of occupying a privileged position in an unequal society. Thus, the results of this study should not be interpreted as more equal societies fostering greater *equality* in educational outcomes, but

instead, more equal societies foster overall higher *achievement* for students, regardless of family background. Thus, more equal countries enable all students to more fully realize their academic potential.

Income Inequality as Education Policy

Because education policies are frequently focused on increasing achievement for all students, the results of this study suggest that mitigating income inequality would promote educational improvement. Thus, social policies that successfully manage income inequality may be some of the most effective education policies because income inequality is a strong predictor of educational outcomes and sets a foundation for other social contexts such as education. Furthermore, and perhaps more importantly, country-level income inequality is not fixed and can be manipulated through social policy. Investing in equality-promoting social policies like social transfers, progressive tax codes, and ending various forms of discrimination could function as a way to decrease income inequality and increase educational outcomes (OECD 2012a; Steil and Menendian 2014). This suggests that for children to achieve their academic potentials, social and economic policy spheres should be considered alongside educational policies, and all should work together to improve student achievement. Specifically, the results of this study indicate that social policy focused on decreasing income inequality would effectively foster academic achievement outcomes. Furthermore, such policies would be more aligned with the universal goals of promoting equity and improvement in educational outcomes.

Addressing income inequality is effective education policy because it provides a foundation from which other social structures and policies—including those related to education—are built. Income inequality is foundational because it determines the range of differences in people's economic opportunities. These opportunities frequently shape social,

economic, political, and educational expectations, including the range of expectations for educational performance. Therefore, income inequality may undermine even the best educational policies, suggesting that education policy can only be as effective as the nation's degree of income inequality. Furthermore, decreasing income inequality may instigate positive changes in educational outcomes that education-specific policies generally try to produce. As an example, Finland—a country with low income inequality and high educational achievement—may have an atmosphere more conducive to creating successful educational policies because of the nation's more equal economic foundation. While this study offers results implying this relationship, the relationship between social policy and educational policy should be further explored and more directly tested.

Limitations

As with any study using a large-scale international dataset (including PISA), my study is influenced by the limitations of the data I use. I recognize that PISA assessments are not intended to comprehensively assess all aspects of students' scholastic experiences and abilities. I also recognize that neither our study nor the PISA data account for the full range of geographic, social, cultural, socioeconomic, and ethnic differences between and within countries. Because I acknowledge that these differences are important when addressing PISA results, this study only offers general recommendations in terms of how the results could be applied. I do not attempt to offer specific policy recommendations for any given country based on the results presented here. Any specific recommendation should thoroughly consider the specific context and opportunities within any given country.

Another limitation of the PISA data is its cross-sectional design, indicating that students are not tracked over time. As with all cross-sectional research, analyses of student achievement

cannot determine causation. Thus, my results highlight the relationship between student SES, national income inequality, and student achievement; however, I cannot determine the degree to which any of these factors *cause* differences in student achievement. Despite its limitations, PISA is one of the premiere cross-national assessments of student achievement (OECD 2010; 2014b). The internationally comparable educational outcomes and thorough student background questionnaire allow for a meaningful examination of the relationship between income inequality, student SES, and academic achievement that can only be facilitated by PISA. This study utilizes the strengths of the PISA data by linking the student-level achievement and background measures to more macro national factors.

Lastly, while this study offers a meaningful illumination of the relationships between income inequality, student SES, and academic achievement, it does not directly assess the mechanisms through which these relationships are filtered. I acknowledge that these mechanisms would be important for determining specific policy recommendations and actions. Thus, future research should explore possible mechanisms through which income inequality might be related to student achievement. Specifically, attention should be given to how income inequality is filtered through educational policies, schools, and individual students. This study provides a foundation upon which future studies examining income inequality and student achievement can build.

CONCLUSION

This study examined the degree to which anyone benefits from income inequality. When considering student achievement outcomes, the answer is simple. No one benefits from income inequality; in fact students from all SES backgrounds are equally disadvantaged by it. Fortunately, income inequality is not a fixed social condition (OECD 2012a; Steil and

Menendian 2014), indicating that strides can be made toward decreasing it. Furthermore, this study, along with others, suggest that reducing income inequality has the potential to improve educational outcomes which can then lead to the improvement of other national outcomes, including economic growth and decreased national poverty (Hanushek et al. 2008; World Development Report 2006). Because a nation's economic structure provides the foundation from which other social structures are built, investing in an equitable foundation can be an effective starting point for policies aimed at accelerating social advancements and economic growth. As an important predictor of economic growth (Hanushek et al. 2008), any investment in improved student achievement is a direct investment in the future of the nation.

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Table 1. Description of Variables

	Mean	*SD*	*Min*	*Max*
Dependent Variable				
Student Math Achievement	493.99	98.84	3.67	953.27
Key Independent Variables				
National Income Inequality The Gini coefficient for each country as reported by the World Bank and OECD. Ranging from 0 to 100, 0 represents complete equality and 100 represents complete inequality in a nation.	32.79	6.41	23.75	51.00
Student SES Student Socio-economic Status (SES) is a composite variable created from equally-weighted information about parental income, parental education status, and home possessions.	.00	.96	-6.04	3.53
Student-Level Background Controls				
Student Gender				
Male = 0	.51	---	0	1
Female = 1	.49	---	0	1
Language Spoken at Home				
Test Language = 0	.86			
Different Language = 1	.14	---	0	1
Grade				
Grade 7	.01	---	0	1
Grade 8	.05	---	0	1
Grade 9	.31	---	0	1
Grade 10 (reference group)	.54	---	0	1
Grade 11	.09	---	0	1
Grade 12	.00	---	0	1
No Grade	.00	---	0	1
Student Immigration Status				
Native Student (reference group) Student and parents are born in test country.	.75	---	0	1
Second Generation Immigrant Student was born in test country, but at least one parent was born outside of test country.	.16	---	0	1
First Generation Immigrant Student was born outside of test country.	.09	---	0	1

Table 1 (cont.). Description of Variables

	Mean	*SD*	*Min*	*Max*
Student Family Structure				
Two Parents in the Home (reference group) Student has both a mother and a father in the home.	.84	---	0	1
One Parent in the Home Student has either a mother or a father in the home.	.13	---	0	1
No Parents in the Home Student has neither a mother nor a father in the home.	.03	---	0	1
Minutes Spent Learning Math in School Minutes the child spent learning math in the classroom each week.	224.66	86.69	0	1000
Country-Level Controls				
National Wealth Per capita Gross Domestic Product (GDP) reported in thousands of dollars as reported by the World Bank. This measure represents the nation's GDP divided by the nation's population.	34.49	19.62	8.62	99.28

Note: N= 309,273 students in 42 high-income countries. Descriptive data is reported using non-imputed data.

Table 2. Descriptive Data for Individual Nations

	National Income Inequality	National Wealth	Average Math Score	SES Average	SES Standard Deviation	SES Minimum	SES Maximum
Australia	33.59	42722	514	0.32	0.76	-3.41	2.97
Austria	26.90	45872	496	0.09	0.83	-5.67	2.99
Belgium	26.92	43834	515	0.21	0.92	-5.72	2.69
Canada	31.99	40764	527	0.46	0.82	-4.78	3.09
Chile	51.00	10142	421	-0.51	1.16	-4.25	2.87
Croatia	33.60	14044	460	-0.18	0.90	-3.63	2.64
Czech Republic	25.80	18881	493	0.02	0.74	-3.11	2.64
Denmark	23.75	56227	503	0.14	0.94	-3.88	3.28
Estonia	30.93	14542	512	0.18	0.79	-3.02	3.53
Finland	26.02	44838	541	0.42	0.78	-3.57	3.05
France	29.30	40488	497	-0.12	0.84	-3.47	2.82
Germany	28.81	40270	513	0.17	0.90	-4.82	3.15
Greece	33.15	28695	466	0.03	0.99	-3.22	3.10
Hong Kong-China	43.44	30697	555	-0.81	1.01	-3.94	2.50
Iceland	26.56	38039	507	0.72	0.89	-3.10	3.43
Ireland	31.21	49708	487	0.06	0.85	-3.23	2.85
Israel	37.27	27492	447	-0.01	0.89	-4.00	2.70
Italy	31.46	35724	483	-0.09	0.98	-3.97	3.01
Japan	33.57	39473	529	-0.01	0.72	-2.61	2.43
Korea	31.40	18339	546	-0.13	0.82	-3.73	2.38
Latvia	35.80	12082	482	-0.05	0.86	-3.39	2.37
Lithuania	37.10	11649	477	-0.04	0.97	-4.85	2.74
Luxembourg	27.81	99282	489	0.22	1.09	-5.85	3.36
Macao-China	38.00	40860	525	-0.70	0.87	-3.24	2.34
Malta	26.00	19636	463	0.04	0.95	-2.34	3.15
Netherlands	28.30	48174	526	0.31	0.85	-3.21	2.76
New Zealand	32.40	27562	519	0.09	0.78	-3.24	2.71
Norway	24.49	78457	498	0.48	0.74	-2.84	2.56
Poland	30.55	11295	495	-0.22	0.91	-3.21	2.95
Portugal	34.04	22153	487	-0.30	1.17	-3.14	3.22
Qatar	41.10	62528	368	0.51	0.91	-3.31	2.87
Russia	42.80	8616	468	-0.16	0.80	-2.85	2.59
Singapore	42.48	38577	562	-0.42	0.81	-3.77	2.27
Slovakia	26.56	16196	497	-0.09	0.84	-3.92	2.75
Slovenia	24.72	24051	501	-0.06	0.88	-3.09	2.91
Spain	32.85	31368	483	-0.25	1.06	-5.35	3.40
Sweden	26.90	43640	494	0.34	0.81	-6.05	2.98
Switzerland	29.81	65790	534	0.02	0.86	-3.27	3.09
Trinidad and Tobago	40.27	14618	414	-0.58	0.94	-3.96	2.53
UK	34.46	35455	492	0.18	0.78	-3.44	2.89
Uruguay	46.30	9065	427	-0.74	1.24	-4.06	3.09
USA	37.86	46999	487	0.15	0.92	-3.43	2.88
AVERAGE	*32.79*	*34496*	*493*	*0.00*	*0.96*	*-6.04*	*3.52*

Table 3. Multilevel Models Predicting Student Achievement

	Model 1			Model 2		
	coef.	*s.e.*	*p*	*coef.*	*s.e.*	*p*
Variable List						
Intercept	604.83	*(30.09)*	***	605.03	*(30.98)*	***
Key Independent Variables						
Income Inequality	-2.17	*(.69)*	**	-2.18	*(.73)*	**
Student SES	14.91	*(1.83)*	***	15.77	*(9.55)*	*
Cross-Level Interaction						
Income Inequality*SES				-0.02	*(.26)*	
Student-Level Background Controls						
Student Gender (ref=Male)						
Female	-19.14	*(3.91)*	***	-19.14	*(3.91)*	***
Language Spoken in the Home (ref=Same Language)						
Different Test Language	-8.93	*(4.33)*	*	-8.93	*(4.34)*	*
Grade (ref=Tenth Grade)						
Grade 7	-125.19	*(10.15)*	***	-125.22	*(10.30)*	***
Grade 8	-93.13	*(11.79)*	***	-93.14	*(11.86)*	***
Grade 9	-47.20	*(6.39)*	***	-47.21	*(6.42)*	***
Grade 11	32.48	*(5.61)*	***	32.48	*(5.60)*	***
Grade 12	30.71	*(24.11)*		30.73	*(24.04)*	
No Grade	-116.86	*(8.90)*	***	-116.86	*(8.89)*	***
Immigration Status (ref=Native Student)						
Second Generation Immigrant	-6.22	*(2.28)*	**	-6.21	*(2.23)*	**
First Generation Immigrant	-10.78	*(3.72)*	**	-10.77	*(3.70)*	**
Student Family Structure (ref=Two Parents)						
One Parent in the Home	-1.27	*(2.07)*		-1.27	*(2.06)*	
No Parents in the Home	-25.77	*(5.26)*	***	-25.78	*(5.32)*	***
Minutes Spent Learning Math in School	.04	*(.02)*	***	0.04	*(.02)*	*
Country-Level Controls						
National Wealth	.55	*(.00)*	**	.55	*(.00)*	**

*Note: N=309,273 students within 10,863 schools nested within 42 high-income countries. P-values reported for one-tailed tests, ***p<.001, **p<.01, *p<.05*

Figure 1. Expected Student Achievement Values in Equal and Unequal Countries

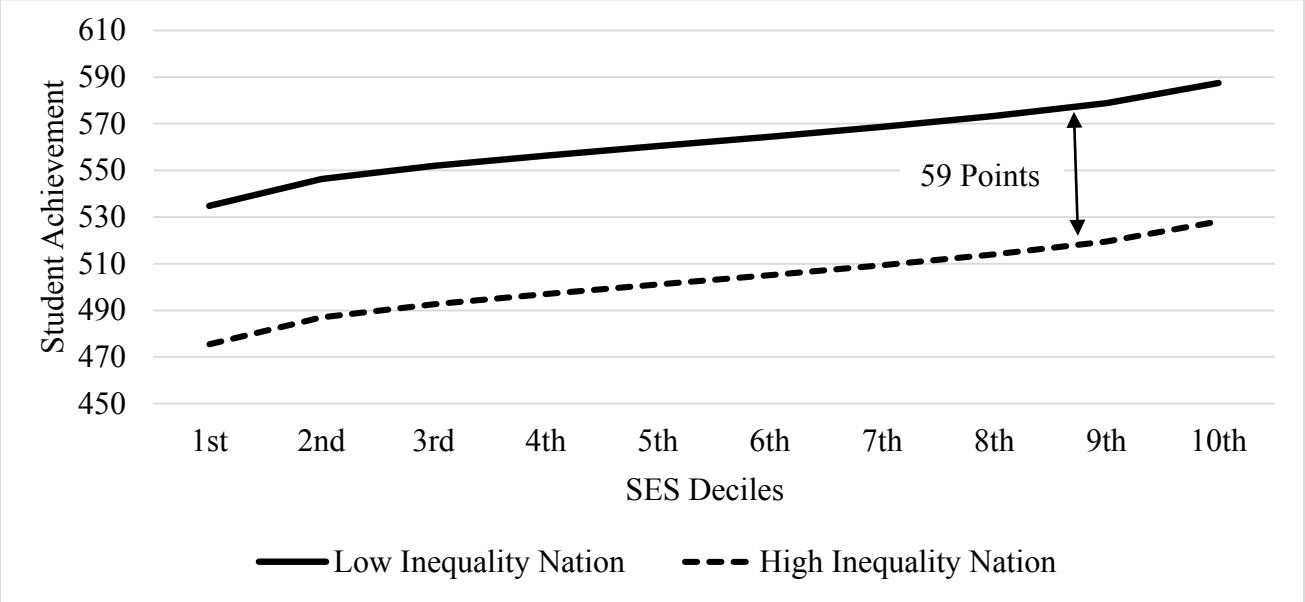
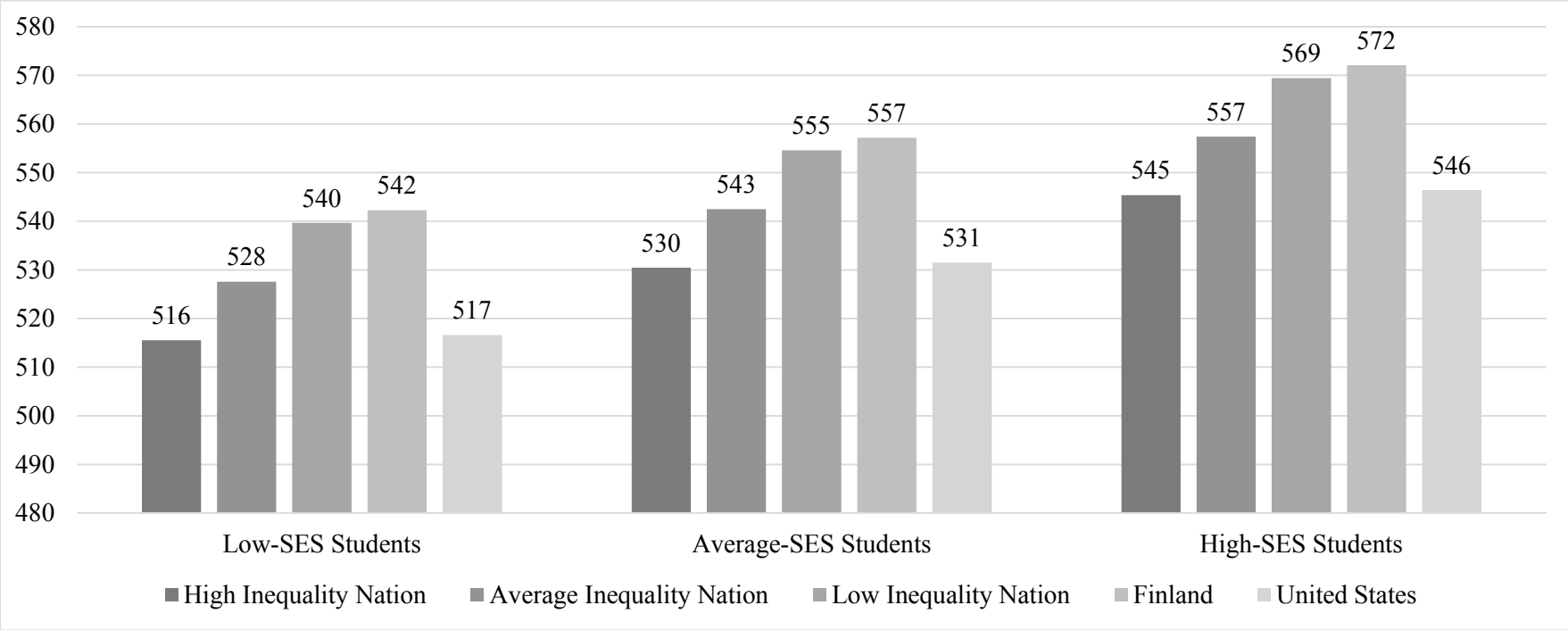


Figure 2. Expected Student Achievement Values by Student SES and National Income Inequality



Note: Average-SES students are represented by the sample mean. Low-SES and High-SES students are represented by the values for one standard deviation below and above the sample mean for SES, respectively. Similarly, Average, Low and High Inequality nations are represented by values for the average Gini coefficient reported for this sample of countries and one standard deviation below and above.