

14 minutes

Good Afternoon. Thank you for giving me the opportunity to discuss how equal learning opportunities are linked to higher test scores in 41 countries.

[click] Why do countries' test scores differ? Is it because some countries are richer? Are some countries more equal? Or do some countries have cultural values that help students learn more?

[click] **First, money.** Students in richer families, schools and countries have more books, computers, and other resources. So, they have more learning opportunities. [click] Using these extra learning opportunities, they often learn more. [click] For example, here's a graph of test scores and country income. As you can see, richer countries typically have higher test scores.

[click] **Second, inequality.** Inequality comes in many forms: family inequality, school inequality, bias toward richer students, and separating rich students from poor students.

[click] Family inequality Do students' homes differ a lot? If so, the learning resources in these homes also likely differ a lot.

[click] Likewise, some schools have more learning resources than other schools

[click] Within a school, teachers might treat students differently. Students who receive better treatment from teachers often learn more.

[click] Lastly, Do all the rich students attend the same schools, with poor students attending other schools? [click] Or, are the students mixed together in integrated schools? Student separation is important because rich students have more resources. If rich students are separated from poor students, they can't share resources, and poor students will learn less.

[click] Inequality can work through many mechanisms. First, students and teachers might share less in unequal countries. Second, inequality might reduce overall school resources. Thirds, unequal countries might have more student discipline problems. Lastly, diminishing marginal returns can sharply lower achievement in unequal countries.

First, **People like others who are similar to themselves**, not different. Imagine that I'm in a very unequal society. I look around, and I see people are very different from me. Because I don't like people who are so different, so I'm not likely to make friends with them. [click] Thus, students and teachers in unequal countries are less likely to be friends, to share resources, or to help one another academically. As a result, students might learn less in unequal countries.

Second, less equal countries might have **fewer school resources** overall. Let's say I'm a rich parent in an unequal society. I have lots of books and educational resources at home for my children. So, I don't need to pay for them at school, and I want to cut spending on public schools. I want every family to pay for their own children's schooling. If families mostly pay for school though, most poor families cannot afford it. Thus, the end result is less money for schools.

In less equal societies, people like one another less and trust one another less. When people don't trust one another and don't care about one another, it's easier to be **corrupt** and take money away from other people. In countries like mainland China and Nigeria, massive school corruption takes away school resources from students. As a result of fewer school resources, students might learn less.

Third, in an unequal country, there are more people who are economically insecure resulting in higher **crime** rates. This is particularly relevant as teenagers commit more crimes than older people. [click] Let's start with **economic crime**. Imagine that I'm a weak student. I have few skills and expect few legal job opportunities in the future. In an equal country, I would get about the same pay after taxes as most other people [hold hands vertically close]. In an

unequal country, my take-home pay after taxes is a lot less[hold hand lower vertically]. So, in less equal countries, I gain a lot more from committing crimes compared to working at a legal job. This is why when the economy goes down and people can't get good jobs, crime often goes up.

Inequality is also linked to **violent crime**. [click] In unequal countries, there are more people who are low status and feel psychologically inferior. These people are more likely to react violently to disrespect or humiliation. Let's say someone yells at us, [Walk away, turn back, point finger] "You're an idiot!" [walk back] Well, we all know we're pretty smart, so we might brush it off [hand flicks fingers away] and say, "You're entitled to your opinion." But imagine I'm a LOW status person who FEELS inferior. I might believe that to some extent I am "idiot." So, I might lash out and [punch hand] punch the person in the face. This type of disrespect ignites a lot of assaults and murders in poor neighborhoods in the US.

Also, some schools unfairly give privileged students more resources such as better equipment or better teachers. Let's say I'm a disadvantaged student. Well, I deeply resent the privileged students. Also, I don't respect the authority of the unfair school, the unfair teachers, and their school rules. So, I'm more likely to violate those school rules, worsening school discipline (Arum, 2003).

In short, in unequal societies, students might suffer from more stealing, more violence, more violations of school rules and generally **weaker student discipline**. Students who are worried about their physical and emotional safety are more distracted from their studies and tend to learn less.

Lastly, diminishing marginal returns. Imagine that Esther is thirsty. So, let's pour some water for her. [Pour two glasses of water.] After drinking her first glass of water, she's not so thirsty anymore. So, Esther benefits more from her first glass of water than from her last glass. [click] Likewise, rich students have more glasses of water, or more resources, than poor students do. So, an extra resource, like an extra book, benefits a poor student much more than a rich student. [click] In unequal countries, the rich get more and the poor get less, so overall achievement is lower. [click] As we saw before, students in rich countries score higher, but it's not a straight line. The log curve gets flatter, and this log curve indicates diminishing marginal returns. [click]

Lastly, **cultural values** might affect student achievement. I will just list them for now. If you are interested, we can discuss them later. I examined whether test scores were higher in countries that were more hierarchical or egalitarian? Collective or individualistic? Had specific gender roles? Avoided uncertainty? Had short- or long-term orientations? Emphasized harmony? Mastery? Had external dynamism –believing in the power of an outside force, like God? Or were cynical about other people?

[click] So in summary, we have **3 sets of hypotheses**.

[click] First, students from richer countries, families, and schools, might score higher

[click] Second, we consider 4 types of inequality: family inequality, school inequality, bias toward rich students, and separation of rich students from poor students. [click] Students in unequal countries might score lower because of the following mechanisms: less sharing by students and teachers, fewer school resources, worse student discipline, or sharper diminishing marginal returns.

[click] Lastly, I tested the effects of cultural values on student achievement.

[click] To test these hypotheses, I used data from the organization for economic cooperation and development which set up a program for international student assessment or OECD-PISA. They tested over a hundred thousand students in 41 countries. [click] They gave the students a science test. They also gave questionnaires to the students, to their parents and to

their principals. [click] I also used economic data collected by the World Bank and the University of Pennsylvania. [click] The cultural values are from several databases created by Hofstede, Inglehart, Smith, and Bond.

[click] To get a representative sample, OECD used stratified sampling in each country. [click] The test items and questionnaires were both forward- and backward-translated. Statistical tests showed that the test items and the sets of questionnaire items had high reliability. [click] We used a Rasch model to measure student achievement more precisely. [click] Still, some students did not answer some questionnaire items, so we used multiple imputation. [click] Because the data is nested, students within schools within countries, we used multi-level analyses (also known as hierarchical linear modeling or HLM).

[click] Applying these analyses, we get the following results. As expected, students in **richer** countries score higher. [click] Also, students in families with higher socio-economic status or SES scored higher. [click] Likewise, students with higher SES schoolmates scored higher. [click] Lastly, students in richer schools scored higher. Specifically, richer schools have enough teachers and teaching materials. They also have more highly educated teachers and more certified teachers.

Controlling for all of these variables, [click] students score lower when there is greater **inequality**. Students score lower with greater family inequality, school inequality, bias toward richer students, or separation of rich students from poor students.

[click] Inequality operates through several **mechanisms**. In countries with greater **family inequality**, students and teachers share less, so students learn less. Also, there are fewer school resources, specifically fewer teaching materials, fewer teachers with university degrees, and less science lesson time. Countries with greater family inequality also often have greater school inequality.

[click] In countries with **unequal schools**, schools have different proportions of certified teachers, and students learn less.

[click] Also, schools that are biased toward rich students have less science lesson time and worse school and classroom discipline.

There were also diminishing marginal returns. Country income and teaching materials at school both have log effects on student achievement.

[click] Lastly, **cultural values had no significant effect** on science scores. Hierarchy, collectivism, gender roles, uncertainty avoidance, short-term orientation, harmony, mastery, external dynamism, and social cynicism all had no effect.

[click] **In short**, students in richer families, schools, and countries score higher. Students in more equal countries and schools also scored higher. Lastly, cultural values did not significantly affect science scores.

[click] What are the practical implications? [click] First, give more resources to poor students, especially those in poor neighborhoods. Second, train teachers to give equal attention to students from poor families. [click] Third, mix rich and poor students together in integrated schools.

Thank you [bow].