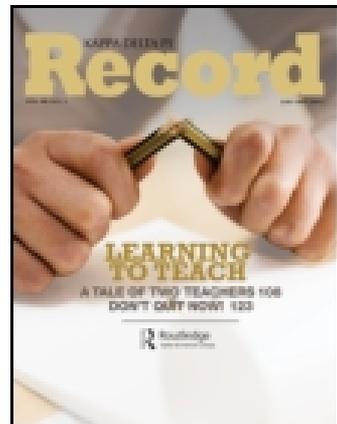


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Poverty and Test Performance

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Poverty and Test Performance

by Christopher H. Tienken
Academic Editor

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Abstract

Students from poverty, as a group, never score or rank as high or higher on standardized tests as their wealthier peers. An analysis of data from national and international tests given since 2011 illustrates some of the deleterious effects of poverty on the standardized test output of American students.

Key words: *poverty, PISA, international rankings*

Poverty affects student achievement in many ways, and it factors greatly in determining standardized tests results. In this essay, I discuss some influences of child poverty on the results from national and international tests and argue that the United States does not have a student achievement problem; it has a child poverty problem.

Interpreting the results from national and international tests without accounting for deleterious influences of poverty on test results is not scientifically sound. Basing education policy and programs totally or in part on the results from international tests without taking poverty into account is, in my opinion, education malpractice.

Poverty Pervades

Whether considering the results from state tests at all grade levels and subjects, or scores on national tests like the National Assessment of Educational Progress (NAEP) or the SAT®, childhood poverty clearly depresses student achievement (The College Board, 2012; Tienken, 2010; Tienken & Orlich, 2013). For example, on the 2013 Grade 8 mathematics NAEP, the average difference in scores between children eligible for the federal free lunch program and those who were wealthy enough not to qualify for the program was 28 scale score points (Institute of Education Sciences

[IES], 2013). Students eligible for free lunch had an average score of 269, whereas those not eligible for the program had an average scale score of 297 out of a possible 500. The difference is statistically significant at the $p = .001$ level. The average scale score for all students was 284.

The aggregated mean score on all three parts of the SAT in 2012 for students from households with annual incomes of \$20,000–40,000 was 1397 compared to 1458 for students from households with annual incomes of \$40,000–60,000. The aggregated mean jumps to 1535 for students from households with annual incomes of \$80,000–100,000. Aggregated mean SAT scores rise unabated for every \$20,000 increase in household income (The College Board, 2012).

The negative effects of poverty are not limited to state and national tests. A country's child poverty rate also impacts the results and rankings on international tests such as the Programme for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS; Mullis, Martin, Foy, & Arora, 2012; OECD, 2014a). PISA is administered to a sample of 15-year-old students in more than 60 countries and cities, and TIMSS is administered to students in Grades 4 and 8 in about 53 countries and cities.

International Rankings of Poverty

According to researchers at OECD (2014b) and UNICEF (2013), the United States has the highest level of child poverty in the industrialized world except for Romania and Bulgaria. Among the 30 industrialized member countries in OECD, the United States has nearly the worst ranking in child poverty, and that ranking affects the performance and rankings on international tests of academic achievement (OECD, 2013). The OECD (2014b, 2014c) uses a harmonized international calculation to measure childhood poverty across countries. OECD (2014c) researchers

explained, “People are classified as poor when their equivalised household income is less than 50% of the median prevailing in each country. . . . The poverty rate is a headcount of how many people fall below the poverty line” (p. 112).

The OECD calculation method is almost identical to the one used by the U.S. Census Bureau, whose calculations are reported by the National Center for Education Statistics (NCES). The poverty threshold for a family of four in the United States during the 2011–2012 school year was \$22,811, according to the NCES (2013), based on official Census Bureau calculations. The OECD method is also similar to the one used by UNICEF (2013), whose researchers ranked the United States 34th out of 35 industrialized countries, once again better than only Romania.

More than 23% of U.S. public school children lived in poverty in 2012 when the PISA was administered compared to about 17% in 2000 (KIDS COUNT Data Center, 2013; Snyder & Dillow, 2013). Moreover, as of the 2010–2011 school year, 48% of public school children qualified for either free or reduced-priced school lunches (Snyder & Dillow, 2013). Consider that high-ranking PISA countries like Finland and Denmark have less than 5% childhood poverty (OECD, 2014b). Germany, another high-performing country, has less than 10% childhood poverty (OECD, 2014b).

PISA and TIMSS Rankings

U.S. students ranked 32nd on PISA math in 2012 when I removed the nonrepresentative cities of Shanghai, Macao, and Hong Kong (OECD, 2013). Cities do not represent countries, especially in China where less than half of all students are not in school at age 15 when the PISA is administered (Rural Education Action Program, 2013a, 2013b). The mean PISA mathematics score for U.S. students in 2012 was 481 (OECD, 2013). However, when I used the PISA Data Explorer from the Institute of Education Sciences (2014) to examine the mean score for students who attended schools with 10% or less poverty, that ranking jumped to 8th, tied with the Netherlands (IES, 2014). I used the 10% poverty rate for my calculations because that is

close to the 10.9% average child poverty rate for the 22 OECD member countries that outranked the United States on the 2012 PISA math test and almost identical to the 10.5% rate for the top 10 scoring OECD countries on the 2012 PISA math test (OECD, 2014a).

My results align with earlier studies of the PISA 2009 math test where Tirozzi (as cited in Riddle, 2010) modeled the results using poverty bands. The U.S. rankings and scores skyrocketed from 31st place to 3rd place when he separated the scores by poverty rates. Students in U.S. schools that had less than 10% of the children in poverty ranked and scored near the top of the world. Likewise, the United States moved from 35th place to 10th place on the 2006 PISA math test and from 28th to 11th place on the 2003 PISA math test (IES, 2014). The average gain in rankings since 2003, provided by reducing child poverty to around 10%, is 23 places (IES, 2014).

Similar results appear with TIMSS rankings and scores. For example, U.S. students in Grade 8 had a mean mathematics scale score of 541 in 2011, putting them in 9th place when I removed the three nonrepresentative cities from China (Mullis et al., 2012). When I used the scores from a state that had only 15% child poverty, the score rose to 561—to 5th place tied with Japan. The child poverty rate in a country explains up to 46% of the PISA scores in the 30 major industrialized countries in the world and is similarly related to TIMSS results (Mullis et al., 2012; OECD, 2014a).

International Pattern of Poverty

Keep in mind that the pattern of lower achievement for students from poverty occurs in all other countries that participate in international tests. In no country do children from poverty, as a group, score higher than their better-off peers. The issue for the United States is that it has a higher percentage of children living in poverty than most of the industrialized world, and that higher percentage depresses achievement. However, the United States demonstrated less variation in performance on the PISA 2012 between its poorest students and richest students compared



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For the Record

to higher scoring countries like Singapore, Germany, Korea, Japan, and the highest scoring cities of Hong Kong, Shanghai, and Macao (OECD, 2013, 2014a). This finding suggests that perhaps U.S. educators are actually doing a better job of educating children from poverty than other industrialized countries. Once again, the U.S. problem is the sheer volume of students from poverty.

Overall, as a country's percentage of childhood poverty increases, its ranking on the PISA and TIMSS tests decreases. If a country wants to raise achievement on international tests, it should first start by lowering its childhood poverty rates.

Poverty's Power Over Math Confidence

Poverty lowers children's confidence in their mathematical abilities. The results from the PISA 2012 student survey suggested that poverty relates to mathematical self-efficacy, and self-efficacy relates to achievement (OECD, 2013). According to the PISA survey, mathematics self-efficacy is an indicator of how well a student believes he or she performs at mathematics. It is a proxy for math confidence. There was a statistically significant correlation of 0.50 between math self-efficacy and PISA mathematics scores (OECD, 2013). Approximately 28% of the variance (difference in test results) on PISA mathematics is explained by math self-efficacy in the OECD countries—the most industrialized countries in the world (OECD, 2013).

The 2012 PISA results suggested that the belief in one's ability to perform in mathematics influences student achievement (OECD, 2013). Unfortunately, the high levels of child poverty in the United States along with the lower levels of math self-efficacy have a greater influence on PISA mathematics scores compared to other nations that have less child poverty. The U.S. score-difference between students with high self-efficacy and students with lower levels of self-efficacy was approximately 50 scale score points on the PISA 2012 math test (OECD, 2013).

Focusing on the Wrong Problem

Low rankings for U.S. students on international tests have been used by every presidential administration

since Ronald Reagan as justification for proposing privatization of public school, vouchers, more standardized testing, standardized curriculum, alternative teacher certification programs, and school choice schemes to raise student achievement (Tienken & Orlich, 2013). The one proposal guaranteed to raise achievement to the highest levels in the world that I have not seen is a sustained commitment, through a comprehensive set of policies and social supports, to eradicate the root cause of underachievement: poverty. Some policymakers and education bureaucrats seem more interested in treating symptoms than the actual problem. If the leaders of most of the industrialized world can provide the social system necessary to keep their children out of poverty, then why can't the leaders of the United States? ■

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