

# Appendix

# Summary of Class Size Reduction Research

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Research on the effects of class size reduction has linked small class sizes with a variety of cognitive and non-cognitive benefits for students and teachers, both short and long-term, especially when class sizes are reduced in the early grades. In fact, class size reduction is one of only a handful of K12 reforms cited by the Institute of Education Sciences (2003) as proven to increase student achievement through rigorous evidence.

Reducing class size is among an even smaller number of education reforms that have been shown to narrow the achievement gap. Its benefits are particularly pronounced for lower-income students and children of color, who experience two to three times the gains from smaller classes.

Smaller classes have also been found to have a positive impact on school climate, student socio-emotional growth, safety and suspension rates, parent engagement, and teacher attrition, especially in schools with large numbers of disadvantaged children.

Yet despite the research that shows that small classes have especially large benefits for low-income students, the United States is one of only four industrialized countries in which schools with disadvantaged students have smaller teacher/student ratios.<sup>1</sup>

Moreover, our nation's public schools have still not recovered from the economic recession which led to the loss of hundreds of thousands of teaching positions. While the number of public K-12 teachers and other school staff has fallen by 221,000 since 2008, the number of students has *increased* by 1,120,000.<sup>2</sup>

Local, state and federal funds should be harnessed to keep class sizes as small as possible. Federal Title IIA funds have been a major source of funding to reduce class size, with about 30 percent allocated for this purpose as of the 2014-15 school year.<sup>3</sup>

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<sup>1</sup> OECD, *PISA 2009 Results: Overcoming Social Background – Equity in Learning Opportunities and Outcomes (Volume II)*, 2010, p.14; <https://www.oecd.org/pisa/pisaproducts/48852584.pdf>.

<sup>2</sup> Center on Budget and Policy Priorities, "After Nearly a Decade, School Investments Still Way Down in Some States," October 20, 2016; <http://www.cbpp.org/research/state-budget-and-tax/after-nearly-a-decade-school-investments-still-way-down-in-some-states>.

<sup>3</sup> US Department of Education, *Findings From the 2014-15 Survey on the Use of Funds under Title II, Part A*, July 2015; <https://www2.ed.gov/programs/teacherqual/learport.pdf>

The US Department of Education's recently released Guidance for Title II Part A under the new Every Student Succeeds Act (ESSA) specifies that class size initiatives must be "evidence-based," though other activities eligible for funding under the law are not held to the same rigorous standard.<sup>4</sup> The law also requires every state have a public comment period to elicit feedback on how they should use Title II funds.

Here are just some of the benefits of smaller class size, according to the peer reviewed research literature— with evidence that parents, teachers and advocates can enlist to urge that these funds be utilized for class size reduction.

## Academic Achievement

- In a meta-analysis by Glass and Smith (1978), small class sizes (20 students or less) were associated with improved academic performance. Effects were strongest in the early primary grades and among low-income students.
- For a study commissioned by the US Department of Education, McLaughlin et al. (2000) analyzed the performance of students in over 2,500 schools on state exams adjusted for difficulty via their scores on the NAEP (national) exams. The analysis showed that after controlling for student background, the only factor positively correlated with student test scores was class size. In this study, student achievement was even more strongly linked to smaller classes in the upper than the lower grades.
- A literature review by Wilson (2002) noted that results from the Tennessee STAR study, a large-scale randomized experiment in grades K-3, showed that grade retention was lower for students in small classes: 17% of students from small classes were held back, compared with 30% and 44% respectively from 'regular' and "regular plus aide" classes. Also, fewer students that had been in smaller classes in the early grade had dropped out of school by tenth grade.
- Using data from the Tennessee STAR study, Krueger (2003) demonstrated that smaller class sizes in grades K-3 led to significant gains in test scores, and that the economic benefits from higher achievement alone would be expected to yield twice the cost of reducing class size.
- Finn et al. (2005) found that four years of a small class in K-3 improved the odds of graduating from high school by about 80%.
- Dynarski et al. (2013) concluded that smaller classes significantly increased the probability of a student attending college, earning a college diploma, and earning degrees in a STEM field (science, technology, engineering, or mathematics).
- A review by Zyngier (2014) of the research literature showed that smaller classes had a strong positive impact on student achievement and narrowing the achievement gap in the vast majority of studies. The benefits of smaller class size outweighed the cost in all but three of the 112 peer-reviewed studies.

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<sup>4</sup> US Department of Education. 2016. *Non-Regulatory Guidance for Title II, Part A: Building Systems of Support for Excellent Teaching and Learning*. <http://www2.ed.gov/policy/elsec/leg/essa/essatitleiipartaguidance.pdf>.

## Safety, Attendance and Disciplinary Issues

- Wilson (2002) analyzed Tennessee STAR data, showing that there were lower suspension rates in later grades among students who had been in small classes in the early years. Tenth grade students who had been in small classes in K-3 were suspended on average 0.32 days, compared with 0.62 and 0.77 days for students in "regular" and "regular plus aide" classes respectively. Similarly, school attendance was significantly higher for tenth graders who had been assigned to small classes in the early years (16 days per year of absence compared to 23 and 24 for "regular" and "regular plus aide" classes).
- Krueger and Whitmore (2002) found that the teen birth rate was one third lower for white girls if they had been assigned to smaller classes in the early grades, and the teen fatherhood rate for Black males was 40% lower.
- In a review of the literature, Finn et al (2003) analyzed 11 separate class size studies, and nearly all showed a positive impact of smaller classes on students' learning behavior, including decreases in anti-social behavior (i.e., withdrawing from interactions with the teacher or other students and/or engaging in disruptive acts) and increases in pro-social behavior (i.e., following rules and interacting positively with the teacher as well as collaborating with other children). In one class size study in North Carolina, disciplinary referrals decreased sharply in the two years after small classes were implemented, with a 26% drop in the first year and a 50% drop in the second year.

## School Climate and Non-Cognitive or Socio-Emotional Factors

- Finn et al (2003) analyzed the relationship between class size and learning behavior, social behavior, and teaching styles, showing a positive relationship between reduced class size and outcomes in all three areas. Reduced class size was linked with increased academic engagement, student effort, initiative taking in the classroom and time on task. Additionally, teachers of small classes were able to get to know each student more intimately and their tolerance for a broader range of student behaviors was increased.
- Babcock and Betts (2009) investigated the mechanism through which smaller classes boost academic achievement and found that small class sizes better enabled teachers to engage "low-effort" students, as defined by a below average tendency to begin work promptly, behave appropriately in class, exhibit self-discipline, and follow directions.
- Bascia (2010) summarized the impacts of class size reduction, noting that teachers were able to interact with individual students more frequently and use a greater variety of instructional and differentiated strategies. Students were more engaged and less disruptive in the classroom.
- In an analysis of national longitudinal data of eighth graders, Dee and West (2011) found that reductions in class size were associated with improvements in non-cognitive skills related to psychological engagement with school; more positive reactions to teachers, peers, and academics in general, higher levels of interest and motivation; lower levels of boredom and anxiety, and a greater sense of belonging. Students in small classes were more likely to look forward to class, believe that the subject was useful for their future, and were less afraid to ask questions.

## Achievement Gaps

- Based on STAR data, Krueger and Whitmore (2002) estimated that if all students were assigned to a small class in grades K-3 for one to four years, the Black-white test-score gap would drop by 38 percent in grades K-3 and by 15 percent thereafter. They also estimated that national trends in pupil-teacher ratios for Black and white students between 1971 and 1999 accounted for nearly all of the narrowing of the Black-white test score gap over that period, as measured by the NAEP exam. In addition, they concluded that smaller classes in grades K-3 would lead to a narrowing of the Black-white gap in taking college entrance exams by 60%, and would shrink the gap in scores on these exams.
- Dee (2004) looked at the effects of student-teacher racial mismatch on academic achievement in small classes. He found that while racial mismatch of teacher and student had negative effects on academic achievement in regular sized classes, this effect was absent in small classes.
- Finn et al (2005) concluded that three years or more of small classes in the early grades increased the odds of graduating from high school of low-SES students by about 67%. Four years of small classes in the early grades more than doubled the odds. The graduation rates for low-income students with three or more years in a small class were at least as high as those of higher income students, closing the income gap.
- Konstantopoulos and Chung (2009) concluded that while all types of students benefit in later grades from being in small classes in early grades, low achievers benefited more, especially in reading and science.
- In a study examining the effect of a variety of inputs on student achievement in majority Latina/o schools, Heilig et al (2010) found that the reduction in student-teacher ratios was the largest predictor of increases in student achievement.
- After analyzing Social Security data, Wilde et al (2011) estimated that Black students who were randomly assigned to a small class size in the early grades had significantly higher employment rates and earnings as adults.
- Yongyun Shin (2012) found that for Black students, reduced class size in grades K-3 led to significantly higher academic achievement in reading, math, listening, and word recognition skills.
- Achilles (2012) concluded that poor, minority, and male students received especially large benefits from reduced class size in terms of improved test scores, school engagement, and lower grade retention and dropout rates.
- Dynarski et al (2013) investigated the effects of small class sizes on postsecondary attainment and degree completion and estimated that assignment to small classes increased the probability of attending college by 2.7 percentage points, with effects more than twice as large among Blacks. Among students with the lowest probability of attending college, the increase in college attendance was 11 percentage points.
- Schanzenbach (2014) summarized the benefits of class size reduction and its efficacy in narrowing the achievement gap in a report for the National Education Policy Center (NEPC). She concluded that significant savings would be produced from higher graduation rates and increased employment, particularly among low-income and minority groups.
- Zyngier's meta-analysis (2014) revealed that of 112 peer-reviewed studies, the overwhelming majority found that smaller classes helped to narrow the achievement gap.
- Mathis (2016) noted that the positive effects of class size reduction are twice as large for poor and minority students, in a literature review for the National Education Policy Center (NEPC) report.

## Parent Engagement

- [Bohrnstedt and Stecher \(1999\)](#) found that parents of students in reduced size classes had more contact with teachers and were more satisfied with their children's education. 74% of parents reported initiating contact with their children's teachers, compared with 69% of parents in non-reduced classes. Parents who had children in smaller classes also gave higher ratings to every aspect of their schooling.
- [Bascia \(2010\)](#) summarized a study conducted by the University of Alberta. After interviewing parents, researchers found that they were encouraged by being able to meet with teachers more frequently. The report also cited evidence from a study of Ontario's class size reduction initiative showing that many parents reported a better relationship with teachers when their children were assigned to a smaller class.

## Teacher Attrition

- According to a [NY City Council survey \(2004\)](#) of public school teachers, nearly a third (30%) of new teachers (1-5 years of experience) in NYC said that it was unlikely that they would be teaching in a NYC school in the next three years. For those teachers who were thinking of leaving NYC public schools, the top three changes in their work conditions most likely to persuade them to stay included a new contract with higher pay, smaller classes, and better student discipline.
- [Loeb et al \(2005\)](#) examined data from teacher surveys and school-level data to determine the relationship between occupational conditions and teacher turnover. They found that the presence of very large classes significantly increased teacher turnover.
- A report from the [Pennsylvania State Education Association \(2008\)](#) noted that smaller classes improved teacher morale, which translates into higher rates of teacher attendance, reduced costs for substitute teachers and less teacher attrition.
- [Pas Isenberg \(2010\)](#) found that a decrease in class size from 23 to 20 students in New York State under a district-wide policy decreased the probability that a teacher would leave the school by 4.2 percentage points.
- [Ingersoll \(2016\)](#) noted that job dissatisfaction is the leading factor behind teacher turnover, with 54% of teachers who leave their school reporting that large class sizes contributed to their decision.

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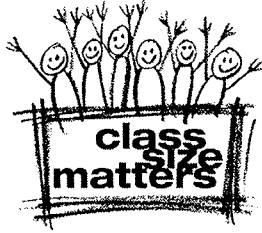
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## Benefits of Class Size Reduction

Reducing class size is one of the few educational strategies shown to increase learning for all students, yielding a host of cognitive and non-cognitive benefits. Throughout the nation, schools have seen sharp increases in class size in recent years.

Since lowering class size is one of the few education reforms that have been proven to work and to narrow the achievement gap, as well as yield economic benefits twice the cost, investing in smaller classes should be a top priority for all schools.

- The Institute of Education Sciences, the research arm of the US Department of Education, concludes that class size reduction is one of only four, evidence-based reforms that have been proven to increase student achievement through rigorous, randomized experiments -- the "gold standard" of research.<sup>1</sup>
- The STAR experiment in Tennessee, as well as studies from Wisconsin and elsewhere, demonstrate that students who are assigned to smaller classes in the early grades do better in every way that can be measured: they score higher on tests, receive better grades, and exhibit improved attendance.<sup>2</sup>
- Those students whose performance improves when class sizes are reduced are those who need the most help: children from poor and minority backgrounds, who experience twice the gains as the average student. Estimates are that reducing class size in the early grades shrinks the achievement gap by about 38%.<sup>3</sup>
- In addition, smaller classes enhance the development of "non-cognitive" skills not captured by tests, like persistence, motivation and self-esteem, which are also linked to success in school and in life.<sup>4</sup>

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<sup>1</sup> U.S. Department of Education Institute of Education Sciences, "Identifying and Implementing Educational Practices Supported by Rigorous Evidence: a User Friendly Guide," December 2003. The other three reforms are one-on-one tutoring by qualified tutors for at-risk readers in grades 1-3rd ; life-skills training for junior high students, and instruction for early readers in phonics.

<sup>2</sup> Jeremy Finn, "Class Size Reduction, Grades K-3," in: School Reform Proposals: The Research Evidence, ed. A. Molnar, 2002 . See also Ivor Pritchard, Reducing Class Size: What Do We Know? US Department of Education, 1999. Alex Molnar, et.al. 1999-2000 Results of the Student Achievement Guarantee In Education (SAGE) Program Evaluation, December 2000, Center for Education Research, Analysis, and Innovation, University of Wisconsin-Milwaukee.

<sup>3</sup> Alan B. Krueger and Diane M. Whitmore, January 2001. "Would Smaller Classes Help Close the Black-White Achievement Gap?" in John E. Chubb and Tom Loveless, eds., Bridging the Achievement Gap, Brookings Institution Press 2002.

<sup>4</sup> Thomas Dee and Martin West, "The Non-Cognitive Returns to Class Size," Educational Evaluation And Policy Analysis, March 2011; see also Philip Babcock and Julian R. Betts, "Reduced-class Distinctions: Effort, Ability and the Education Production Function," Journal of Urban Economics, May 2009; J. Heckman and Y. Rubinstein, "The Importance of Noncognitive Skills: Lessons from the GED testing program," The American Economic Review, May 2001.

- Alan Krueger, Chairman of the Council on Economic Advisers, has estimated that every dollar invested in reducing class size yields about \$2 in benefits.<sup>5</sup> This does not take into account savings from lower rates of grade retention or special education referrals, both of which fall when class sizes are lowered.<sup>6</sup>
- Class size reduction is likely to have large public health benefits – with medical savings comparable to spending on antibiotics or even vaccines-- with nearly two more years of life projected for students who are in smaller classes in the early grades.<sup>7</sup>
- The benefits of class size reduction in the early grades last throughout a student's educational career. Tennessee students who attended smaller classes in the early grades were significantly ahead of their regular-class peers in all subjects in later grades.<sup>8</sup>
- These students also had significantly lower drop-out rates, higher grades, and received better results on their college entrance exams. The graduation rate for free-lunch students more than doubled, and their likelihood of graduating closed the gap with non-poor students.<sup>9</sup>
- National surveys of educators believe that class size reduction is the most effective method to improve the quality of teaching. In a 2008 survey, 76% of teachers said that reducing class size would be "a very effective" way of improving teacher quality, and 21% responding that it would be an "effective" method, far outstripping every other reform cited.<sup>10</sup>
- A study commissioned by the US Department of Education analyzed at the achievement levels of students in 2,561 schools across the nation, as measured by their performance on the national NAEP exams. The sample included at least 50 schools in each state, including large and small, urban and rural, affluent and poor areas. After controlling for student background, the only objective factor that correlated with higher test scores was class size, and the gains in the upper grades associated with smaller classes surpassed the gains from smaller classes in the lower grades.<sup>11</sup>

*Prepared by Leonie Haimson, Executive Director, Class Size Matters, June 4, 2013.*

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<sup>5</sup> Alan B. Krueger, "Economic Considerations and Class Size," *The Economic Journal*, February 2003.

<sup>6</sup> See for example, only 16.7% of Nashville students who were in smaller classes in the early grades were held back through 10th grade, compared to 43.5% of those who had been in regular-size classes. Jayne Boyd-Zaharias et al, "The Student/Teacher Achievement Ratio (STAR) Project, STAR Follow-up Studies, 1996-1997, HEROS Inc., September 1997.

<sup>7</sup> Peter Muennig and Steven H. Woolf, "Health and Economic Benefits of Reducing the Number of Students per Classroom in US Primary Schools," *American Journal of Public Health*, September 27, 2007.

<sup>9</sup> Helen Pate-Bain, 1999, "Effects of Class-Size Reduction in the Early Grades (K-3) on High School Performance," HEROS Inc., Jeremy D. Finn, Susan B. Gerber, Jayne Boyd Zaharias, "Small Classes in the Early Grades, Academic Achievement, and Graduating From High School," *Journal of Educational Psychology*, 2005.

<sup>10</sup> Public Agenda, "Lessons Learned, Issue No. 3: New Teachers Talk About Their Jobs, Challenges and Long-Range Plans," May 26, 2008.

<sup>11</sup> Donald McLaughlin and Gili Drori, *School-Level Correlates of Academic Achievement: Student Assessment Scores in SASS Public Schools*. Washington, DC: U.S. Department of Education, 2000. See also David Grissmer, et.al. *Improving Student Achievement: What State NAEP Test Scores Tell Us*. Santa Monica, CA: RAND, 2000, which had similar results from analyzing national test score data from 44 states to look at the effect of different educational factors on student achievement. The study showed that, controlling for students' family backgrounds, states with the lowest class size in the early grades had the highest NAEP scores.