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Is identification with school the key component in the 'Black Box' of education outcomes? Evidence from a randomized experiment

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ABSTRACT

In this paper, we follow up the important class size reduction randomized experiment in Tennessee in the mid 1980s (Project STAR) to attempt to further understand the long-lasting influences of early education interventions. While STAR led to large test score benefits during the intervention, these benefits quickly faded at its conclusion. However, research has recently shown that the STAR experiment led to long term benefits, including increases in college entrance exams participation (ACT/SAT), especially for minority students. We collect new follow up data on high school participation in extracurricular activities to examine whether (1) STAR increased participation in high school activities and (2) whether this increase in participation in high school is the explanation behind the long term benefits of the intervention. We find suggestive evidence that STAR did indeed increase some aspects of high school participation, including scholastic honors and participation in sports, especially for minority students. In contrast, we find little evidence that this increase in participation is the mechanism that has conferred higher rates of college-going to the STAR students.

1. Introduction

Whether class size reduction programs represent effective and cost-effective school reforms continues to be one of the most controversial issues in education research. A new twist in the debate has recently been introduced by examinations of potential long term benefits to class size reductions in early elementary school. Using experimental data from Tennessee (Project STAR), researchers have consistently found clear initial achievement gains for students who were randomly assigned to small classes in early elementary school. However, these gains largely disappeared after the students returned to normal-size classes. Then in high school, 8 or 9 years later, students who were randomly assigned to small classes in early elementary school were more likely to take college entrance exams and attend college (Krueger & Whitmore, 2001). An essential question for researchers is *why* this effect exists. We examine whether small class size in the early elementary years had an important (and yet unmeasured) enduring effect on these students' identification with school that then led to the long term benefits of the intervention.

In particular, we test two related hypotheses. The first hypothesis is that individuals in small classes in elementary school will, because of their increased identification with the schooling process, be more likely to participate in school activities. We chose to examine participation in school activities because the data are relatively easy to collect and the link between participation in school activities and identification with school is well established in the education literature (Finn, 1989; Holland & Andre, 1987; Ma, 2003). In order to test this hypothesis, we gather and combine new data on participation in high school from students who were involved in a randomized class size reduction experiment in early elementary school (Project STAR). The measures of participation that we use include sports, clubs, and other activities during high school. As it is well-documented that minority students lose substantial ground in achievement in the first years of schooling (e.g. Fryer & Levitt, 2004, 2006), we also examine whether there

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are differential effects of small classes on school identification for minority students.

For our second hypothesis, we test whether increased identification with school had an effect on whether a student took a college entrance exam. We test this hypothesis by examining the probability than an individual took a college entrance exam. Including our measure of identification with school should increase the likelihood of taking a college entrance exam and should reduce the relationship between small class size and the college outcome documented in previous research (Krueger & Whitmore, 2001). Importantly, the random assignment of students to class rooms in the Project STAR experiment should allow the relationships in both of our analyses to be interpreted as causal. Finding identification with school to be a critical element that makes schools work and educational interventions effective would imply that efforts to increase student identification with school should be a top priority in future education policy suggestions.

To preview our results, we find evidence that small classes during grades K-3 increased some measures of high school participation, especially for minority students. The results are strongest for participation in scholastic clubs and sports but weak for participation in non-scholastic clubs.

While we find causal evidence of effects of small class size on participation in high school activities, we are unable to link these increases in high school participation to an increase in the likelihood of the students taking a college entrance examination. Using additional measures of identification with school administered in 8th grade that have recently been provided in the public access STAR database, we also find that the increases in identification with school provided through the class size reduction seem to be orthogonal to the college exam participation. Although we are unable to provide the mechanism linking class size reductions with college exam participation, we extend the literature by providing new evidence of additional benefits from class size reduction in early elementary school—identification with school in 8th grade and participation in high school activities.

2. Background literature

There is a large literature documenting the long term benefits of many types of early investments in children, particularly disadvantaged children (see Heckman, 2006 for a recent summary; also see Reynolds, Wang, & Walberg, 2003). For example, the Perry Preschool Program, an early intervention on Black children, is estimated to have a rate of return of approximately 15% (Rolnick & Grunewald, 2003) and a benefit-cost ratio of over 8:1 due to its long term benefits in decreasing arrests, cash assistance, out-of wedlock births, etc. Importantly, this intervention showed small immediate benefits, and researchers hypothesize that the benefits accrued in part because the pre-schoolers "bonded" with their school (Berrueta-Clement, Schweinhart, Barnett, Epstein, & Weikart, 1984; Finn, 1989). Another example of targeted early interventions with long term benefits is the Abecedarian program, which started when participants were 4 months old. This expensive and intensive program has been shown to permanently raise IQ and non-cognitive skills. A broader set of investments societies make in children include a large range of educational inputs. In this paper, we focus on one such input: class size.

The debate over the benefits of reducing class size has raged over several decades. In fact, Hanushek (1999) states, "No topic in education has received such public and professional attention as class size". The Tennessee Student/Teacher Achievement Ratio (STAR) program has been at the center of the debate because it was a large scale randomized experiment designed specifically to examine the efficacy of class size reductions. During the STAR experiment over 11,000 students in 79 schools were randomly assigned to small classes (13–17 students per teacher), regular classes (22–25 students per teacher, and regular-with-aide classes (22–25 students with a full-time teacher's aide).

While there is much debate regarding the robustness of some of the findings of the STAR experiment, several research findings appear uncontroversial. Achievement for students in small classes increased more than their counterparts during the experiment (Kindergarten through 3rd grade). Additionally, the achievement-test gains for students in small classes continued through 4th grade (Finn, Fulton, Zaharias, & Nye, 1989). The consensus for the effects of class size on student outcomes stops at the 4th grade. Finn, Gerber, Achilles, and Boyd-Zaharias (2001) present evidence that achievement gains continue through 8th grade for students who were in small classes between Kindergarten and 3rd grade. Hanushek (1999) analyzes the same data and is not persuaded of long-lasting achievement gains. Additionally, Hanushek stresses two reasons to be skeptical of the effectiveness of class size reductions: there have been long term decreases in class size in the US with no apparent effect on achievement and class size reductions appear to have a one-time effect on achievement rather than a cumulative effect. Krueger and Whitmore (2001) similarly show that the initial test score gains seem to fade after the children return to regular class sizes. However, all researchers emphasize the potential for unmeasured benefits from class size that could be both important and long term.

Longer term effects of small classes have recently been examined. In particular, Krueger and Whitmore (2001) present a perplexing finding. They document that students who were randomized to small classes in Project STAR in grades K-3 were more likely to take college entrance exams and attend college 8 or 9 years after the class size program ended. This increase in college entrance exams was particularly strong for Black students and students on free/reduced lunch. Resolving the finding that small class size had initial effects on achievement that faded with time, and then the effects reemerged at the end of high school is of fundamental importance to improving education. The uncertainty in whether class size reductions are effective (and if so, why?) leaves researchers, practitioners, and parents with more questions than answers. In this paper we seek to answer this question by examining whether class size reductions increased students' identification with school and whether this increase in identification with school is the mecha-