**Abstract:**

This paper explores the effects of attrition on student development in early education. Utilizing data from Tennessee's Project STAR experiment, this paper aims to expand upon the literature of peer effects as well as competition between public and private schools. It first reproduces the attrition profile of Project STAR first outlined in Rohlfs \& Zilora's (2014) to determine the nature of attrition in the experiment. It departs from other papers in the literature by utilizing survival analysis to determine which characteristics of students prolonged participation in the experiment. This paper then uses these findings to estimate the peer effects of attrition on students who remained in the experiment through the change in test scores of students between the 1\textsuperscript{st} and 2\textsuperscript{nd} grades. Such peer effects are subsequently decomposed using clustering to estimate the peer effects from students who may have left to private schools.

This paper aims to provide evidence that student sorting across different types of schools has educational impacts on the students they leave behind. At the same time, it analyzes attrition in Randomized Controlled Trials and may provide evidence of subsequent confounding factors or spillover effects on the broader population related to such developments.

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\noindent \textit{JEL Classification:} I, I21, I26, H4, J13.

\noindent \textit{Keywords:} Attrition, Economics of Education, Peer Effects, Private Schools, Project STAR.

**Introduction:**

Imagine yourself as an elementary school teacher trying to manage an unruly group of stu-  
dents. Do you seat them across the classroom from each other, hoping that once separated  
they stop their disruptive behavior? Or does this choice mean that they’ll simply find some-  
one else to talk to, resulting in further disruption? Answering these questions may prove  
instrumental for the success of your students. There exists extensive empirical literature  
examining the effect of exogenous policy shifts on student achievement. A considerable por-  
tion on the current economics of education literature, however, is now centered around the  
estimation of peer effects: the unobserved, peer-to-peer spillovers from students both inside  
and outside the classroom. Studying these mechanisms through which student outcomes  
may be maximized or diminished has significant consequences for policymakers.  
It is well documented in the literature that student-to-student peer effects do in fact  
exist and that such effects are, in part, influenced significantly by peer quality. It is also  
well known that both private schools provide a channel through which wealthier, high-ability  
students are able to leave the public school system. Many private schools have entrance exam  
requirements which deliberately select for high-achieving students. Given the existence of  
such rationing, it is perhaps the case that the act of exiting a school may have unobserved  
effects on peers in the classroom. That is, if the distribution of students that exit public  
schools for private schools consists primarily of high-achieving students, perhaps there exist  
negative or reduced positive peer effects from such withdrawal. My paper aims to analyze  
the effects of this attrition, especially in relation to the varying degree of these effects based  
on student ability.  
Within the context of United States public education, private schools create both exclu-  
sionary and rivalrous conditions. In particular, Private schools create rivalrous conditions by  
introducing rationing through two distinct channels: tuition rationing and cream-skimming.  
Tuition rationing is the practice through which private schools select for students with high-  
income backgrounds by charging for seats – disallowing lower-income families from con-  
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sumption without some form of subsidization. Cream-skimming is the practice through  
which private schools select for high-ability students by introducing entrance exam cutoffs  
as a requirement for admission. In other words, the highest performing students in public  
schools (i.e. the ”cream) is “skimmed” into private schools. Although, in some cases, pri-  
vate schools may “cross-subsidize” (i.e. high-income, low-ability students’ tuition is used to  
provide scholarships for low-income high-ability students) it remains that the plurality of  
students that enter private-schools are likely to be of high-ability.  
Utilizing evidence from Tennessee’s Student/Teacher Achievement Ratio Project (Project  
STAR) – an experiment in which elementary school students and teachers were randomly  
assigned to different class sizes – my paper aims to estimate the peer effects of student  
attrition on academic achievement between the 1st and the 3rd grade. Given that students  
were randomized into class types, it is likely that measures of peer effects from Project STAR  
are not biased due to sorting. Additionally, as part of the experiment, a robust set of student,  
teacher, and school-level characteristics were collected and students were tracked individually  
throughout the experiment. My analysis draws upon subsequent data on graduation and  
dropout rates of the students involved in STAR as well as the identification of students that  
left the public school system in order to classify students who potentially left the experiment  
for private schools.  
First, I examine attrition in Project STAR writ large. Though the identification of the  
proportion of students who either moved across classrooms or schools within the experiment  
and those that left the experiment entirely, I paint a picture of differential attrition that  
occurred.  
Second, using this identification, I introduce a model of attrition which measures the  
effect of student ability, controlling for confounds, on the probability a particular student  
stayed in the experiment. I compare the results from this model on the schools in Project  
STAR with attrition data from schools in the control group and compare both. This model  
motivates the empirical strategy behind peer effects estimation in the paper.  
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Third, I consider how attrition across all students who left Project STAR may have  
impacted students by considering the effects of attrition on changes in their lagged test  
scores. I estimate these peer effects using a regression analysis to explore both changes in  
the magnitude of the effect based on class size.  
Finally, I perform an empirical analysis aiming to isolate the peer effects from students  
who left the public school system entirely. I use information on public school testing data  
both during and after Project STAR to classify students who potentially left the public school  
system. In order to identify students who potentially left the experiment for private schools,  
I fit a clustering model aimed at sorting such students into ”similar” groups. Using these  
clusters, I undertake a sensitivity analysis to measure the robustness of my measurements  
to certain assumptions on attrition. I also undertake a short discussion of the limitations  
of measuring unobservables and how inconsistencies in randomization within Project STAR may bias my results

**Lit Review:**

* Include more stuff on peer effects
* Include more stuff on low income mobility
* Include more stuff on development and education
* Reframe question and context
* Actually read papers (especially ones w/ influence on data)

**Data:**

* Read other papers to more accurately summarize data
* Understand and decide on summary charts
* Format charts and footnote correctly
* Explain measures, variables, etc.

**Empirics:**

* Update empirical specifications according to notes
* Rewrite final section and peer effects section to better explain what I’m doing and why
* Read Jessica’s/TJ’s to understand everything

**Results:**

* Finish Pie Charts
* Finish Kaplan Meier Plots
* Finish Log Rank Tests
* Finish Survival Models
* Finish Peer Effects Model
* Write Clustering Algorithm
* Finish Clustering Regression
* Finish Coefficient Stability
* Missingness analysis? Perhaps not needed
* Check Comparison students survival

**Discussion:**

* Writeup, limitations, conclusions
* Policy Impact

List of running questions:

* For survival variable, do I use number of years in star? This is a composite, non time-indexed measure (i.e. it doesn’t care if the student was in star between 1980-1981, only cares aggregate number of years)
  + In principle, my functional form doesn’t change if it is time indexed or not, either way attrition is still monotonically decreasing (i.e. more for 0-1 than 1-2)
  + Also, since I measure by entry cohort, doesn’t necessarily matter for if a kid left btwn 2nd and 3rd
  + Am I still teasing out variation especially due to changes between K and 1 due to re-randomization? (by controlling for class size should be ok right)
* Right now I’m using my own variables, I think the coding of the composite duration is incorrect because I want to understand that if they switched to a small class (i.e. the parent was able to lobby, does that lessen their chance of attrition? Tells smtg about preferences)
  + Can switch to composite metric later, but I believe it is wrong
* Do I need to show hypothesis tests for randomization? I think not b/c already well established, but let me know.
* Do I need to control for exit variables (e.g. teacher gender on exit? Will this somehow confound for students that stayed the whole time?)