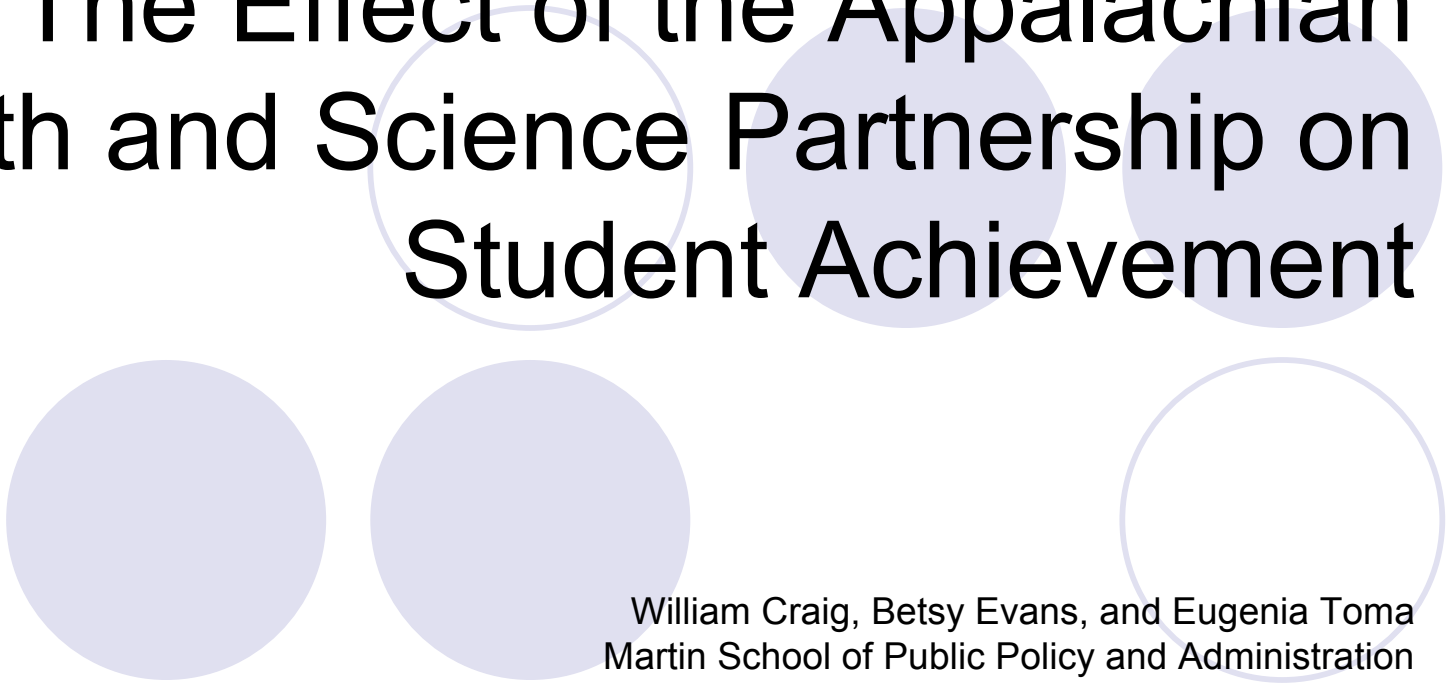


# The Effect of the Appalachian Math and Science Partnership on Student Achievement



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# Purpose of AMSP



- Eliminate the achievement gap in central Appalachian region
  - Lower levels of performance in math and science exist in these schools than in more affluent areas of the state
  - Enrollment in higher level math and science courses less than 1/3 in lower level courses
  - Enrollment in AP courses often nonexistent
- Build an integrated K-16 system to ensure high-quality math and science teacher workforce



## **Focus of this research**

- Look at one aspect of overall purpose: student outcomes



# Previous research

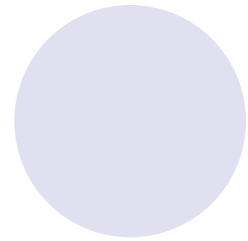
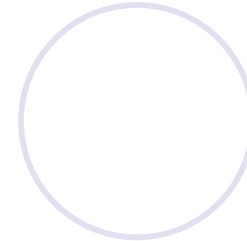
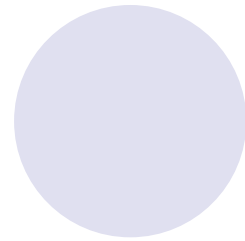
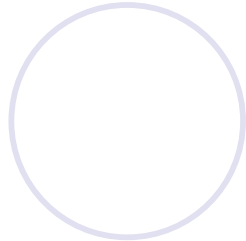
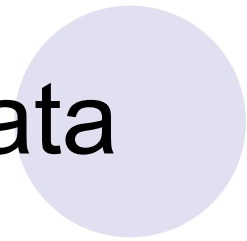
- Large existing literature on importance of teacher quality
- Scientific evidence mixed on effects of professional development programs
- Recent evaluations of programs using large scale data sets find effects two to three years after the intervention



# Methodology for evaluation

- Education production function or value-added model
- Student Outcomes = f( Student Characteristics, Family Characteristics, Teacher Characteristics, School Characteristics, Peer Characteristics, Past Student Outcomes)

# Data



- School level data
- Years 2000-2001 through 2005-2006
- AMSP begins 2002-2003



## Our goal

- Examine outcomes in AMSP schools over this time period
- Assess whether participation in AMSP has increased CATS scores
- Control for other factors including prior year CATS scores

# Variables Used



- Dependent variable – CATS index scores
- Independent variables- AMSP dummy, ARSI dummy, % Students on free and reduced price lunch, % Students in various ethnic categories, teacher experience, pupil-teacher ratio of the school, per pupil spending of the school, school year, fixed effects





# Inputs that matter for math achievement

- **Student characteristics**

- Free and reduced price lunch students perform at lower levels
- Asian and Hispanic students perform at higher levels than White students

- **Teacher characteristics**

- More years of experience increases scores

- **Time**

# Math Scores

Table 2: Fixed-Effects Regression for Math Academic Index Score

Math Score	Coefficient	t-statistic	P-value
School Year	0.0004***	24.93	0
Experience	0.1464*	1.82	0.068
Spending	-0.0001	-0.48	0.628
Pupil-Teacher Ratio	-0.3454***	-3.72	0
Free Lunch	-0.1101*	-8.59	0
% Black	-0.0025	-0.15	0.824
% Hispanic	0.3269***	3.16	0.002
% Asian	0.3561**	2.31	0.021
% Other	-0.0067	-1.14	0.253
AMSP	-1.1146	-1.06	0.287
ARSI	-0.3568	-0.3	0.764
Math Index Lag	-0.0311*	-1.87	0.061
Dummy for Missing	-9.0101***	-3.83	0
Constant	-7086.68***	-24.73	0

# Inputs that matter for science achievement



- Qualitatively the same as math with a couple of exceptions
- Asian students do not perform better than whites on science
- Schools that participated in ARSI perform at higher levels than others

# Science Scores

Table 3: Fixed-Effects Regression for Science Academic Index Score

Science Index	Coefficient	t-statistic	P-value
School Year	0.0003***	25.91	0
Experience	0.2109***	2.89	0.004
Spending	0.0003**	2.11	0.035
Pupil-Teacher Ratio	-0.4637***	-5.99	0
Free Lunch	-0.0525***	-4.6	0
% Black	0.0145	0.97	0.33
% Hispanic	0.2993***	3.24	0.001
% Asian	0.1488	1.08	0.28
% Other	-0.0091*	-1.74	0.082
AMSP	1.3219	1.42	0.157
ARSI	2.3355**	2.08	0.037
Science Lag	0.0527***	3.28	0.001
Dummy for Missing	-8.5230***	-4.06	0
Constant	-6531.27***	-25.7	0



# Conclusions and future research

- Positive effects of AMSP may be present but not yet identified
- Reasons
  - Time span may be too short
  - Data are aggregated to the school level
- Future
  - Collect data for two more years
  - Match individual students to specific teachers participating in AMSP