Who will Success in College? Effect of High School Experience and Socioeconomic Status

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Outline

- Motivation
- Analytical framework
- Findings
- Discussion

SES gap in college development

- Significant SES difference in college choice and development

  - Poor first-generation students have less access to selective colleges (Bao, 2012)
  - Rural college freshmen face greater challenges in academic and social adaption to college (Yang & Mao, 2012)
  - Students from metropolitan cities adjust better to college, but have lower major rankings (Luo, 2012)
  - Female, rural and low-SES college graduates have higher unemployment rates (Bao & Li, 2012)

Mechanisms

- Why does SES matter in college?
  - Strict ability sorting through college application and admission should mitigate the SES effect on college development
  - Life cycle skill formation hypothesis
    - Low-SES students accumulate disadvantages from preschool to high school, and this long-term deficit in human capital investment can damage child, adolescent, and adult achievement, because life cycle skill formation is a dynamic process in which early inputs strongly affect the productivity of later inputs (Heckman, 2006)
    - It implies a high correlation between one's k-12 and postsecondary performance. This correlation may transfer one's disadvantages in high school into college years (Kuh, Kinzie, Buckley & Bridges, 2006)
    - Low-SES students may perform worse in colleges than others due to a lack of preparation in elementary school, middle school or high school.

Research Questions

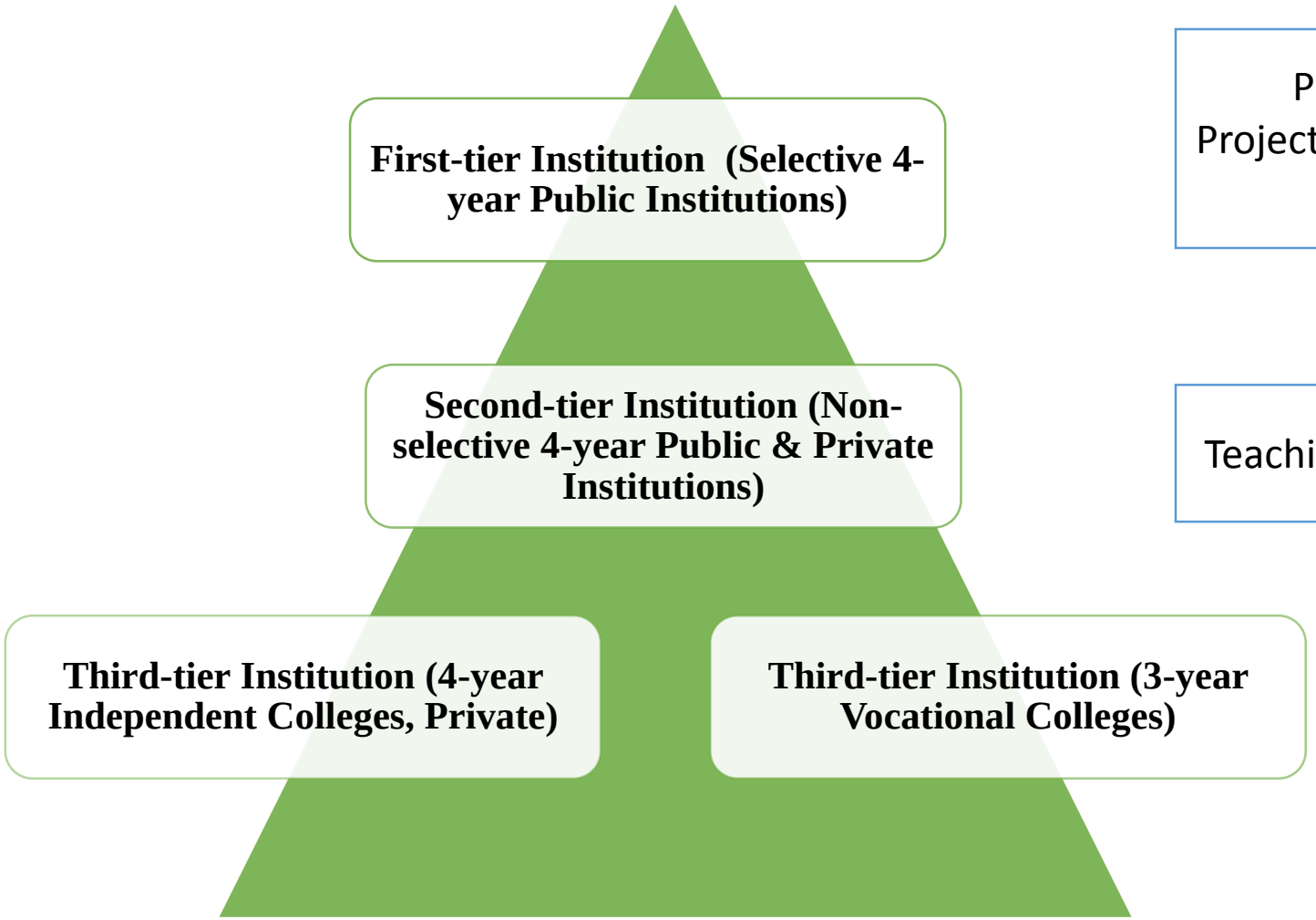
Is there a significant correlation between individual high school preparation and college development?

How does socioeconomic status influence one's college performance?

Preliminary Finding

- Identifies a high correlation between high school engagement and college achievement.
  - Well prepared and academically engaged high school graduates achieve a significantly higher level of college development than their less prepared peers
  - This is largely due to the fact that academic preparation and learning engagement in high school increase the level of college readiness, which is a critical threshold for college success (Conley, 2008)
- Individual's family background has direct and significant effects on one's college performance.
  - Low-SES college students have a significantly lower level of core competence and civic participation than their high-SES peers, due to their lack of academic preparation, learning engagement, and parental support in high school
  - This provides a critical evidence for the life cycle skill formation argument, i.e., the deficit in early human capital investment can impair adolescent and adult attainment.

Country Context: Structure of CHEIs



Project 985-No. 39
Project 211-No. 112 Research intensive

Teaching intensive; No. 600+

No. 600+, Teaching intensive; switch to polytechnic, award B.A.

No. 1200+, community college, award A.A.

Country Context

- Over competition
  - 112 out of more than 2240 postsecondary education institutions are considered the most selective ones
  - “Project 985” and “Project 211” institutions take fewer than 7.5% of high school graduates
- Strategic behavior of families and schools
  - better-off families invest lots of money in school choice and private tutoring as early as first grade, even though the average effect of private tutoring is not significant for most students (Zhang, 2012)
  - for the low-income students, a high proportion of them retake the college entrance examination after unsuccessful attempts (Luo et al., 2011)
  - Chinese parents are famous for pushing their children into the *gaokao* race by providing private tutoring (Bray, Zhan, Lykins, & Kwo, 2014; Zhang, 2012)
  - High schools also compete vigorously on college-going rate and number of students admitted by first-tier institutions

Role of High School Preparation

- High school preparation is crucial for college development (Kuh, Kinzie, Buckley & Bridges, 2006)
  - High school GPA and class ranking are strong predictors for college GAP (Pike & Saupe, 2002)
  - Academic intensity and curriculum quality can reduce dropout risk and improve academic achievement (Adelman, 1999)
  - Number and degree of challenge of high school math courses increase the probability of enrolling in four-year college (Horn & Nuñez, 2000)
  - High school academic intensity even increases persistence rate and the possibility of on-time graduation with BA degree (Warburton, Bugarin & Nuñez, 2001)

Role of parental support

- Parental style and support are critical for college success
  - Discussing education related topics within households, parental involvements in high school volunteer programs, parents' contacting high schools for children's academic issues increase the probability of enrolling in 4-year college (Perna & Titus, 2005)
  - Early planning (8th grade) for higher education has positive effects on completing BA degree (Swail, Cabrera, Lee & Williams, 2005)
  - Appropriate parental support and involvement can mitigate the negative impacts of poverty on higher education completion (Chrispeels & Rivero, 2001)
  - Parents and high school peers can influence college access and persistence (Bank, Slavings & Biddle, 1990)

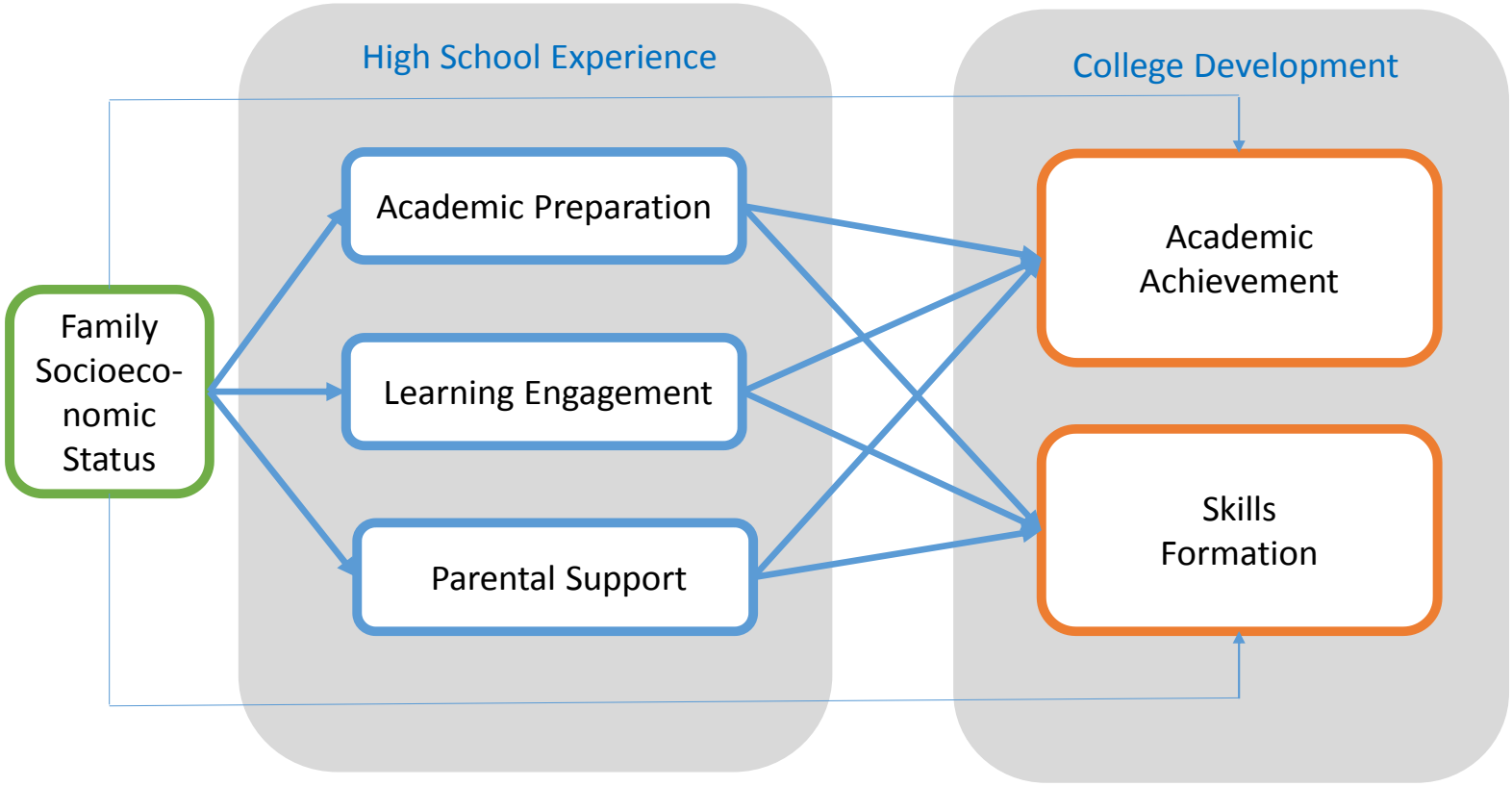
Prior Chinese evidence

- Access to selective colleges and universities (Bao, 2012)
  - Attending selective high schools and having higher class ranking increase the probability of going to first-tier tertiary institutions
  - Private tutoring cost in high school is negatively correlated with attending selective colleges
- Academic performance in college
  - High school teaching pedagogy, student-teacher interaction, and non-academic engagement in high school influence students' adaption to college environment (Luo, 2012)
  - Receiving high school education in Beijing reduces college GPA, but increases the degree of social engagement and the level of non-cognitive ability (Yang, 2009)

Unresolved questions?

- How to measure academic intensity and curriculum quality?
  - Lots of discussion on the influence of number of credits enrolled, but no analysis on the effects of student effort in high school (time allocation), exposure to different pedagogy, student-teacher interaction, and high school selectivity
  - Not pay attention to the heterogeneous effect of high school preparation on college development
- How to measure parental involvement and investment?
  - Not pay attention to private tutoring and competition participation supported by parents, which are prevalent in China
- How to measure college success?
  - Focusing only on GPA, not on core ability and moral development
  - Not pay attention to college engagement

Analytical Framework



Analytical Framework

- High school experiences
  - **Academic preparation:** high school selectivity, science track in high school, participation in academic competition in high school, high school innovative curriculum/traditional curriculum
  - **Learning engagement**: in-class study time in high school, teacher-student interaction in high school
  - **Parental support**: private tutoring time in high school, household socio-economic status, high school leadership experience

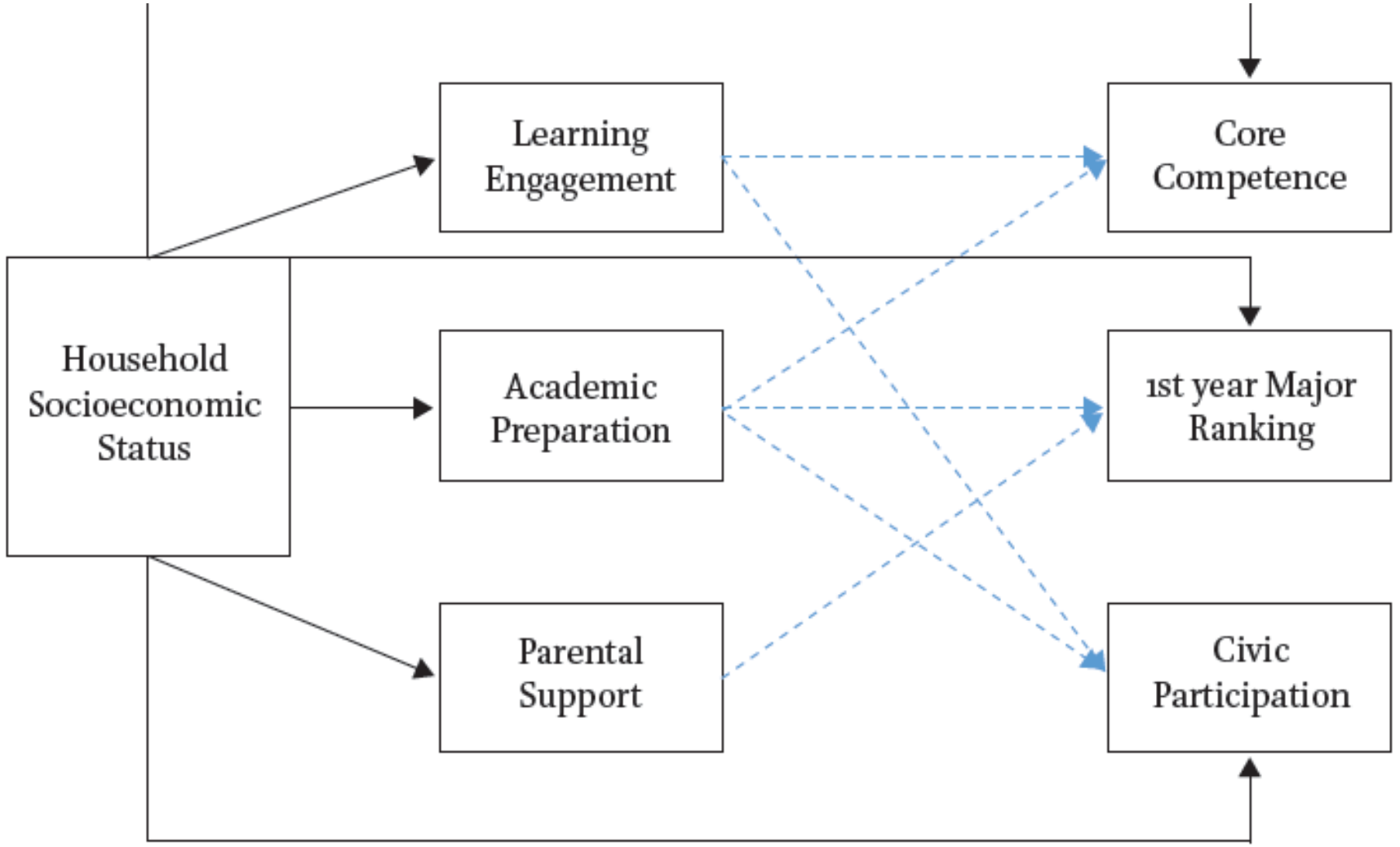
Empirical Framework

- Education production function approach (Hanushek, 1986)

$$A_t = f(A_{t-1}, F_{t-1}, T_{t-1}, OS_{t-1}\, C_t)$$

- At stands for student college development
- A_{t-1} represents student learning experience and achievement in high school
- F_{t-1} stands for household input in high school
- T_{t-1} stands for teacher input in high school
- OS_{t-1} stands for school input in high school
- C_t represents student engagement and effort in college

Empirical Framework

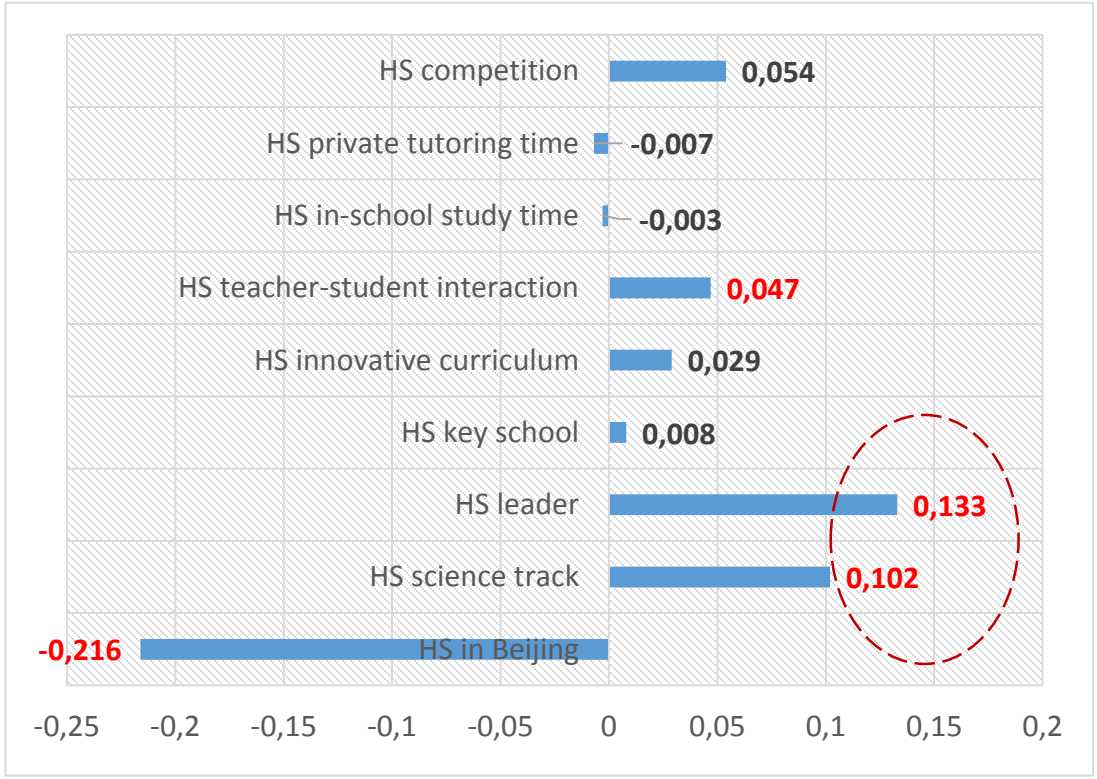


Data and Model

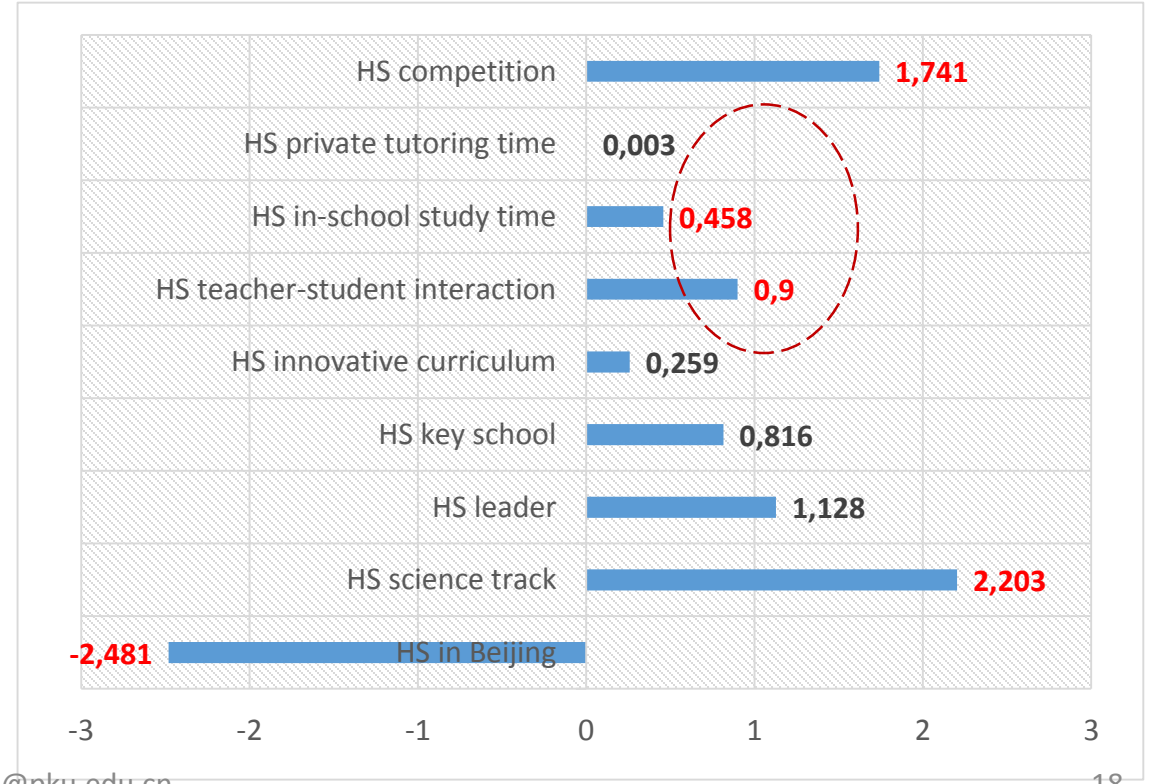
- Data
  - 2011 Beijing College Freshmen Development Survey
    - Surveyed 28 higher education institutions in Beijing, 4,244 responses (response rate was 85%)
    - 81% from 4-year colleges and 19% from 3-year colleges
    - 44% male and 56% female participants
    - 30% from Beijing and 70% from other provinces
- Model
  - OLS estimation for each outcome variable
  - Path analysis with the Structural Equation Modeling in STATA

OLS Findings: Critical high school experience for college engagement

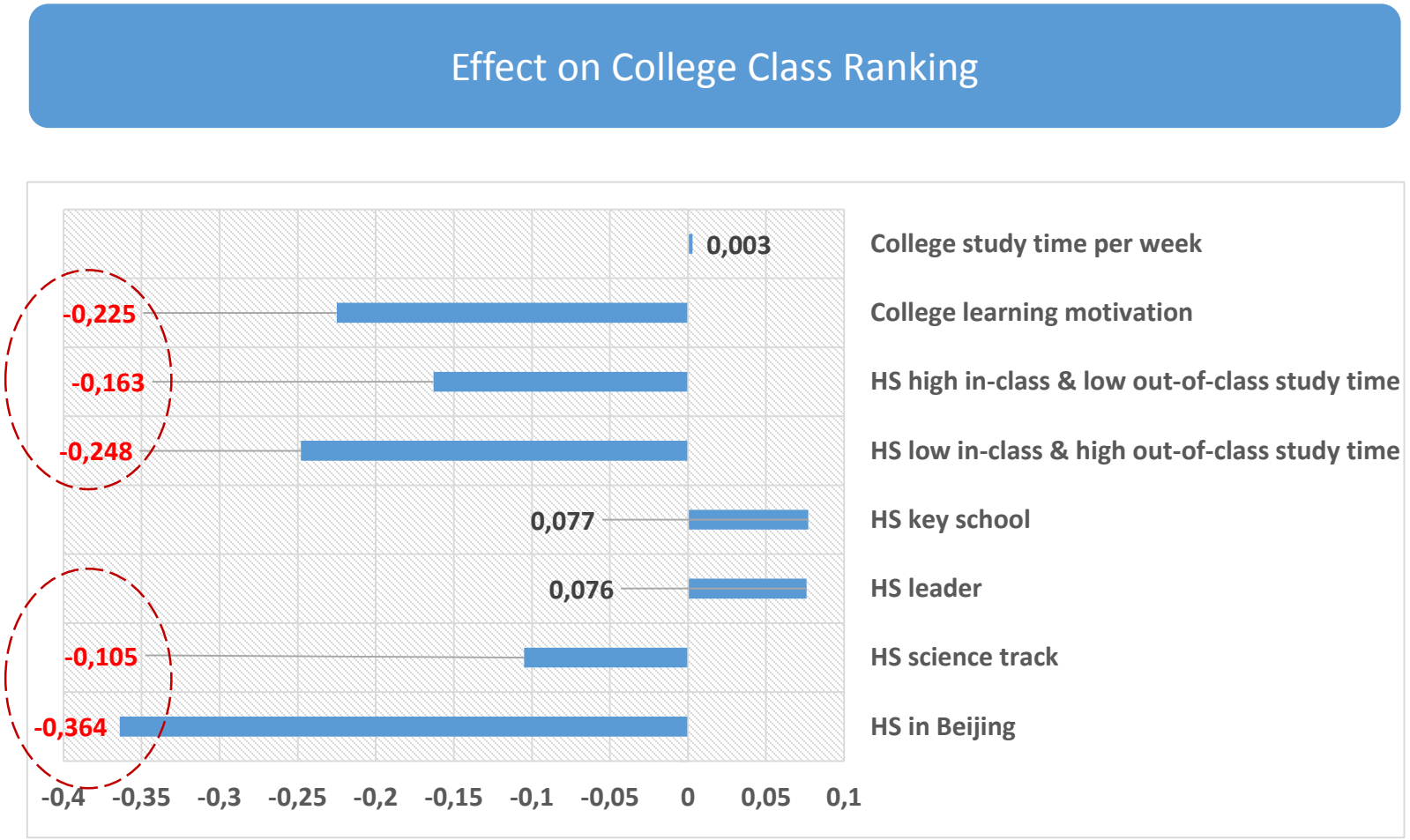
Effect on College Learning Motivation



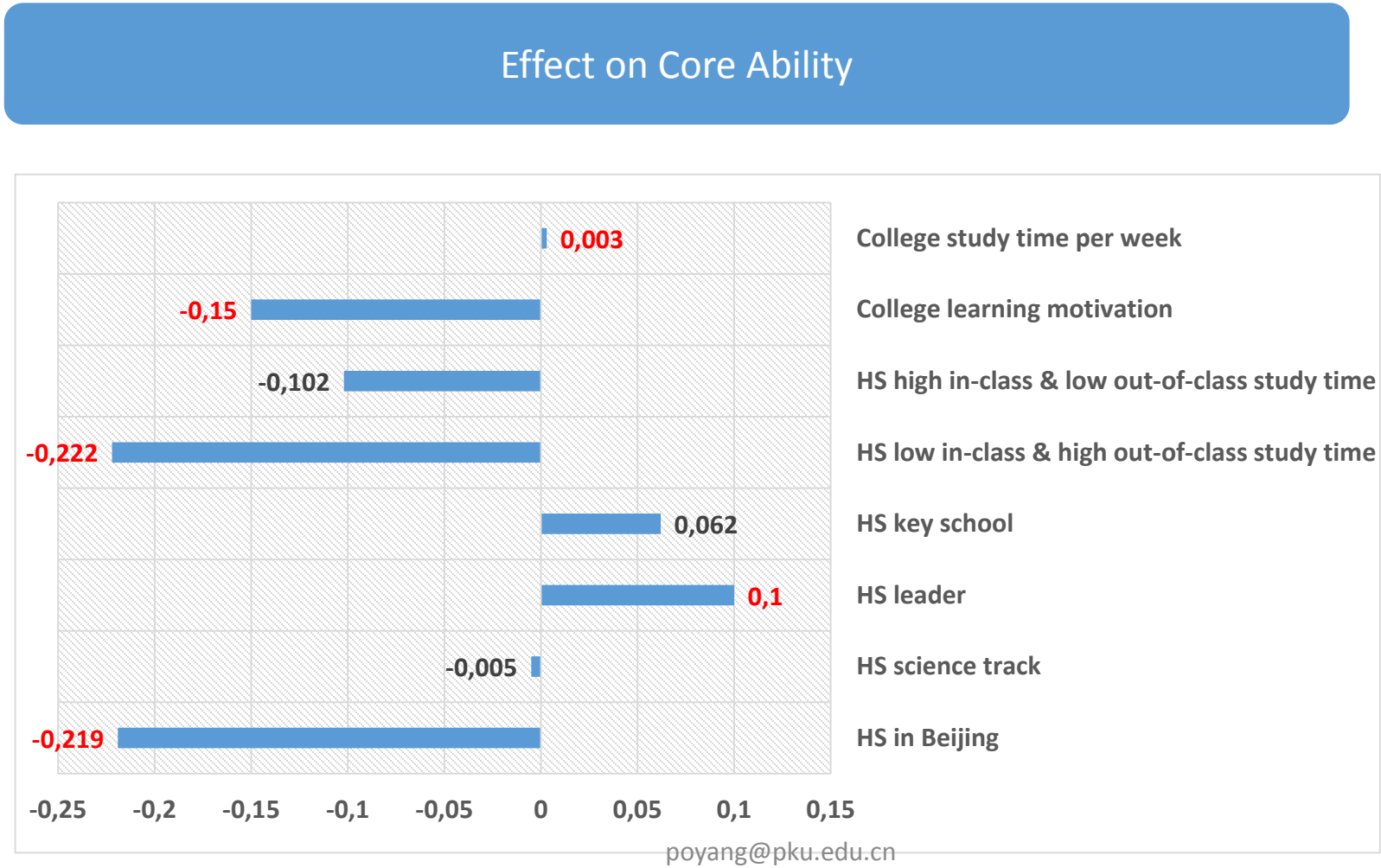
Effect on College Study Time Per Week



OLS Findings: Critical high school experience for college achievement



OLS Findings: Critical high school experience for core competency



SEM Findings:

Dependent	Independent	Coefficient	Stand error	Z score
	Panel C: Total effects			
Academic Preparation	Socioeconomic Status	0.250	0.030	8.300
Academic Preparation	Socioeconomic Status	0.086	0.035	2.450
Parental Support	Socioeconomic Status	1.427	0.106	13.470
First-year Major Ranking				
	Academic Preparation	0.055	0.025	2.180
	Parental Support	0.013	0.007	1.880
	Socioeconomic Status	−0.034	0.030	−1.130
Core Competence				
	Academic Preparation	0.068	0.022	3.140
	Learning Engagement	0.045	0.018	2.430
	Socioeconomic Status	0.100	0.024	4.090
Civic Participation				
	Academic Preparation	0.129	0.022	5.720
	Learning Engagement	0.041	0.019	2.090
	Socioeconomic Status	0.097	0.026	3.780

SEM Findings: high school experience

- Well prepared and academically engaged high school graduates achieve a significantly higher level of college development than their less prepared peers
  - One standard deviation increase in academic preparation corresponds to a 0.056 points increment in major ranking, 0.085 points increment in core competence, and 0.154 points increment in civic participation
  - One standard deviation increase in learning engagement is associated with 0.064 points increment in core competence, and 0.055 points increment in civic participation
  - Parental support only affects college major ranking, and has no significant impact on core competence and civic participation

SEM Findings: high school experience

- Why high school experience matters?
  - College readiness (Wimberly & Noeth, 2005; Conley, 2008)
    - Level of preparation a student needs in order to enroll and succeed in a credit-bearing general education course at a post-secondary institution that offers a baccalaureate degree
  - Academic preparation and learning engagement are good predicators of college readiness
    - Academic preparation measures the quality of high school teaching (being selective high school and using innovative teaching pedagogy) and the cognitive ability of individuals (participated in disciplinary competition at province or national level)
    - Learning engagement measures the quality of student's study effort and teacher-student interaction

SEM Findings: high school experience

- Why high school experience matters?
  - When capable students attend high-quality high schools (i.e. academically prepared), if they work hard and get along with their teachers (i.e. engaged in learning), they are more likely facing academic challenges need to be solved by key cognitive strategies, acquiring more content knowledge, and obtaining self-management skills such as time management, strategic study skills, and awareness of one's true performance, persistence and the ability to utilize study groups

SEM Findings:

Dependent	Independent	Coefficient	Stand error	Z score
	Panel A: Direct effects			
Academic Preparation	Socioeconomic Status	0.250	0.030	8.300
Learning Engagement	Socioeconomic Status	0.086	0.035	2.450
Parental Support	Socioeconomic Status	1.427	0.106	13.470
First-year Major Ranking				
	Academic Preparation	0.055	0.025	2.180
	Parental Support	0.013	0.007	1.880
	Socioeconomic Status	–0.067	0.032	–2.080
Core Competence				
	Academic Preparation	0.068	0.022	3.140
	Learning Engagement	0.045	0.018	2.430
	Socioeconomic Status	0.079	0.025	3.190
Civic Participation				
	Academic Preparation	0.129	0.022	5.720
	Learning Engagement	0.041	0.019	2.090
	Socioeconomic Status	0.061	0.026	2.370

SEM Findings:

Panel B: Indirect effects

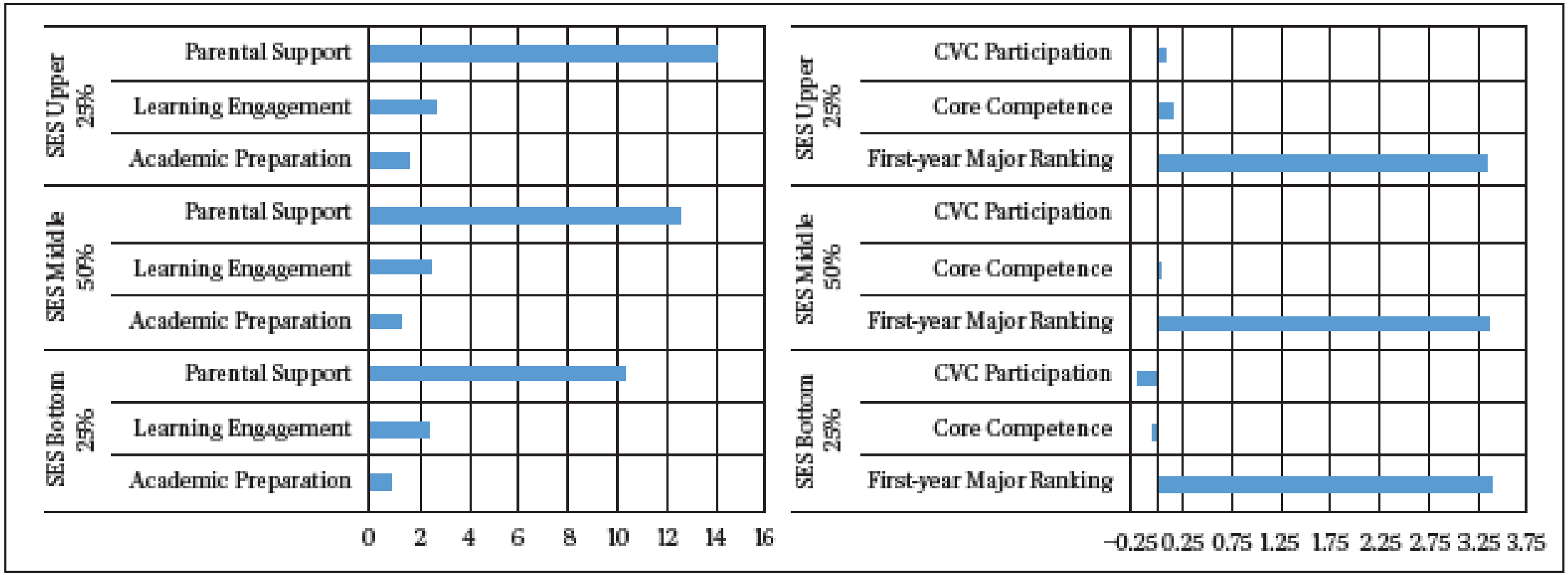
Academic Preparation	Socioeconomic Status	0.000	(no path)	
Learning Engagement	Socioeconomic Status	0.000	(no path)	
Parental Support	Socioeconomic Status	0.000	(no path)	
First-year Major Ranking				
	Academic Preparation	0.000	(no path)	
	Parental Support	0.000	(no path)	
	Socioeconomic Status	0.033	0.012	2.720
Core Competence				
	Academic Preparation	0.000	(no path)	
	Learning Engagement	0.000	(no path)	
	Socioeconomic Status	0.021	0.006	3.630
Civic Participation				
	Academic Preparation	0.000	(no path)	
	Learning Engagement	0.000	(no path)	
	Socioeconomic Status	0.036	0.007	5.290

SEM Findings: SES effect

- Individual socioeconomic status may produce direct and indirect effects on college success
  - Direct effect
    - High-SES students accumulate more core competence (0.079) and have a higher level of civic participation in college (0.061), but lower major ranking in the first year (-0.067)
  - Indirect effect
    - Socioeconomic status also has indirect effect on college performance through its influence on high school preparation

SEM Findings: SES effect

- How to interpret the socioeconomic gap in college development?
  - Socioeconomic performance gaps at both high school and college level



SEM Findings: SES effect

- How to interpret the socioeconomic gap in college development?
  - In school gap
    - Disadvantaged students were less prepared and engaged in high school
    - Because academic preparation and learning engagement are key indicators for college readiness, low-SES students are possibly not ready for college at time of matriculation
  - Out-of-school gap
    - Parents in low-SES households were not able to provide sufficient support for their children as the high-SES parents did
    - Top 10% SES group spends on average 8,095 RMB for private tutoring in senior year, while the bottom 10% SES group only spends 1,433 RMB

Discussion: Low-level Development Cycle

Children from low-SES households are less likely to attend selective high schools due to residential segregation

When they enter mediocre or underperformance high schools, they are not likely meet academic challenges necessary for developing college skills

Some disadvantaged students can pass the college entrance examination and are admitted to postsecondary institutions, they are not college ready

They may have a higher probability of being maladapted. These adaption issues in freshmen year may “cool out” low-SES students’ academic aspiration and they will become less engaged in learning and campus life

Low level of academic and social engagement can lead to course failure and marginalization on campus, significant predictors for dropout, low achievement and low satisfaction.

Potential Strategy

- Principle
  - Leveling the playground in high school and college for low-SES students
- High school intervention
  - Random experiments in rural high schools, using information intervention and counseling to leverage low-income high school graduates' college expectation (魏建国, 罗朴尚, 宋映泉, 2012; Loyalka and associates, 2013)
  - Provided early college financial aid commitment to rural high school students, in order to affect the college decision making of poor students in rural China (Liu and associates, 2011)
  - Randomly assigning a proportion of slots in selective high schools to graduates from non-selective middle schools
- College intervention
  - Improving Disadvantaged Freshmen's College Adjustment through Enhancing Student Engagement (Yang and associates, 2013)

Please forward your comments and suggestions to

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