

# Variations and relevant influencing factors in academic performance

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## Study overview

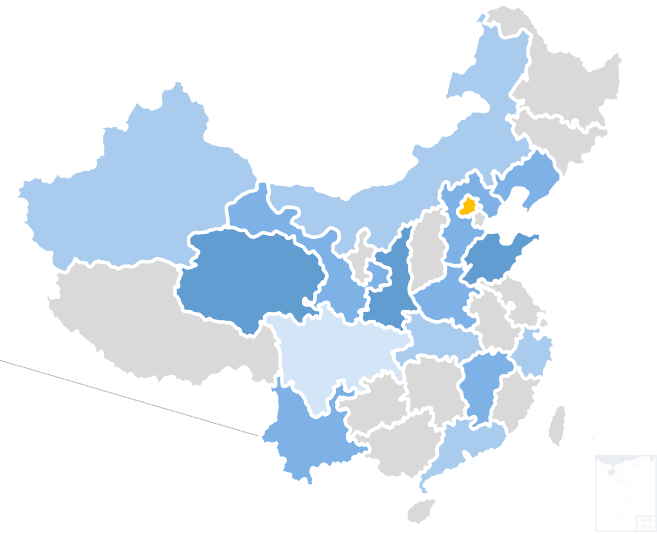
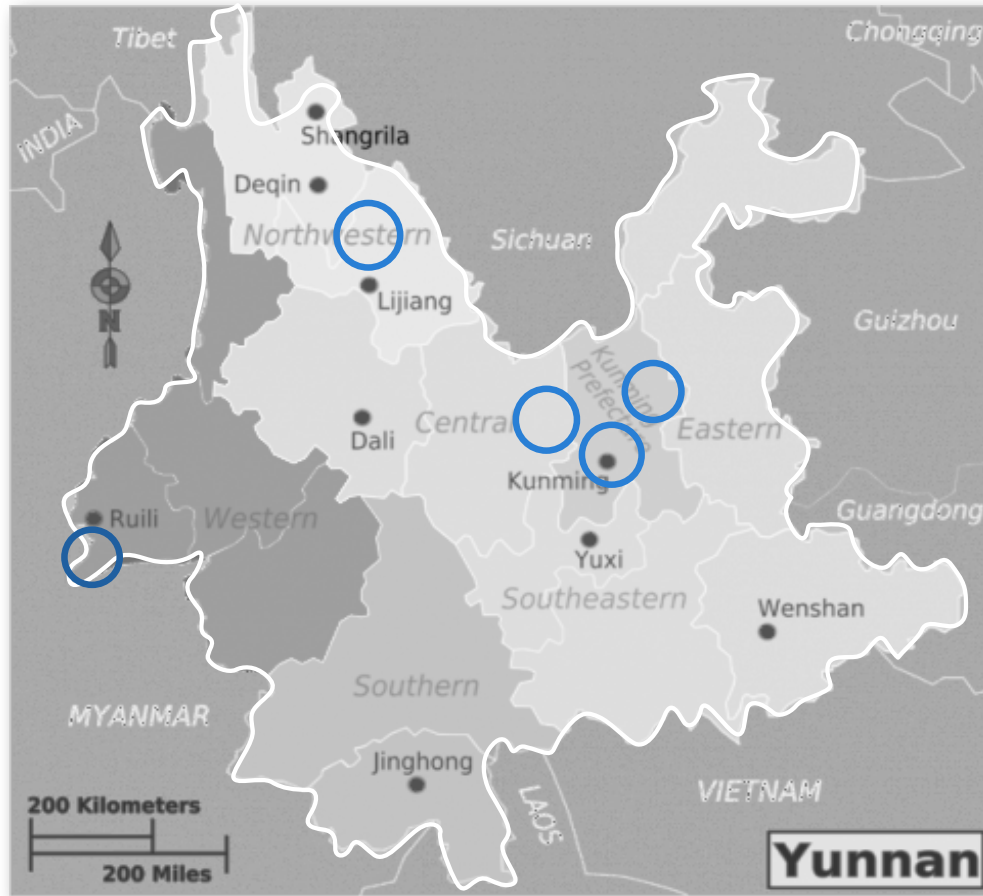
Paper 1:

*Cognitive abilities differences between urban-rural students in Yunnan province, China*

Paper 2:

*The influence of cognitive ability on academic performance of junior middle school students:  
a mediated moderation model*

# Background



## Background



Photo/Xinhua

AI technology is used to teach calligraphy at a school in Kunming, Yunnan province



Photo/China Education Journal

Pupils have class equipped with electronic devices



Photo/Kunming.cn

Students at a primary school in Kunming, Yunnan

## Background



*Photo/GoKunming*

Pupils at a primary school in Longchuan County, Dehong Prefecture, Yunnan



*Photo/China Daily*

Children from pre-school to Grade 2 share a classroom in Funing County, Wenshan Prefecture, Yunnan

## Research questions – Research I

- Do rural/urban differences in children's and adolescents' cognitive outcomes exist in Yunnan province, where there are significant educational differences between urban and rural areas?
- If disparities exist in urban and rural students' cognitive abilities, how do we reduce the gap to improve students' academic performance and education quality?

# Methodology

## Participants in Research I

Total **14,714** primary and junior secondary students in Yunnan



Urban students  
**36.3%**



Rural students  
**57.2%**



Mountainous students  
**6.5%**



Han ethnicity  
**65.8%**



Ethnic minority groups  
**34.2%**



Boys  
**36.1%**



Girls  
**63.9%**



Grade 3-6  
**19**  
primary schools



Grade 7-8  
**27**  
junior secondary schools



Average age  
**11.18 ± 1.41**  
**14.30 ± 1.01**

## Participants in Research II

Total **5,038** junior secondary students in Yanqing, Beijing



Boys  
**2,574**

**51.1%**



Average age  
**15.39 ± 1.02**



Girls  
**2,399**

**48.9%**



Average age  
**15.29 ± 0.95**



Valid  
**4,973**

**98.7%**



Invalid  
**65**

# Methodology

Measures used in Research I	Measures used in Research II
<b>Cognitive Ability Test: The Cognitive Assessment Battery II (CAB II)</b>	<b>Cognitive Ability Test: The Cognitive Assessment Battery II (CAB II)</b>
<ul style="list-style-type: none"> <li>• Working memory</li> </ul>	<ul style="list-style-type: none"> <li>• Working memory</li> </ul>
<ul style="list-style-type: none"> <li>• Attention</li> </ul>	<ul style="list-style-type: none"> <li>• Attention</li> </ul>
<ul style="list-style-type: none"> <li>• Reasoning ability</li> </ul>	<ul style="list-style-type: none"> <li>• Reasoning ability</li> </ul>
<b>Social Support Scale</b>	<b>Social Support Scale</b>
<ul style="list-style-type: none"> <li>• Parental Support Scale</li> </ul>	<ul style="list-style-type: none"> <li>• Parental Support Scale</li> </ul>
<ul style="list-style-type: none"> <li>• Teacher-Student Relationship Scale</li> </ul>	<ul style="list-style-type: none"> <li>• Teacher-Student Relationship Scale</li> </ul>
<ul style="list-style-type: none"> <li>• Friendship Quality Self-Assessment Scale (FQSS)</li> </ul>	<ul style="list-style-type: none"> <li>• Friendship Quality Self-Assessment Scale (FQSS)</li> </ul>
	<b>Learning Motivation Scale</b>
	<b>Academic Performance: Mid-term Examination (Autumn semester of 2017/2018)</b>

Note: The Cognitive Assessment Battery II contains [three versions](#): CAB II for Grade 1-2, CAB II for Grade 3-6 and CAB II for secondary school students

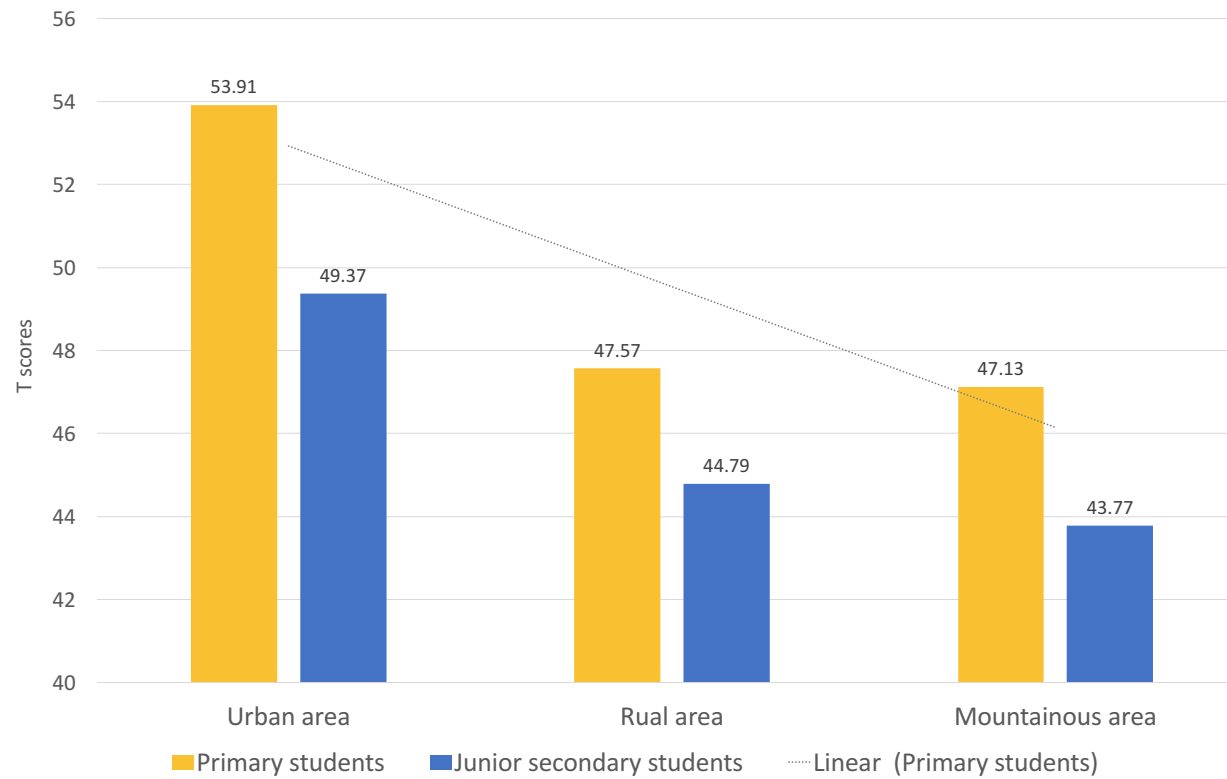


# Methodology

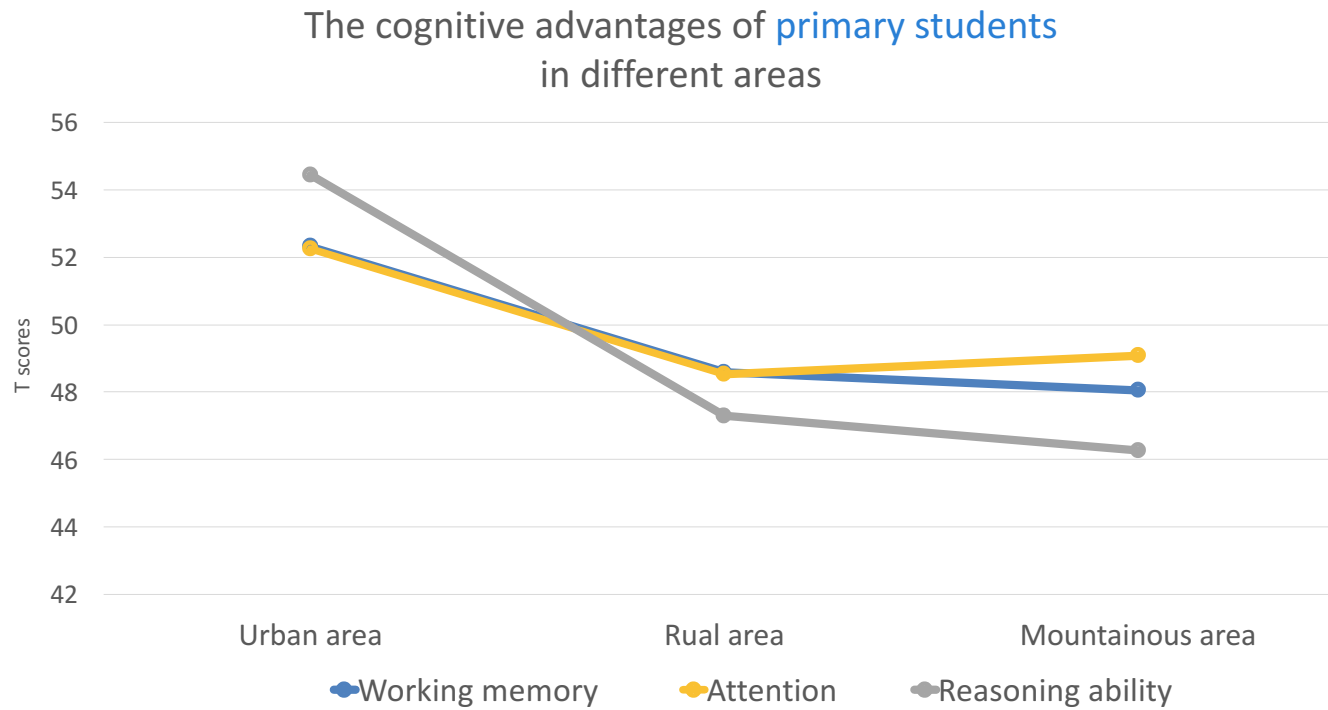
Measures	Cronbach's alpha (Research I)	Cronbach's alpha (Research II)
<b>Cognitive Ability Test: The Cognitive Assessment Battery II (CAB II)</b>	-	-
• Working memory	-	-
• Attention	-	-
• Reasoning ability	-	-
<b>Social Support Scale</b>		0.90
• Parental Support Scale	0.87	0.86
• Teacher-Student Relationship Scale	0.65	0.65-0.84
• Friendship Quality Self-Assessment Scale (FQSS)	0.79	0.88
<b>Learning Motivation Scale</b>	-	0.73
<b>Academic Performance: Mid-term Examination</b> (Autumn semester of 2017/2018)	-	

# Results - Research I

Overall cognitive ability of primary and junior secondary students in different areas

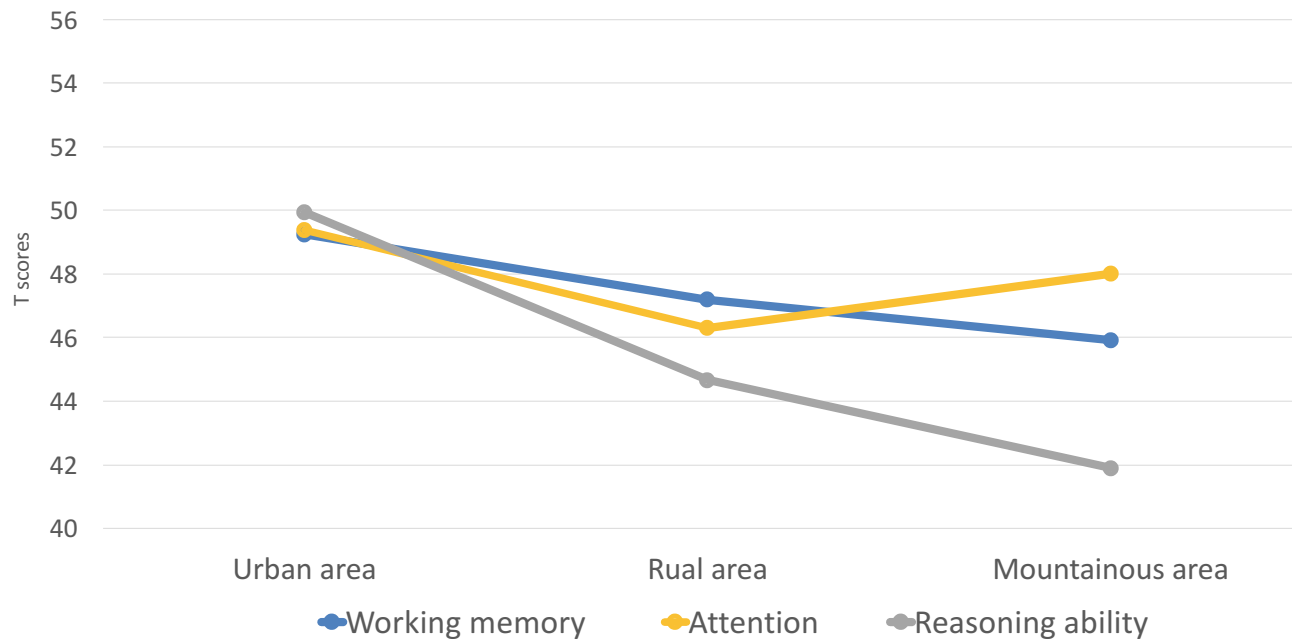


# Results - Research I



## Results - Research I

The cognitive advantages of junior secondary students in different areas



# Implications from our findings in Research I

## ● Urban teachers

should take advantage of the strong **reasoning ability** of the students and consider:

- how to attract and keep students' attention in the classroom
- how to **maintain** the persistent development status of students' cognitive abilities
- to simplify and avoid heavy memory tasks
- to offer more flexible and creative activities or tasks to improve pupils' thinking skills

## ● Rural and mountainous teachers should focus on:

- how to improve students' **reasoning skills: keep try new activities?**
- how to enhance and develop students' memory and increase students' attention span

## Results - Research I

The cognitive abilities of pupils were strongly associated with parental support, teacher-student relationship, and friendship quality

Correlations between cognitive ability and external factors of primary school students

Area types	Variables	Parental support	Teacher-student relationship	Friendship quality
Urban	Cognitive ability	0.085**	0.017	0.191**
	Memory	0.089**	0.025	0.176**
	Attention	0.026	0.000	0.085**
	Reasoning ability	0.075**	0.011	0.171**
Rural	Cognitive ability	0.314**	0.286**	0.390**
	Memory	0.194**	0.178**	0.235**
	Attention	0.205**	0.191**	0.245**
	Reasoning ability	0.309**	0.274**	0.400**
Mountain	Cognitive ability	0.293**	0.259**	0.328**
	Memory	0.205**	0.190**	0.238**
	Attention	0.245**	0.212**	0.223**
	Reasoning ability	0.228**	0.199**	0.296**

Note: \*\* p<0.01, \*p<0.05

## Results - Research I

The cognitive abilities were strongly associated with **friendship quality** within junior secondary students

**Correlations between cognitive ability and external factors of junior secondary school students**

Area types	Variables	Parental support	Teacher-student relationship	Friendship quality
Urban	Cognitive ability	-0.046**	-0.006	0.073**
	Memory	-0.002	0.004	0.052**
	Attention	-0.034**	0.011	0.044**
	Reasoning ability	-0.071**	-0.031**	0.063**
Rural	Cognitive ability	0.074**	0.036**	0.173**
	Memory	0.061**	0.030*	0.117**
	Attention	0.050**	0.019	0.102**
	Reasoning ability	0.055**	0.032*	0.170**
Mountain	Cognitive ability	-0.016	0.016	0.193**
	Memory	0.020	0.025	0.138**
	Attention	-0.043	-0.017	0.082**
	Reasoning ability	-0.015	0.020	0.178**

Note: \*\* p<0.01, \*p<0.05

## Discussions and implications - Research I

- Policymakers/decision makers: to reduce urban-rural education inequality by utilizing the **cognitive ability characteristics** of students in different areas
- More **customized educational opportunities and curriculum** to rural and mountainous students should be offered according to the differences of their cognitive abilities
- The **distance education project and "Dual-Teacher" programs** should be continuously pushed forward to allocate high-quality education resources from urban areas to remote rural regions
- **Differentiated instructions** should be promoted following the cognitive features of urban and rural students
- **Parental involvement** and support (parenting skills) should be encouraged and strong **family-school partnerships** should be cultivated to improve children's cognitive abilities



## Research questions – Research II

- Can cognitive abilities predict academic performance?
- Is there a moderation effect of social support on the relationship between cognitive ability and academic performance?
- Is the moderation effect of social support on the relationship between cognitive abilities and academic performance mediated by the academic motivation?

## Results - Research II

- **Gender differences**

- the scores of girls in cognitive abilities, teacher-student relationship, and friendship quality were significantly **higher than boys** ( $p < 0.01$ )
- gender differences were **not** significant in **parental support** ( $p > 0.05$ )

- **Correlations**

- cognitive abilities were significantly **positively** correlated with academic performance  
the **higher** the cognitive ability, the **better** academic performance
- a significant **positive** correlation between cognitive abilities and social support  
(teacher-student relationship and friendship quality );
- **no** significant correlations between cognitive abilities and parental support
- social support was significantly **positively** correlated with learning motivation and academic performance

## Results - Research II

- **Measurement Model (CFA) Test**

- the fit of the measurement model was good:

- ( $\chi^2(32)=319.89$ , CFI=0.98, TLI=0.97, SRMR=0.02, RMSEA=0.04 )

- **Mediated Moderation Model Test**

- **social support moderated** the relationship between cognitive ability & academic performance

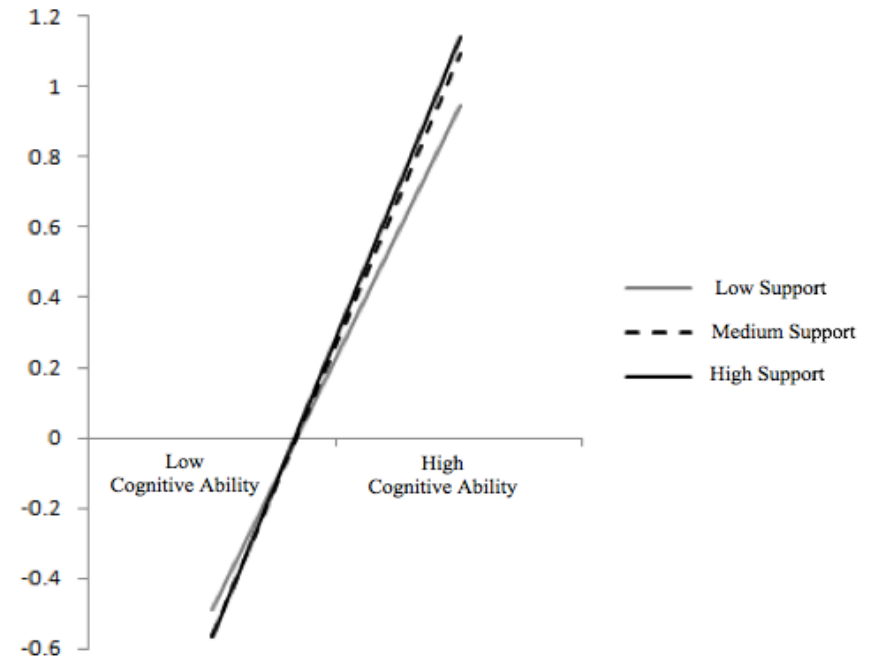
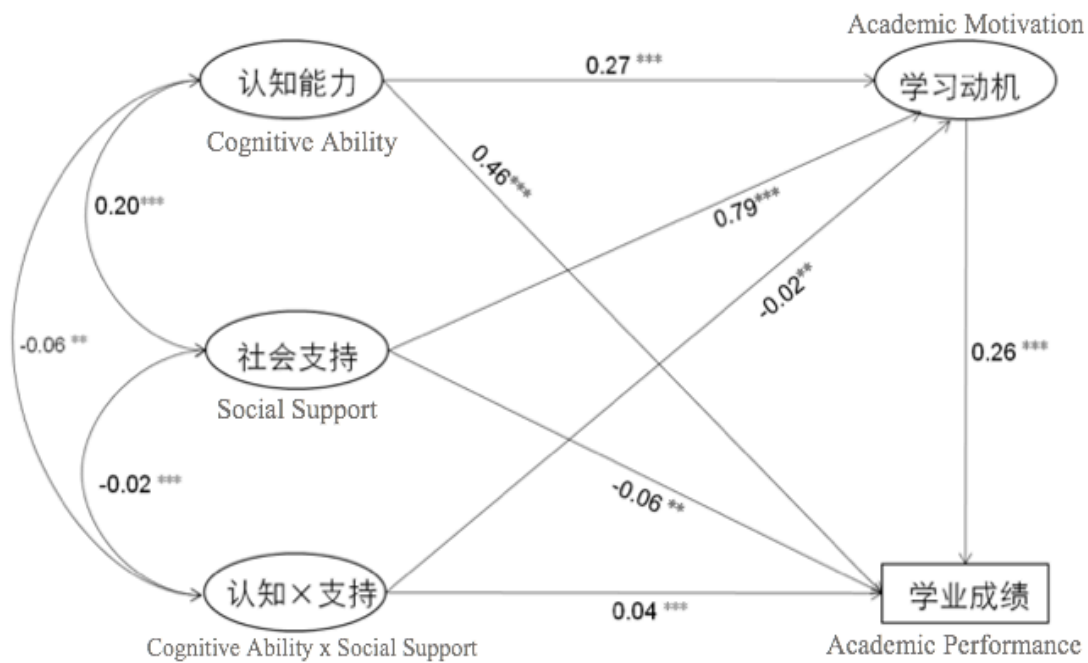
- the **moderating role** of social support was partially played by **the mediating variable - learning motivation**

- **The moderating effect of social support (a simple slope test and group regression)**

- when **social support increased**, the predictive power of cognitive ability to academic performance showed a strong **increasing trend**;

- with the improvement of cognitive ability, the more social support students felt, and the academic performance showed a trend of first decreasing and then increasing

# Results - Research II



## Discussions and implications - Research II

- Both schools and families should pay special attention to the differences between boys and girls, and give appropriate support and scientific guidance according to their characteristics
- The **moderating role** of social support implied that social support should be provided to students appropriately according to **the level of cognitive ability** of the students which is more helpful to improve academic performance
- Social support and learning motivation as important **non-cognitive factors** should be considered and measured in the interventions to improve academic performance
- **Competency-based formative** assessments considering non-cognitive factors and should be promoted in future academic performance evaluations

# Thank you!

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