Are Gender and Social Disparities Associated with STEM Persistence in Kentucky Colleges?

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Introduction

Children have the right to receive a quality education, but concerns about county disparities in school funding, facilities, and resources exist. This is known as the "**zip code effect**".[1,2]

Because high school STEM classes require lab space, materials, equipment, and specialized teachers, **disparities in school funding** can impact students who want STEM careers.[3]

College students with **low SES** have been found to:

- Have lower rates of transition and academic readiness, compared to those from high SES school districts.[4]
- Feel isolated in unwelcoming higher education environments where finances are a concern.[5,6]

According to Tinto's model of retention, these students will be more likely to **drop out of college[3]** and **switch out of STEM** programs.[7,8]

Female students experience additional struggles; they are less likely to declare a STEM major and persist in it until graduation, especially in quantitative fields.[9]

Research Questions and Methods

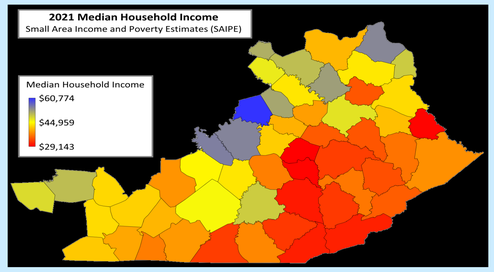
This study explored factors that may affect the STEM persistence of MSU students. The research questions were: Is there a significant difference in the STEM persistence of college students based on…

- **Sex** (M/F) and **SES** (Pell-grant eligibility)?
- **School size** and school **funding per pupil**?
- **Type of STEM major** (Quantitative or life science?

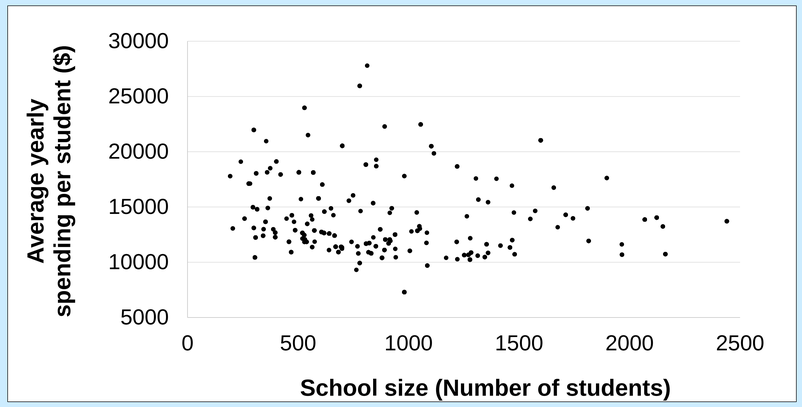
Data for **n = 1,699** students were obtained from the KDE[10] and MSU Institutional Research.

Persistence outcomes were classified as Major Persisters, STEM Persisters, STEM Departers, and MSU Departers**. Descriptive and inferential statistics were used to identify significant differences, p < 0.05.**

Findings



Variable	Major Persister	STEM Persister	STEM Departer	MSU Departer	Total	X^2 value p-value
High SES	**172 (22.1%)**	**189 (24.3%)**	110 (14.1%)	308 (39.5%)	779	35.11 < 0.0001
Low SES	142 (15.4%)	155 (16.8%)	**165 (17.9%)**	**458 (49.8%)**	920	
Life Science Majors	**236 (19.8%)**	237 (19.9%)	**205 (17.3%)**	515 (43.2%)	1,193	9.68 0.021
Quantitative Majors	78 (15.4%)	107 (21.1%)	70 (13.8%)	**251 (49.6%)**	506	



	SES Status	Average School Size	Standard Deviation	Z-value p-value
School Size	High	903 students	450 students	5.22 < 0.0001
	Low	**779 students**	355 students	

Variable	Quantitative Major	Life Science Major	Total	X^2 value p-value
Low SES	**305 (33.1%)**	615 (66.8%)	920	10.9 < 0.001
High SES	201 (25.8%)	578 (74.2%)	779	
Male Students	**377 (46.7%)**	431 (53.3%)	808	209.8 < 0.0001
Female Students	129 (14.5%)	762 (85.5%)	891	

Higher Education Outcome	Spending per Student	Standard Deviation
STEM Departers	**$ 12,888**	$ 3,556
STEM Persisters	$ 13,481	$ 3,812
MSU Departers	$ 13,441	$ 3,722
Major Persisters	$ 13,101	$ 3,687

Variable	Average Spending	Standard Deviation	t-value p-value
Life Science Majors	$ 13,171	$ 3,665	2.114 0.035
Quantitative Majors	**$ 13,593**	$ 3,806	
High SES	$ 13,540	$ 3,887	2.476 0.013
Low SES	**$ 13,090**	$ 3,544	

Conclusion and References

Low SES students entering higher education in Eastern Kentucky arrived mainly from **smaller**, **lower-funded schools**, and **departed STEM and MSU** at higher rates. Students who **graduated from lower-funded schools** avoided **quantitative majors** and **departed STEM** at higher rates. Students who wanted to major in a **quantitative** discipline **departed MSU** at higher rates. This study confirmed the role of SES in the transition and academic readiness of students in Eastern Kentucky.

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