Evaluating Researcher Identity and Science Motivation in High School Student Co-Researchers of the MYHealth Program

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BACKGROUND

- MYHealth is a virtual research training program focused on high school students in Southeast Michigan who are historically underrepresented in science, engineering, and math (STEM) careers [1]
- Students are trained as co-researchers on MyVoice, a national text message poll of young people [1, 2]
- Students engage in an interactive curriculum throughout the academic year (Impact Projects) to conduct a research project to further their interest and persistence toward research careers [1]
- We anticipate that students will feel more connected to research and motivated to pursue a STEM or research career upon completion of Impact Projects

METHODS

Eligibility Criteria and Recruitment

- High school students 14 years or older who live in Southeast Michigan were eligible to participate
- Students were recruited through school counselors and community partners to help identify high school students who are underrepresented in STEM and health careers

Data Collection and Analysis

- Student attendance was taken at each session
- Students completed surveys at baseline, midway through, and upon completion of Impact Projects
- Demographic data (grade, gender, race/ethnicity, SES, STEM interest [3]) were collected at baseline

The following variables of interest were measured:

1. Researcher Identity Scale [4]: how students see themselves as researchers (5-point scale)
2. Science Motivation Questionnaire-II [5]: interest and persistence in STEM topics (5-point scale)
3. Research and Action Self-Efficacy Scale [6]: select items on confidence applying research concepts (5-point scale)
4. Scientific Literacy Assessment [7]: ability to apply science concepts (4-point scale)

Descriptive statistics were calculated for variables of interest at 3 timepoints. Kruskal-Wallis tests were used to evaluate differences in median scores.

FINDINGS

Table 1: Participant demographics

Variable	N = 20
Gender[&]	
Female	19 (95%)
Male	1 (5.0%)
Race/Ethnicity[&]	
African American/Black	4 (20%)
Arab/Arab American/ Middle Eastern	11 (55%)
South Asian	4 (20%)
Mixed Race	1 (5.0%)
Grade[&]	
10th grade	4 (20%)
11th grade	9 (45%)
12th grade	7 (35%)
Macarthur Social Scale[^] [8]	6.00 (2.26)

[&]n (%) [^]Mean (standard deviation)

Table 2: Descriptive statistics of Impact Projects survey variables from pre, mid, and post-program data collection

Variable	Pre N = 20	Mid N = 15	Post N = 16
	Median (IQR[+])		
Researcher Identity**	3.42 (3.08, 3.67)	3.75 (3.33, 4.00)	4.12 (3.62, 4.33)
Science Motivation Questionnaire-II (SMQ-II)			
Intrinsic Motivation	4.00 (3.60, 4.60)	3.80 (3.50, 4.50)	4.40 (4.00, 4.80)
Self-Efficacy	4.00 (3.80, 4.60)	4.20 (3.90, 4.50)	4.10 (3.95, 4.60)
Self-Determination	3.60 (3.40, 4.60)	4.20 (3.20, 4.50)	4.10 (3.95, 4.40)
Grade Motivation	4.80 (4.40, 5.00)	4.80 (4.60, 5.00)	4.80 (4.30, 5.00)
Career Motivation	5.00 (4.00, 5.00)	4.80 (4.20, 5.00)	5.00 (4.10, 5.00)
Scientific Literacy*	3.00 (2.45, 3.34)	3.36 (3.18, 3.59)	3.50 (3.07, 3.86)
Research Self-Efficacy	-	4.25 (4.12, 4.50)	4.50 (4.25, 4.75)

**p-value <0.01, *p-value <0.05 [+]IQR = Interquartile Range

Participant demographics are described in Table 1 (above). Descriptive statistics for the four variables of interest (including 5 subscales for the SMQ-II) are presented in Table 2. Over the nine month program, we observed a statistically significant increase in both researcher identity and scientific literacy among Impact Projects students. Increases were also observed in research self-efficacy. Changes in SMQ-II subscales varied.

Figure 1: Impact Project session attendance by group
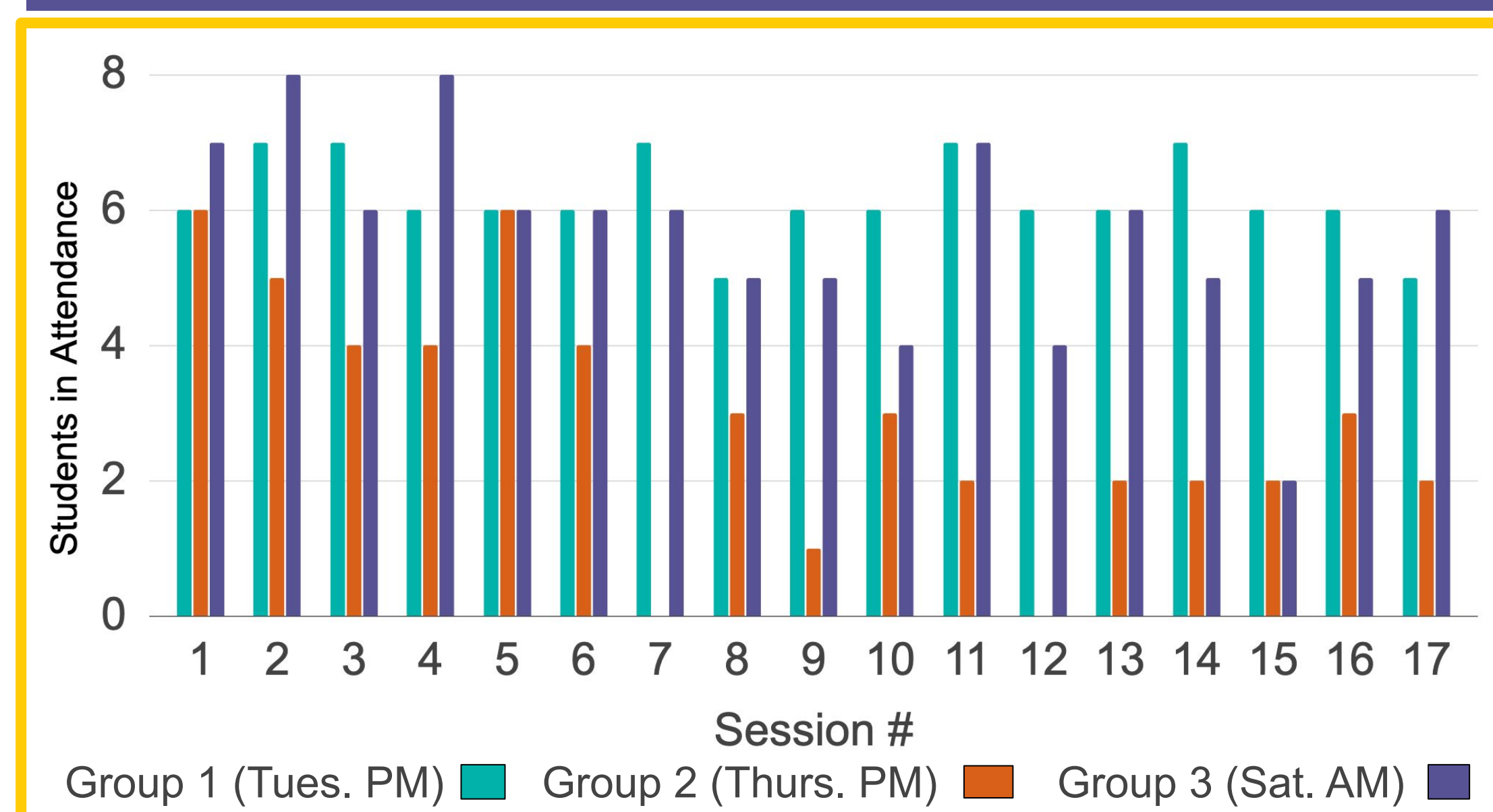
At the start of Impact Projects, students selected from a list of potential meeting times and were assigned a regular group. Sessions were held online two times per month and 17 sessions were completed for each group (51 total). The majority of sessions (27/51) had at least 75% of students in attendance. Attendance over the 9-month program is displayed by group in Figure 1. Fewer students were in attendance in the second half of the program compared to the first half.

Figure 2: Student development of key findings from their research project using virtual collaboration

Students met online using Zoom and online tools such as Jamboard, Padlet, and Poll Everywhere to collaborate throughout their research project. A sample Jamboard (Figure 2, above) showcases students developing key findings from their research project. Upon completion of the research project, over a dozen students from across all three groups presented at the virtual national Conference on Adolescent Health.

CONCLUSIONS

- 20 students completed at least one of three surveys
- Student attendance was high (>60%) in the majority of Impact Project sessions
- Students completed the research cycle: developing a research question, designing survey questions, qualitative analysis, identifying key findings, and academic dissemination
- Impact Projects students were trained as co-researchers on a health research project. They built their ability to see themselves as researchers (researcher identity), and their ability to (scientific literacy) and confidence (research self-efficacy) in conducting research. Motivation to pursue science of a research career appears unchanged

NEXT STEPS

- Additional research will be conducted to evaluate the effect of Impact Projects on research self-efficacy
- Post-program interviews will be completed to better understand key outcomes of interest
- A longitudinal analysis of the combined summer and academic year programs will be conducted
- Impact Projects will be offered again in 2023-2024

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