

## Background

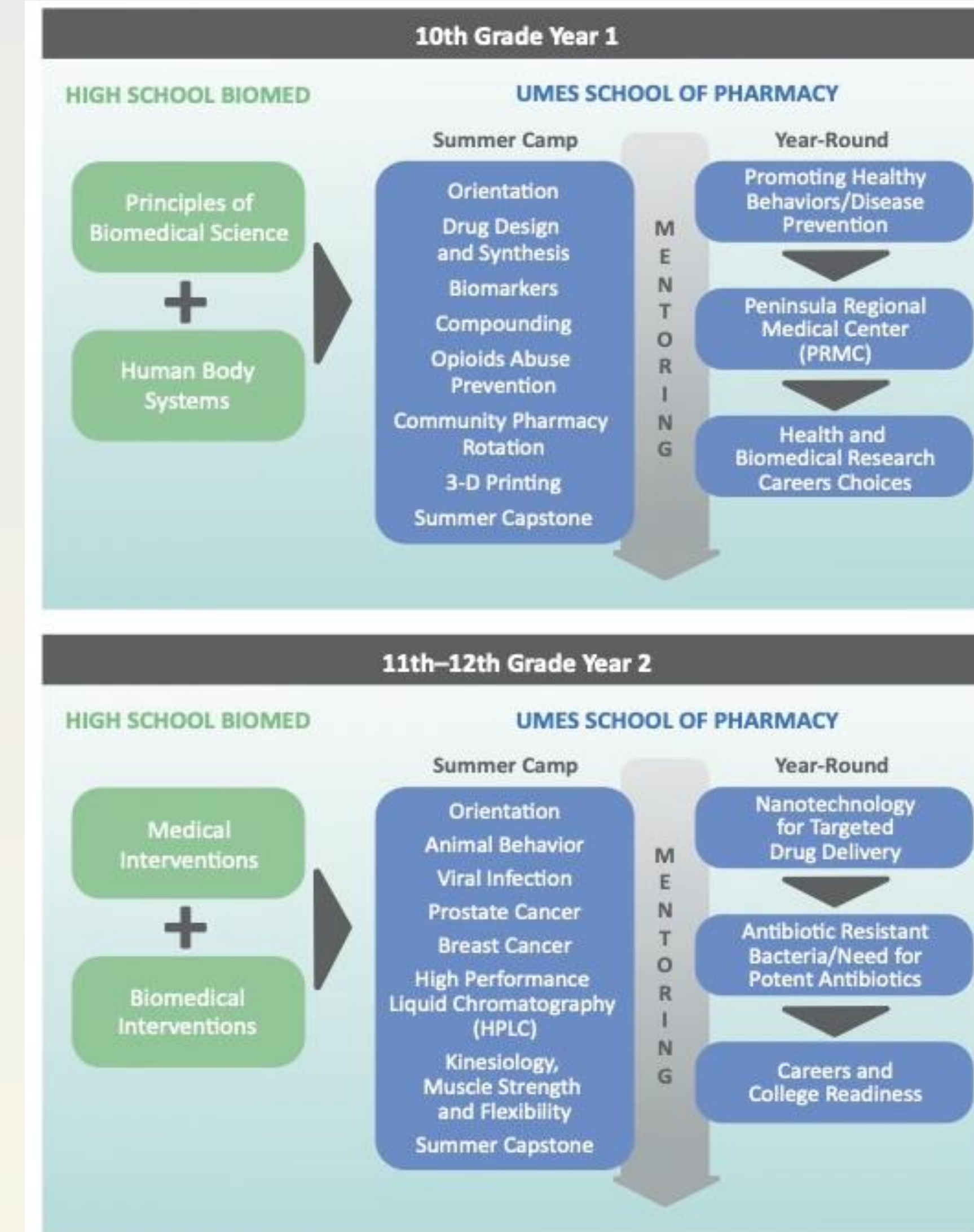
- Despite efforts to increase diversity in the biomedical sciences, the underrepresentation of Black, Hispanic, and Native Americans in the biomedical career workforce remains evident.
- Somerset County is one of the most rural and underserved areas in Maryland. Maryland Action for Drug Discovery and Pharmaceutical Research (MADDDR) is a partnership program between the UMES School of Pharmacy and high schools in Somerset County, MD.
- MADDDR Program provides hands-on lab experience and mentoring to underserved minority high school students. The program's main aims are: (1) Deliver, evaluate and disseminate a curriculum comprised of interactive STEM modules in the areas of drug delivery and biomedical sciences to high school students and (2) Implement a mentoring program for the high school students to provide support during and after curriculum delivery.
- MADDDR seeks to train minority youth in research methods of drug discovery and biomedical sciences and to motivate them to pursue higher education and careers in applied healthcare fields and biomedical research, with the support of near-peer mentors who are graduate students in the UMES School of Pharmacy.

## Objective

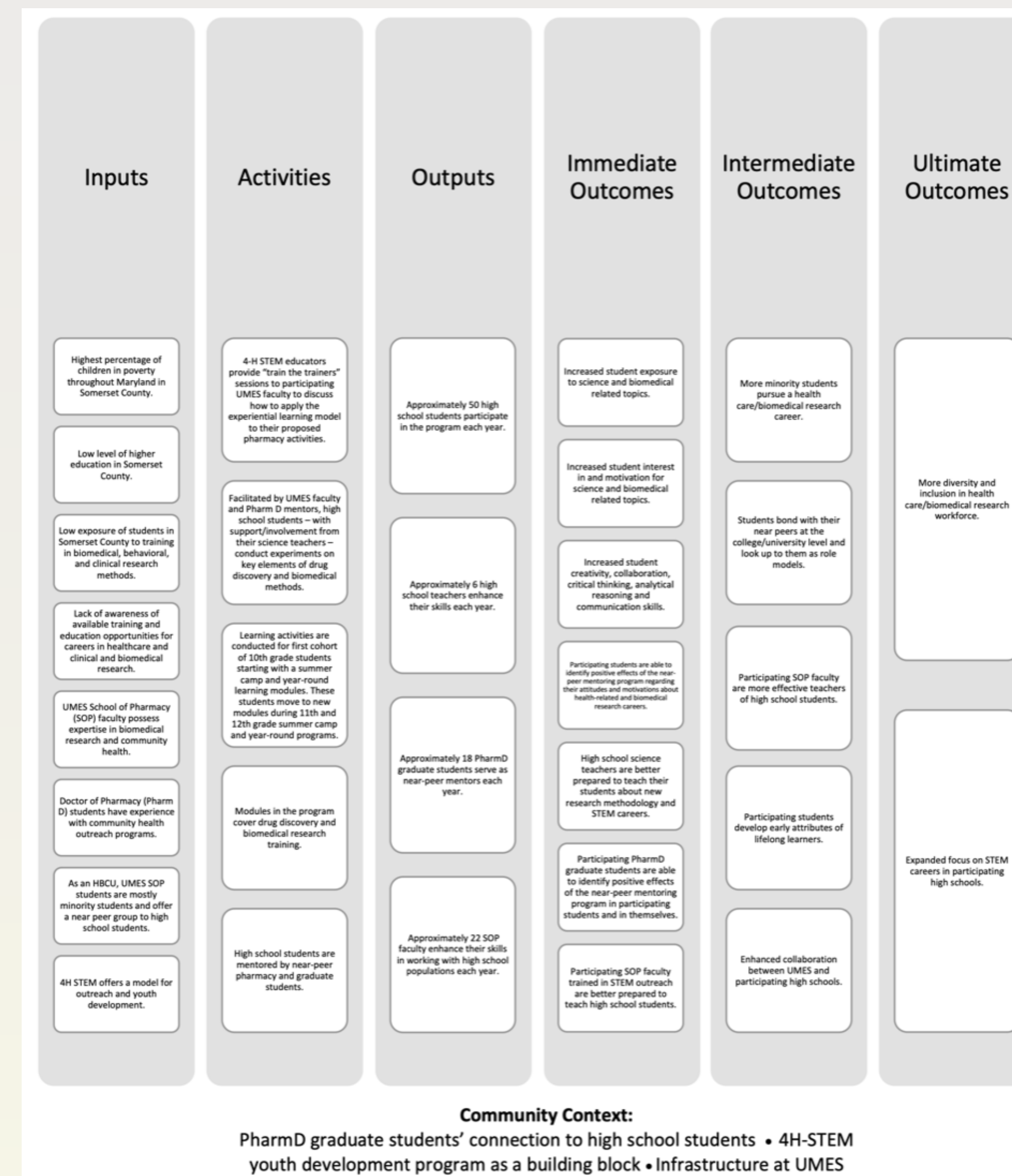
To report on four years of collective data from a high school summer MADDDR research training program at the University of Maryland Eastern Shore (UMES) School of Pharmacy.

## Methods

**Figure 1.** MADDDR curriculum aligned with the PLTW Core Coursework.



**Figure 2.** Logic Model for the MADDDR Program



## Results

- Over 4 years, 93 high school students and their science teachers participated in the 2-wk summer program led by 14 faculty from the School of Pharmacy and Health Professions.
- Graduate student mentors led small student mentor groups. The program offered labs with a diverse set of topics ranging from drug design to applied clinical pharmacy.
- Across study years, Black/African American, Hispanic and "Two or more races" groups accounted for 40, 13 and 11% of participants.
- Survey data from pre- and post-sessions show that MADDDR program significantly influenced students' career choices with most opting to choose future careers in life sciences, pharmacy and pharmaceutical sciences.
- Data from a demographically matched comparison group showed that the MADDDR respondents reported statistically significant higher levels of agreement with the statements "I know I would like to pursue a STEM career" (p=0.00424) and "I know I would like to pursue a biomedical science career" (p=0.0004) compared to a comparison group.

## Results

**Table 1.** Impact of MADDDR Program on student's decision on future career choices. Chi-Square McNemar's test applied on pre- & post camp survey data considered statistically significant where p-values were less than 5% alpha levels (p ≤ 0.05).

2019* Year 1 students	2020**	2021 Year 1 students	2021 Year 2 students	2022 Year 1 students	2022 Year 2 students
Life Sciences $\chi^2(1, N=16)=8$ Prob > $\chi^2=0.0047$	Life Sciences $\chi^2(1, N=10)=5.00$ Prob > $\chi^2=0.0253$	Physical Therapy $\chi^2(1, N=23)=6.00$ Prob > $\chi^2=0.0143$	Life Science $\chi^2(1, N=15)=5.00$ Prob > $\chi^2=0.0253$	Life Sciences $\chi^2(1, N=14)=5$ Prob > $\chi^2=0.0253$	Life Sciences $\chi^2(1, N=20)=5.44$ Prob > $\chi^2=0.0196$
Pharmacy $\chi^2(1, N=23)=16.00$ Prob > $\chi^2=0.0001$	Physical Therapist $\chi^2(1, N=8)=4.00$ Prob > $\chi^2=0.0455$	Pharmacy $\chi^2(1, N=16)=4.00$ Prob > $\chi^2=0.0455$	Pharmaceutical Sciences $\chi^2(1, N=15)=4.00$ Prob > $\chi^2=0.0455$	Pharmaceutical Sciences $\chi^2(1, N=9)=4.00$ Prob > $\chi^2=0.0455$	Pharmacy $\chi^2(1, N=18)=6.00$ Prob > $\chi^2=0.0143$
Biomedical Science $\chi^2(1, N=20)=5.00$ Prob > $\chi^2=0.0253$	Nursing $\chi^2(1, N=8)=4.00$ Prob > $\chi^2=0.0455$		Behavioral Science $\chi^2(1, N=16)=7.00$ Prob > $\chi^2=0.0082$	Biomedical Science $\chi^2(1, N=14)=5.00$ Prob > $\chi^2=0.0253$	Pharmaceutical Sciences $\chi^2(1, N=18)=5.44$ Prob > $\chi^2=0.0196$
Environmental Science $\chi^2(1, N=13)=4.50$ Prob > $\chi^2=0.0339$	Physician Assistant $\chi^2(1, N=9)=4.00$ Prob > $\chi^2=0.0455$		Respiratory Therapist $\chi^2(1, N=16)=5.00$ Prob > $\chi^2=0.0253$	Respiratory Therapist $\chi^2(1, N=15)=5.00$ Prob > $\chi^2=0.0253$	Behavioral Science $\chi^2(1, N=16)=5.00$ Prob > $\chi^2=0.0253$
Earth Sciences $\chi^2(1, N=12)=4.00$ Prob > $\chi^2=0.0455$				Behavioral Science $\chi^2(1, N=14)=5.00$ Prob > $\chi^2=0.0143$	Physical Therapy $\chi^2(1, N=14)=5.00$ Prob > $\chi^2=0.0253$
				Physician Assistant $\chi^2(1, N=14)=4.00$ Prob > $\chi^2=0.0455$	
				Rehabilitation Therapist $\chi^2(1, N=17)=4.00$ Prob > $\chi^2=0.0455$	

## Conclusion

- MADDDR program is supporting the STEM career exploration by minority underserved high school students to ultimately enhance the diversity of the biomedical workforce.
- The following quote from one of the students regarding the capstone project really captures what we had hoped the MADDDR project will achieve: "With the help of the capstone project, I was able to analyze all that we did this week and find out what module interested me the most. This helped with my career decision options". A comment on the campus tour responded, "I am planning to attend UMES for 4 years and this tour gave me lots of insights to what is on campus as well as what opportunities are available for me".

## Acknowledgement

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**Figure 3.** Pictures from MADDDR camp sessions A: Student injecting drug sample in GC/MS. B: Students designed inhalation devices by 3D-printing. C: Students filling prescriptions in a model retail pharmacy. D: Student using UV spectrometer to measure drug content in capsules. E: Students using the COVID-19 Rapid Antigen Test. F: Graduate student mentor assists a student observing a virus particle under the fluorescence microscope. G: Students worked jointly with the CURE SEPA Students on Pharmaceutical Compounding of a Capsule Prescription. H: Nanomedicine Lab Session where students prepared drug dispersions and learned the use of Zetasizer Nano® for particle characterization.

