Research Square

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Perspectives of First-Generation, Underserved, and Rural Students in STEM to Medical School Community of Practice Program

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Abstract

Objective: First-generation, rural, and underserved students encounter challenges in attaining higher education, especially in science, technology, engineering, and mathematics. This study focused on understanding the impact of Undergraduate Students Together Reaching Instructional Diversity and Excellence (U-SSTRIDE)'s Community of Practice's (CoP) integrated approach to social, cultural, academic, leadership, professional development, and experiential learning to help students overcome barriers and succeed as premedical students, medical students, residents, and practicing physicians.

Methods:
A mixed-methods approach was used, including qualitative interviews with U-SSTRIDE participants, which consisted of premedical students, medical students, residents, and practicing physicians. Thematic coding was used to identify personal and professional development themes. Quantitative data, including race, gender, and first-generation/disadvantaged status, were analyzed for correlations between demographic factors and academic success.

Results:
Responses were analyzed from 75 participants. Most of the sample reported as male (53%), Black (60%), having grown up with disadvantages (72%). Thematic analysis yielded three psychosocial and leadership development themes: Camaraderie, Personal Development, and Mentorship. The reported benefits gained from the U-SSTRIDE included the following themes regarding leadership development: (a) Professional, (b) Personal, (c) Academic, and (d) Soft Skills.

Discussion:
The findings underscored the importance of structured mentorship and a holistic CoP framework in supportingstudents from historically limited-access backgrounds in their academic and professional success. U-SSTRIDE's emphasis on leadership, experiential learning, and collaborative support helped participants develop resilience, overcome psychological barriers, and succeed as premed students, residents, and practicing physicians. The study findings highlighted the need for similar educational pipeline programs to expand access and strengthen the physician workforce.

Introduction

Health challenges in many communities have continued to worsen due to physician shortages, particularly in underserved and rural areas, across family medicine and various specialties.[1,2] Limited representation of physicians from communities with limited access to educational opportunities also presents substantial challenges to the effectiveness and accessibility of healthcare delivery.[3] Such a gap in representation can impact patient outcomes, and studies have indicated that patients often experience better health results when their physicians understand their sociocultural and economic backgrounds.[1,2] This fact underscores the necessity for a well-rounded medical workforce, especially in

family medicine and other primary care specialties, including individuals from first-generation, rural, and limited-access-to-resources backgrounds.

First-generation, rural, and economically disadvantaged students often face barriers to advancing academically due to socioeconomic and educational factors contributing to their acceptance and matriculation in the medical field.[4] Rural students often face geographic isolation and a lack of resources, further compounding their challenges.[5] Studies have shown students from these backgrounds frequently encounter inadequate resources, limited access to support systems, few mentorship opportunities and role models, and financial constraints—all of which contribute to lower college enrollment and graduation rates, often resulting in lower career aspirations.[6-9] Psychological hurdles for students (e.g., imposter syndrome, a lack of belonging, feelings of isolation) often pose additional challenges for these students.[10] Subsequently, early intervention is critical to expanding access to medical careers and addressing gaps in the healthcare workforce. Interventions and programs that increase access to science, technology, engineering, and mathematics (STEM) education by committing to STEM leadership and representation, in addition to providing academic assistance and social support, are essential.[11]

Florida State University College of Medicine (FSUCOM) has worked to mitigate these issues by increasing the number of matriculating students from these backgrounds and those who pursue primary care specialties.[12,13] Longitudinal pipelines, such as the Undergraduate Students Together Reaching Instructional Diversity and Excellence (U-SSTRIDE) Program, were created to address this issue and to provide mentorship and personal and professional development through leadership training and opportunities. The U-SSTRIDE program, which supports students from rural and underserved backgrounds, is part of a larger pipeline that includes precollege, undergraduate, and graduate-level outreach.[14] The U-SSTRIDE's Community of Practice (CoP) model[15] was designed to address these issues for undergraduate pre-health students and includes four focus areas in which U-SSTRIDE students are involved from their freshman to senior years to help in their overall development: (a) sociocultural development, (b) academic development, (c) leadership and professional development, and (d) experiential learning and development. The CoP provides an environment of collaboration, support, empowerment, inspiration, and engagement. This program has been shown to support positive academic outcomes; however, there is still a need to explore how participation in U-SSTRIDE fosters personal and professional growth and development.[4]

This study aimed to address two key research questions:

1. What factors contributed to perceived growth socially, emotionally, and as a leader by U-SSTRIDE participation that assisted students in successfully completing a premedical track and advancing in medicine?
2. What individual benefits were gained from the U-SSTRIDE CoP Mentorship Program?

Understanding these resilience factors is crucial for holistically assessing how U-SSTRIDE CoP supports students in overcoming barriers and building leadership, academic, and professional skills while transitioning successfully into their medical careers. Knowledge gained from this study can be used in medical education and primary care pipelines to recruit, support, and expand access to all students interested in medicine and primary care.

Methods

Recruitment and Data Collection

The study's recruitment criteria included the U-SSTRIDE alumni network, consisting of premedical students, medical students, residents, and practicing physicians. An internal email list was maintained for these individuals. A survey was developed in Qualtrics consisting of 35 questions. The survey probes relevant to this study encompassed several demographic, background, and qualitative questions, as displayed in Table 1. An online link for the survey was sent through Qualtrics to all eligible participants (*n* = 96), including information on consent, survey length, and risks associated with this study. Participants were asked to consent to participation before accessing survey questions. All data collection occurred in Qualtrics from October 24, 2022, to January 30, 2023. Survey data from 75 participants was obtained with a survey response rate of 78%.

Data Analysis

The survey data were exported from Qualtrics into an Excel data sheet. Two types of data analyses were performed: descriptive and qualitative. Descriptive analyses were performed in Stata 14.0 and involved developing pie graphs for Variables I, II, III, and IV, along with tables to summarize these data. These analyses entailed calculating descriptive statistics (i.e., frequencies and percentages) for the following variables:

- Demographics (i.e., age, sex, race);
- Whether they were from rural or underserved areas (binary yes/no);
- Whether they grew up with any educational or economic disadvantages (binary yes/no);
- Whether they came from single-parent households (binary yes/no);
- Types of support they received as a college student (binary yes/no);

The qualitative data, which included 66 participants, were used to analyze the responses to the two selected open-ended questions from the survey. Specifically, the study used inductive content analysis, which involves an analytical process consisting of reading, organizing, integrating, and forming categories, concepts, and themes to summarize the main categories, concepts, and themes of textual data.[16] The central task in this process entails coding, which involves labeling chunks of text in a document and using these labels to identify and bring together similar pieces of text.[17] Inductive content

analysis was used in this study due to its appropriateness in research where the questions are specific and direct to elicit descriptions of the situation, event, or experience (e.g., the two open-ended questions analyzed) and when the researchers aim for a practical answer or application of the findings (e.g., to develop practice guidelines or inform policy) rather than theory development.[17] Two coders independently read all responses for each question and developed initial codes inductively from the data. The next phase involved the two coders' discussion and review of their respective codes, which involved organizing them by patterns of meaning. These codes eventually emerged as themes and subthemes relevant to the research objective.

Results

Sample Characteristics

Figures 1A and 1B present the univariate analyses exhibiting the descriptive statistics for the sample's demographic and socioeconomic variables. Additionally, most of the sample (72%) reported growing up with educational or economic disadvantages, and nearly half the sample reported being the first in the family to attend college (see Figure 2). Individuals reported using a wide range of support through the program, which ranged from 22% receiving parental assistance to 93% participating in volunteer opportunities (see Figure 3).

Additionally, most respondents reported graduating from an allopathic or osteopathic medical school (*n* = 46; 61%), with 70% (*n* = 32) of those individuals graduating from the medical school in which the U-SSTRIDE program is housed.

Qualitative Results

We identified three major themes and three subthemes related to Research Question 1. The major themes include Camaraderie, Personal Growth, and Mentorship, while the subthemes related to Personal Growth include Experiential Learning, Self-knowledge, and Maturity. Additional quotes are listed in Table 2.

Theme 1: Camaraderie

Theme 1, Camaraderie, was defined by the U-SSTRIDE program as helping its participants connect with their peers with similar medical career aspirations. Camaraderie enabled participants an opportunity to obtain moral support and expand their network, facilitating their fulfillment of personal and professional goals. One participant spoke about how the program helped ameliorate the challenges of connecting with others interested in medicine and the impact these connections had on their career:

U-SSTRIDE gave me the opportunity to connect with like-minded people who shared a passion for pursuing medicine at an early age. It was hard to find these people at school, but U-SSTRIDE was the bridge for those relationships. The mentorship I obtained from U-SSTRIDE was one of the most impactful components that helped propel my career.

Another participant spoke to how the program improved their social skills by simple exposure to diverse groups of people; they said:

U-SSTRIDE exposed me to different types of people and it made me a little more social and outgoing. Serving as a peer group leader, I was able to become more personable to some students that really struggled in their courses.

Furthermore, another participant spoke about how the program provided connections to other individuals who motivated them to continue the path of medicine and inspired them to find their inner voice as an advocate for others facing similar intransigent circumstances.

Theme 2: Personal Growth

Theme 2, Personal Growth, was defined by how the U-SSTRIDE program fostered an environment of self-enrichment through the direct opportunities it provided, along with how these experiences shaped participants' understanding of themselves. The specific subthemes of personal development were experiential learning, self-knowledge, and maturity.

Subtheme 1: Experiential Learning. This subtheme was defined by the U-SSTRIDE program providing hands-on tutoring, volunteering, and work (e.g. teaching, internship) opportunities that bolstered leadership skills and provided participants with valuable experiences to enhance their medical school competitiveness. One participant mentioned how the program helped carve their leadership identity, which reinforced their commitment to pursue medicine:

U-SSTRIDE helps you grow as a leader by presenting you with opportunities to do so. Although there are competencies to be met and lessons directly taught within U-SSTRIDE, I believe that leadership is formed through practice and reflection. Giving opportunities to serve as mentors, medical assistants, intern under wise mentors along with the empowerment of staff and upper classmen has truly allowed me to develop my leadership identity. . . . It is via these methods that today I can participate in leadership confidently in any setting with a community.

Subtheme 2: Self-Awareness. This subtheme was defined by the U-SSTRIDE program assisting participants in uncovering the self-confidence and motivation necessary to overcome any existing barriers to their goal of pursuing a career in medicine. One participant cited how the program cultivated self-confidence by connecting with other individuals who helped them overcome self-destructive habits while enhancing their soft skills (i.e., professionalism and communication). They said:

U-SSTRIDE has taught me to believe in my capabilities. Through my participation in the program, I have grown in confidence. The U-SSTRIDE team challenged me, and reinforced that I am a strong candidate for medical school despite my socioeconomic disadvantages.

Subtheme 3: Maturity. This subtheme was defined by how the program empowered participants to develop strategies to enhance their competitiveness for medical school. One participant described how exposure to others with similar aspirations for medical school admission allowed them to refine their methods in building a competitive profile for medical school applications, saying:

U-SSTRIDE allows me to connect with students who understand the difficulties predisposed to premedical students. Feedback from students with more experience helps my decision-making process, enhancing my probability of being a competitive applicant before applying to medical school.

Theme 3: Mentorship

Theme 3, Mentorship, was defined by how the U-SSTRIDE program inspired participants to use the skills they obtained to serve others who needed academic assistance and moral support. Participants mentored high school and middle school students from similar background as the participants themselves, as evident from the following example of a program participant who noted:

I was able to give back by mentoring high school and middle school students, which really allowed me to hone in on my leadership abilities. I led a science class a few times and became a role model for students. I still keep in touch with a few of the students I mentored and provide them with career advice.

We identified four major themes for this Research Question 2 (see Table 2). The major themes include Professional Benefits, Personal Benefits, Academic Benefits, and Soft Skills.

Theme 1: Professional Benefits

Theme 1, Professional Benefits, was defined by the U-SSTRIDE program enabling participants to gain valuable work experiences, exposure to leadership roles, and attainment of certifications to enhance their resumes. One participant described how the program helped them gain both leadership and work experiences, sharing:

I was a peer leader and helped develop the program with the e-board. I was a study group facilitator and tutored on occasion. I was a precollege mentorship facilitator for Sarasota SSTRIDE. I served as a U-SSTRIDE executive board member for 3 years.

Another participant discussed the program's instrumental role in helping them gain a valuable certification. They said, "U-SSTRIDE allowed me to gain my medical assistant certification with a scholarship to the certification course. I still use that certification today."

Theme 2: Personal Benefits

Theme 2, Personal Benefits, was defined by the program exposing participants to mentorship and responsibilities, which fueled their personal development by building empathy, self-confidence and self-efficacy. One participant discussed how the program helped them to understand the intrinsic satisfaction of assisting others and reflect on their own growth in the process, sharing: “Helped to see the value of helping others and reflect on how far I’ve come.” Another participant discussed how the program exposed them to a leadership role that enlightened them on the importance of being vulnerable as part of the leader development process. They said:

I was on U-SSTRIDE e-board in my senior year of college. One thing that was part of being in e-board was to share your story on why you wanted to pursue medicine. I was super nervous to stand in front of others and share something so personal. It wasn’t until then that I had peers acknowledging my resilience and my effort that I realized being vulnerable was essential in leadership.

Theme 3: Academic Benefits

Theme 3, Academic Benefits, was defined by the U-SSTRIDE program as providing tangible benefits in the form of promoting strong academic performance (e.g., good grades) and contributing significantly to participants’ central goal of admission into medical school. One individual described how the program provided them with the suite of resources needed to excel academically, saying: “My grades were always As because of the peer resources such as study groups, library of books in the USSTRIDE suites, the moral support from my colleagues.”

Theme 4: Soft Skills

Theme 4, Soft Skills, was defined by the U-SSTRIDE program helping participants develop the intangible qualities necessary for success in the medical field such as leadership, communication, diplomacy, and open-mindedness. One program participant cited how exposure to different positions in the program helped build their leadership and communication skills, noting:

I got to serve many positions within U-SSTRIDE, including precollege mentor, peer advising, executive board member for 2 years, and college-level mentor. These experiences have benefited me in so many ways, including improving my leadership and communication skills.

Another program participant discussed how the program helped them build their humanistic skills making them a more well-rounded person, sharing:

I benefitted in U-SSTRIDE as a peer group leader myself, as a mentor, and as an executive board member. I think these have imparted to me the importance of delegation, introspection and being open to new ideas, which are crucial in the medical field.

Discussion

The current study provided empirical evidence highlighting the effectiveness of using a CoP program model, where mentoring is central in bridging academic gaps, expanding access to medical careers, and breaking down barriers to academic success and degree completion in STEM fields. This CoP model emphasizes the social context of learning where premedical students collaborate, engage, and mentor each other within an integrated infrastructure and comprehensive design. Findings suggest the CoP model, applied through the U-SSTRIDE program, resulted in many positive reported outcomes from participants. The positive aspects of participating in the U-SSTRIDE CoP program included personal development, which included increased self-knowledge, maturity, mentorship of others, and camaraderie. Participants felt the CoP program helped foster relationships not only with themselves but also with others. Participants were also able to develop a support network given the sense of social connectedness experienced among peers with similar medical career aspirations. Within the theme of Mentorship, participants reported feeling inspired to pay it forward to serve other people needing academic assistance and moral support. This inspiration mostly involved mentoring precollege middle and high school students from similar backgrounds, further inspiring future generations of medical students. These skills are extremely important for those pursuing careers in health professions.[4]

The U-SSTRIDE mentorship program provided substantial benefits in the areas of experiential learning and academic, professional, and personal skills development. Other key skills highlighted by participants included leadership, communication, diplomacy, and open-mindedness. Professionally, participants highlighted how valuable work experiences, exposure to leadership roles, and attainment of certifications (i.e., medical assistant certification) enhanced their resumes positively. Additionally, obtaining certification in medical assisting and other fields provided exposure to the medical field and opportunities for financial independence. Finally, most of the program participants reported graduating from medical school. Most of these students graduated from the medical school housing the U-SSTRIDE program, which suggests this program may serve as a feeder program into the local institution’s medical school.

Study Limitations

This study’s main limitation involved using survey data, which may include social desirability bias (i.e., the tendency to underreport socially undesirable attitudes and behaviors and to emphasize more desirable attributes) and recall bias (i.e., study participants incorrectly recording responses that depend on their ability to recall past events.[18,19] Another possible survey limitation worth noting involved using an online survey rather than direct interviewing, which limits the time and details obtained in qualitative data compared to direct interviewing.

Conclusion

This study attests to the significant impact of the CoP mentorship model in successfully supporting first-generation, rural, and underserved students in their journeys toward becoming physicians or other healthcare professionals. Findings indicated targeted pipeline programs for students facing educational and economic barriers to provide mentorship, support, and personal opportunities for professional development, ultimately increasing successful matriculation and completion of medical education.

In the future, the CoP mentoring model and strategies employed in the program can be further explored in prospective studies within other academic institutions using other pre-health professions students (i.e., pre-nursing, pre-physician assistant, pre-dental) to strengthen pathways into the healthcare workforce and increase the number of primary care physicians.

Declarations

Ethics approval was obtained from the St. Edwards University Institutional Review Board (IRB) and the IRB of the research institution (Florida State University).

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Tables

Tables 1 and 2 are available in the Supplementary Files section.

Figures

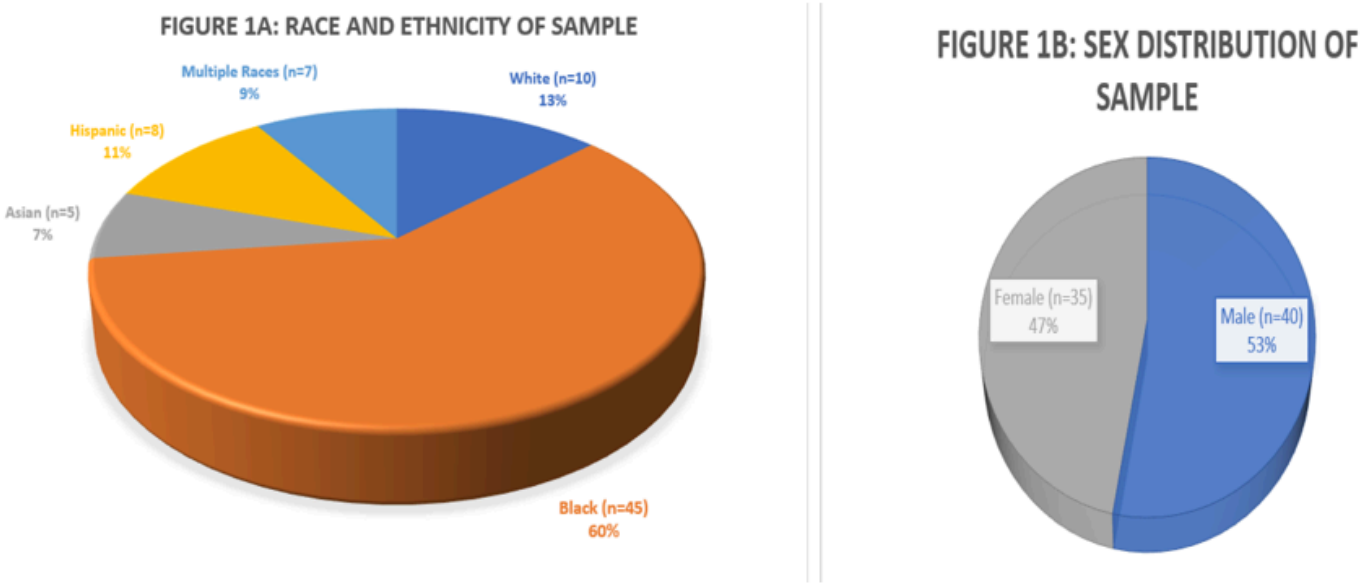


Figure 1

Sample Demographics

Most of the sample reported as male (60%; Figure 1A) and Black (53%; Figure 1B).

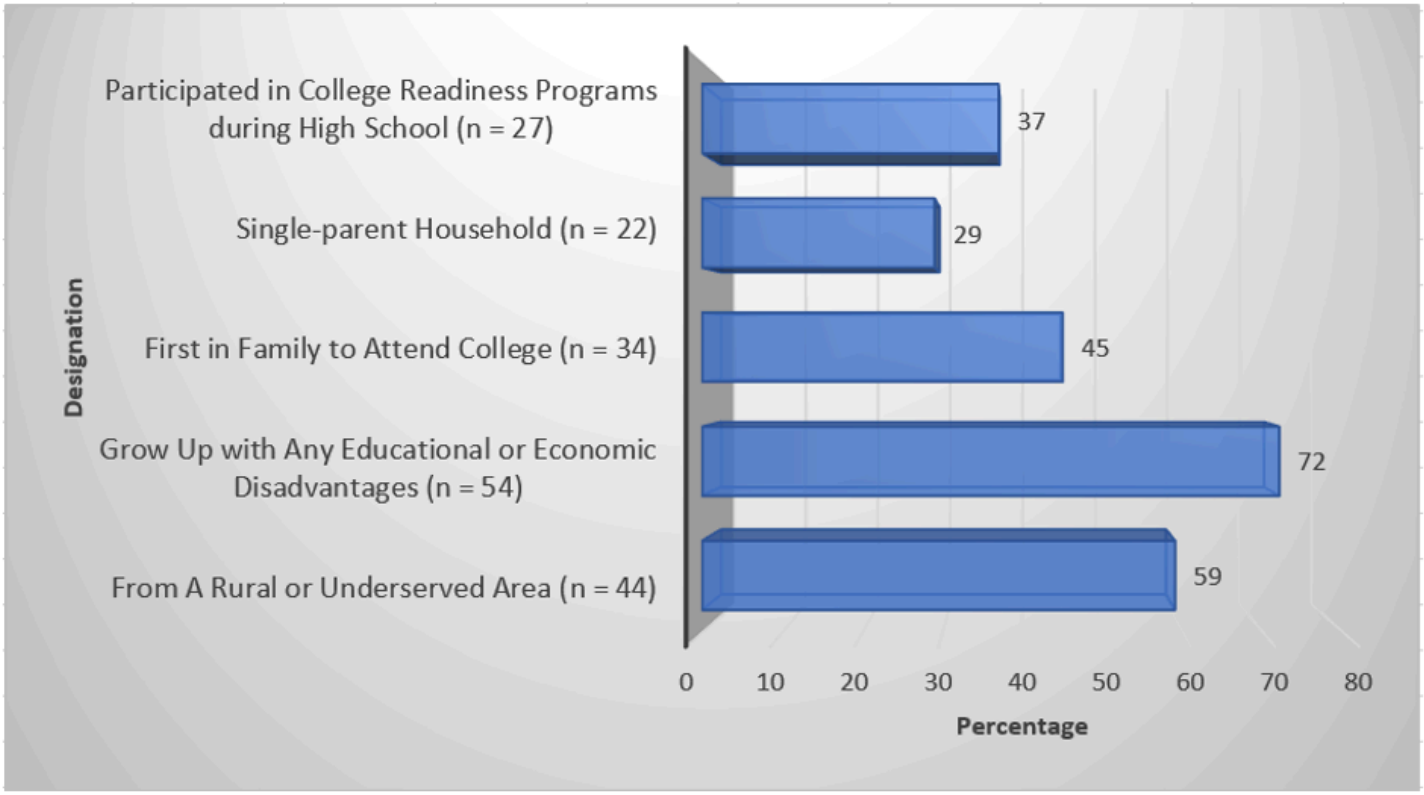


Figure 2

Demographic and Socioeconomic Factors

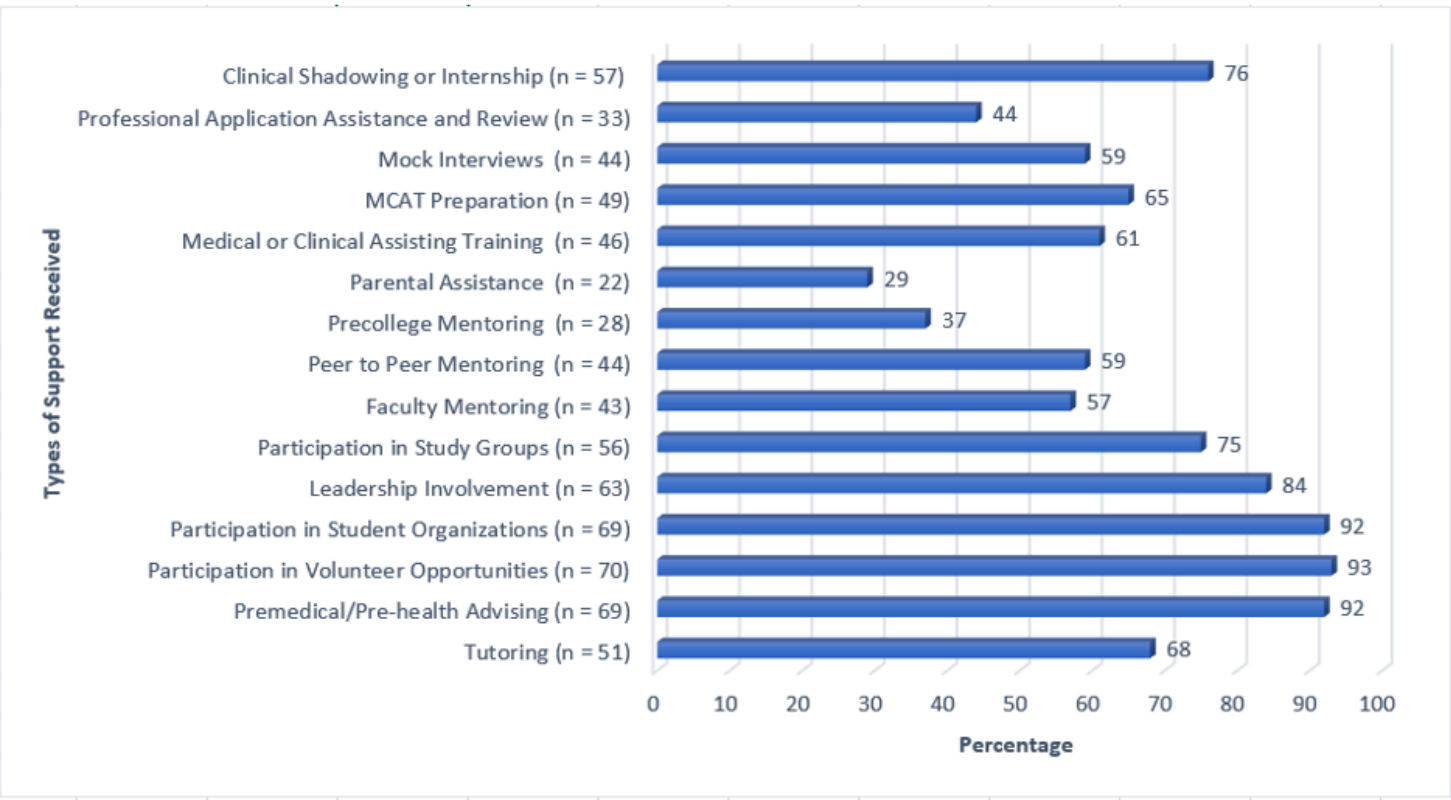


Figure 3

Types of Support Received

Supplementary Files

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- Tables.docx