ORIGINAL RESEARCH

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The Navigating Medical School Program: An innovative student-led near peer mentoring program for strengthening the medical school learning environment

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ABSTRACT

Background: The medical school learning environment (LE) includes the setting and context in which students develop into physicians. We identified "student navigation" as an opportunity for addressing the LE and describe the development of a student-led, faculty-supported program to improve student navigation.

Methods: A student focus group needs assessment, and a self-regulated learning assessment completed by 139 junior medical students identified four key components to Navigating Medical School (NMS): faculty mentor, near-peer guides, colleague support, and friends and family. The NMS program improves student navigation by facilitating the development of an individualized student navigational team.

Results: In its first year, participation was high: 84 (64%) first-years, 105 (79%) second-years, 54 (43%) third-years, and 49 (44%) fourth-years attended at least one seminar. Post-seminar surveys were completed by 89 students and 97% "agreed/strongly agreed" that these seminars improved student navigation. The Guides program enrolled 134 junior medical students who were paired with 45 near-peer guides. An impact on medical student mentoring at all the levels was observed. Near-peer mentoring significantly increased from 46% before to 70% after implementing the NMS program. Students who gained a near-peer mentor demonstrated improved self-directed learning behaviors.

Conclusion: The NMS program is a feasible model for a student-led, faculty-supported initiative to strengthen the LE by improving student navigation, connection, and promoting self-directed learning.

Background

Problem

The learning environment (LE) includes the physical, social, and psychological contexts in which students learn. For medical schools, the LE encompasses the lecture hall and the wards, thereby directly impacting academic performance and patient care [1,2]. The LE is explicitly assessed by the Liaison Committee on Medical Education's (LCME) Graduation Questionnaire.

Following an LCME site-visit in 2016, strengthening of the LE to improve the student experience was identified as an opportunity for improvement at our institution. Previous efforts to address the LE were primarily faculty generated. Limited evidence exists for the efficacy of specific interventions on improving

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ARTICLE HISTORY

Received July 01, 2019 Accepted November 21, 2019 Published November 27, 2019

KEYWORDS

Medical education; leadership; learning environment; student initiative



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the LE, including pass/fail grading, increased faculty advising, and well-being programs [3]. Students provide a unique perspective on the challenges and solutions to addressing the LE and are able to influence their experience within the existing LE [4–6].

Our students identified "student navigation" as an area where they need support. Prior work has indicated that strong mentors are an important ingredient for a supportive LE [7–11]. Mentors serve as role models and guides, aiding their mentees in successfully navigating the transitions and challenges in medical school [12,13].

The aim of this study was to describe the development and preliminary evaluation of a student-led near-peer mentoring program to facilitate a culture of peer guidance and support to strengthen the medical school LE.

Methods

Needs assessment

A needs assessment was disseminated to 250 firstand second-year medical students in February 2017 to assess how students at our institute connect with other students, faculty, and resident, including their understanding of mentoring, opinions of the benefits and barriers to mentoring, the challenges faced in navigating medical school, and self-regulated learning behaviors. This survey was completed by 139 (56%) students, including 78 (60%) first-year and 61 (50%) second-year students. Students defined mentors and mentoring relationships as those where they could seek advice for specific career, life, and/or work problems (129, 93%), where personal and professional goals are discussed (125, 90%), and where the mentor was more experienced (122, 88%). Most students did not identify performance assessment (45, 32%) or counseling (62, 44%) as components of mentoring (Fig. 1). Faculty was the primary source of mentorship with 66% of students identifying a faculty mentor. Resident or fellow mentors were identified by 21% and peer student mentors by 49% (Fig. 2).

Students were asked to describe their perception of faculty and peer mentoring, to identify how they met their mentors, and list the benefits and barriers to peer mentoring. Free-text survey responses were mined and grouped thematically (Table 1). Students indicated that mentoring relationships were primarily developed from random run-ins including "finding potential mentors that I fit with personality-wise and career-interest wise," "sporadically [making] connections with [senior medical students] I identified with," and "seeking out people that I have met socially that have similar interests."

Students reported that they valued and desired peer mentors because they possess shared experiences, provide personal and professional guidance, have up-to-date advice, and help students navigate the challenges of medical school. One student stated that "as a first-year [medical student], I often feel 'lost' so their guidance and advice is invaluable"



Figure 1. Student identified definitions of mentors and mentoring relationships.

and is "really helpful because they have just been in your shoes and have the most updated information. They also feel more like peers, so it is less intimidating to talk with them."

Students identified several barriers to forming these near-peer relationships. The most commonly identified barriers included limited student-to-student communication and difficulty connecting with peers interested in mentoring. They commented that these barriers were due to the "lack of a formal system" for connecting with mentors and "third and fourth year [medical students] never see [junior medical students] as they are at the hospital," which is geographically separate from the medical school.

In order to evaluate the impact of student mentoring on performance, we assessed students' self-regulated learning behaviors. Self-regulated behaviors are strongly associated with high-achieving students and performers. [4,14] Our hypothesis is that students who participate in this program and



Figure 2. Medical student mentors, pre- and post-NMS implementation.

Table 1. Benefits and barriers to medical student mentoring.

	Theme	Representative Response
Benefits	Shared experience	"Nice to chat with someone who has been through the experience recently and can provide insight and understands the stress you are dealing with."
	Personal and professional guidance	"You get to learn from their experiences and they can give you tips as to how to avoid common road blocks. They are also seem to be more honest and real in their explanations of things which is a big plus."
	Up-to-Date and honest advice	"Medical students are really helpful because they have just been in your shoes and have the most updated information. They also feel more like peers, so it is less intimidating to talk with them."
Barriers	Limited student-to-student communication	"It's challenging getting to know people from different classes. We spend a lot of time in class and doing activities with our own class but meeting people in more than just a superficial way from other classes takes a lot of time and effort, unless you are lucky enough to both enjoy the same hobby. In that case, you can use your shared interest to get to know each other. However, many medical students, including myself, drop most of their hobbies in medical school because there isn't time to pursue them."
	Difficult to identify students interested in mentoring	"It is hard to get to know upperclassmen as a first or second year since we are at different campuses and on different schedules, especially those that have the time and are willing to answer questions whenever."
	Lack of formal peer mentoring system	"Lack of a formal system identifying appropriate mentors."

gain a near-peer mentor will demonstrate improved self-regulated learning behaviors.

Self-regulated learning was assessed using the Self-Regulated Learning Perception Scale (SRLPS) [15–17]. Self-regulated learning is learning that occurs as the result of student goal and developing specific thoughts and behaviors to achieve them. The SRLPS is composed of 41-items assessing four dimensions that contribute to *self-regulatedness*: (1) motivation and action to learning, (2) planning and goal setting, (3) strategies for learning and assessment, and (4) self-directedness. Scores were calculated as Total SRLPS, representing a composite of the four sub-scales, and sub-scores for each domain. Sub-group analysis was performed by dividing students into those that gained, lost, never-had, or always-had a near-peer mentor, faculty mentor, and resident/fellow mentor. Between these sub-groups, analysis of variance was performed for each of the four SRLPS sub-scales.

Following this needs assessment, a focus group of third and fourth year medical students, faculty advisors, and representatives from the administration selected to represent varying styles and experiences was convened to interpret these data. The group made the following recommendations: (1) they identified four critical roles in medical student navigation: faculty mentors, near-peer student guides, peer support, and encouragement from friends and family; (2) faculty mentors were recognized as providing a crucial "north star" for student navigation and were seen as supporting students' with long-term direction; (3) near-peer mentors in the form of senior medical students were identified as critical day-to-day navigators; and (4) programs to increase informal run-ins and opportunities to connect with near-peer and faculty mentors were requested to overcome barriers to initiating and sustaining these important relationships. In response, the student leaders proposed the development of the Navigating Medical School (NMS) Program.

Program description: the Navigating Medical School Program

Purpose

The NMS Program is a student-led, faculty-supported program to improve student navigation within the existing learning environment. The purpose of The NMS Program is to facilitate the development of an individualized student navigational "compass" consisting of a faculty mentor, near-peer guides, colleague support, and friends and family (Fig. 3).

The medical school compass

This medical school compass [18] arms students with an experienced and personalized team capable of assisting them with any navigational decision. Faculties serve as mentors aiding in long-term career and academic navigation [19,20]. Near-peer guides help with block-toblock and course-to-course navigation helping



Figure 3. The Navigating Medical School student "compass."

students to prepare for the exams, select summer enrichment, debate research opportunities, or prepare for upcoming clerkships. Students engage with colleagues, family, and friends continuously both in-person and fostered by online networking. Like the four points on a compass, this team helps students navigate the challenges, obstacles, and successes of medical school.

Structure

The NMS program builds upon the previously published *Transitions in Medicine* program implemented at our institution (2007–2013) which consisted of a series of panel discussions held at critical times during medical school [21,22]. Upon this backbone, additional layers were added.

Central to the NMS program is a layered approach to mentoring and guidance (Fig. 4). Seminars provide a foundation for regularly timed meetings between students and their colleagues. Near-peer guides are added to extend guidance beyond these regularly scheduled meetings and faculty help to provide the final layer, assisting in the long-term direction of a student's academic, career, and/or social development.

Guides

Near-peer mentors in our program are called "Guides." This is an important and deliberate distinction that reflects the purpose and value of a nearpeer mentor. While faculty help to steer student's growth by opening doors, supporting professional development, and when appropriate sponsoring students for opportunities, near-peer guides are senior medical students who serve a more day-today role helping students to identify and prioritize the optimal "doors" which faculty may end up helping to "open."

Leadership

The NMS program is entirely student-led and implemented. Faculty advisors (RS, PB, IH, and PR) play a critical role in providing in providing mentoring on skill development (leadership, teamwork, program develop, etc) to the student leadership. Administrative support from the School of Medicine is essential in providing access to resources and sustainability through institutional support.

Faculty-generated initiatives to address student navigation and the LE benefit from alignment with institutional objectives and existing curricula, but can be hindered by reduced flexibility to changing student needs [3]. Student-led programs benefit from increased flexibility and student ownership, but can struggle with sustainability and integration into existing curricular offerings [23,24]. The NMS program balances student leadership and energy with faculty support and guidance – both are critical to successfully targeting student navigation and the LE.

Small teams of senior medical students supported by faculty advisors (RS, PB, and IH) lead the individual components. Teams are coordinated by a fourth-year medical student director and third-year



Figure 4. The Navigating Medical School program's layered approach to mentoring and guidance with the seminar series providing the foundation, the near-peer guides providing continuity between seminars, and the networking program connecting students to faculty for long-term direction and development.

medical student co-director who are responsible for fundraising, coordination, and integration with institutional initiatives. At all levels of this program, senior students work closely with junior students, encouraging junior medical students to pass along the same effort and benefits that they have received. These *pay-it-forward* actions promote collaboration, build peer teams, nurture institutional culture, and support a positive LE [25].

Rationale

The NMS program is a peer-assisted learning (PAL) program. PAL programs benefit from cognitive and social congruence. Peers, and near-peers, share a similar knowledge base resulting in cognitive congruence, and a similar social role resulting in social congruence [26,27]. Medical school is a transformative experience in which college graduates enter and physicians leave. PAL programs aid students in the transitions and challenges that occur during this period by addressing a gap in knowledge that exists between medical students and attending physicians and residents regarding how to navigate medical school [28,29].

PAL programs are representative of the signature pedagogy of medical training [30]. Signature pedagogies are the characteristic training and instruction paradigms of a profession. PAL is the signature pedagogy for residency training because it is grounded in residents training and teaching other residents, often only separated by a year of training [31–33].

Based upon these theories and evidence, we hypothesized that by increasing student-to-student connections we could impact the learning environment and improve the student experience. Here, we describe the feasibility of implementing the NMS program and describe the impact on self-reported student connection.

NMS Seminar Series

The NMS Seminar Series is the foundation of the NMS Program (Fig. 4). It consists of eight non-compulsory seminars held at critical transition points in medical school. Each seminar includes a short didactic presentation followed by a student panel. Predefined seminar topics are determined from prior student experience but remain flexible from year-to-year through seminar follow-up surveys. Panels are composed of senior students (e.g., MS Year 3 leads MS Year 2, etc.) providing timely advice from those who were just in the students' shoes. The seminars anchor the program by providing routine contact and communication between senior and junior medical students, promoting mentoring and peer support, and ensuring flexibility and relevancy.

NMS Guides Program

Programs that support peer connection and guidance improve academic performance and provide psychosocial support [3,34–36]. The NMS Guides Program is a near-peer mentoring program layered on top of the NMS Seminar Series, expanding student contact beyond the seminars and strengthening student-to-student connection and communication (Fig. 4). Guides are self-selected senior medical students who volunteer their time, which promotes the *pay-it-forward* mentality that is core to this program's culture. Guides receive formal leadership training that supports their own career development and addresses skills in team building, communicating, and authentic leadership that builds a foundation for future success and leadership in residency and beyond. Junior students reflect on their individual needs and choose their senior guide at an annual Guides Showcase where junior students self-select a senior guide based on shared experience, interests, or goals.

NMS professional networking

The NMS Professional Networking program is an internal socio-professional networking platform that is institution-specific and facilitates organic relationships between students, residents, fellows, faculty, and alumni (Fig. 4). The platform supports virtual connections adding a layer of professional contact at the digital fingertips of students [37]. Currently, the development is a mechanism of matching students with potential mentors through a database which allows users to share their research, personal interests, and opportunities to engage others. The platform provides an open forum for students to seek mentors and vice versa, increasing opportunities for the run-ins.

Results

Initial program evaluation

Feasibility

In the 1st year of this program, eight seminars were scheduled and offered (Table 2). Overall, participation was high with 84 (64%) first-year medical students, 105 (79%) second-years, 54 (43%) third-years, and 49 (44%) fourth-years attending at least one seminar. Follow-up surveys assessing student satisfaction were completed by 89 attendees.

Forty-six (52%) students "strongly agreed," 40 (45%) "agreed," and 3 (3%) were "neutral" when asked "*I learned something during this seminar session that will help me in my approach to medical school.*"

The NMS Guides program was piloted in Spring 2017. Sixty-one first year students were enrolled (47% of MS1 class). They were paired with 23 senior student guides who completed formal leadership training prior to, during, and after the program. A total of 37 guide-mentee meetings occurred (informal communications, including text/phone calls, were not included). Following this pilot, the

Table 2. Seminar series timeline and topics.

Year 1		
1. Early fall	Welcome & transitioning to medical school	
2. Late winter	Planning for a successful summer; Transition between MS1 and MS2	
Year 2		
3. MS2 orientation	Transitioning to a successful second year	
4. Early winter	Planning and preparing for the USMLE Step 1	
5. Late winter	Transitioning to independent USMLE Step 1 study	
Year 3		
6. MS3 orientation	Transitioning to the clerkships	
7. Early winter	Choosing a specialty	
Year 4		
8. MS4 orientation	Preparing for residency: applications & interviews	

program was expanded to the subsequent first-year student class. Seventy-three first-year students (56% of MS1 class) enrolled and were grouped with 22 senior student guides.

Impact on student connection

In this theory-driven intervention, we assessed the impact of NMS on self-reported student-to-student connection. An assessment was distributed school-wide and pre- and post-implementation results compared. The end-of-year survey was completed by 206 medical students (53%), including 77 (60%) first-year, 65 (50%) second-year, and 64 (50%) third-year medical students.

Faculty mentorship was common pre-NMS (66%) and remained after implementation of NMS program (71%) (Fig. 2). Resident/fellow mentorship increased from 16% to 22% and the largest increase in mentors was seen in near-peer mentors which increased from 48% to 63% (Fig. 5). At the end of the first-year of this program, 70% of first-year medical students reported a near-peer mentor, representing a 24% absolute increase (70% vs. 46%) from the year prior and 57% of second-years reported a near-peer mentor, representing a 11% absolute increase (57% vs. 46%) from the year prior (Fig. 5). Faculty mentors were common before (66%) and remained after implementation of the NMS program (71%, Fig. 2).

Impact on self-regulated learning

We assessed the impact of NMS on self-regulated behaviors through the SRLPS and pre- and post-implementation results were compared. Pre- and



Figure 5. Medical student mentorship by academic year, pre- and post-NMS implementation.

post-assessments were completed by 89 students. Total SRLPS among all the participants was not significantly different pre- and post-implementation (mean 155 *vs.* 149, p = 0.53). Overall, levels of self-directedness decreased, however, the decrease reported by those students who gained a near-peer mentor was significantly less than those in the other sub-groups.

In the near-peer mentoring group, 20 (22%) students reported gaining a near-peer mentor, 11 (12%) reported losing a near-peer mentor, 26 (29%) reported never having a near-peer mentor, and 32 (36%) reported having the same near-peer mentor pre- and post-implementation.

Sub-group analysis of students who gained/lost/ never-had/always-had a near-peer mentor demonstrated no significant difference in the planning (p = 0.88), strategy (0.79), and motivation (p = 0.42)sub-scales. However, there was a significant difference in the self-directedness sub-scale (p = 0.01). After Bonferroni correction for multiple comparisons, students who lost a mentor had a 4.3 point greater reduction in their self-directed learning behaviors compared to students who gained a mentor (p = 0.02).

Lessons learned

In many traditional student–faculty relationships, medical students reach out to faculty with interest and energy and are provided with research ideas and career opportunities. The NMS program is unique because students lead, direct, and implement the entirety of the program with faculty providing interest and guidance to empower student-generated ideas. In this model, faculties serve as sponsors and administration as supporters of the student voice. Faculty presence during NMS programming has helped to facilitate sponsorship, provide credibility, and demonstrate commitment to this student-led initiative. This has allowed the NMS Program to stand out from other student-led, non-sponsored programs (e.g., Big Sibling Program, etc).

Coordination with other institutional advising and guidance programs has been critical to reducing redundancy and increasing student participation. To facilitate this, NMS leadership meets with the Office of Student Services twice per year to coordinate schedules, identify opportunities to combine institutional with NMS meetings, and facilitate integration of NMS into the curriculum.

High-rates of leadership turnover have at times put the student-led spirit and initiative at risk. Faculty advisors provide stability from year-to-year providing more advising during handoff periods and less oversight in between. Student leaders continue to ensure program flexibility while faculty advice helps put new initiatives in the context of prior programs. Identifying supportive faculty advisors that have displayed this leadership style has helped to accomplish this. At the same time, early identification of junior students interested in contributing and leading the NMS program is essential to sustainability. Interested junior students are invited to NMS leadership meetings and meet with individual members of the NMS leadership to discuss their goals and identify a role that is consistent with their interests.

The ongoing success of the NMS student initiative lies in harnessing student energy. A powerful method of harnessing student energy is to consolidate efforts under a single mission [38]. In the NMS program, this mission is the fostering and facilitation of a "pay-it-forward" culture among students. Aligning student leadership with a central vision empowers students with a clear direction and ensures that potential conflicts are superseded by the group's larger mission.

Discussion

The NMS Program is an innovative student-led, grassroots initiative designed to address the changing LE by arming students with the tools to navigate medical school's challenges and successes. The NMS program facilitates the development of an individualized medical school compass that includes faculty mentors, near peer guides, colleague supporters, and family/friends (Fig. 3). The NMS program was feasible and heavily used by the student body. A total of 292 (60%) students attended at least one seminar, 134 (52%) first- and second-year medical students enrolled in the NMS Guides program and were matched with 45 third- and fourth-year students. The NMS program was led by a team of 17 third- and fourth-year medical student directors and leaders. In just one year of this program, students reported increasing connection demonstrated by increased near-peer mentorship.

The NMS program is a PAL program. PAL programs benefit from social and cognitive congruence. Social congruence is the ability to create a safe and open environment and relationship with students through informal and empathetic communication [39]. Cognitive congruence occurs when learners share similar knowledge bases and are able to connect with each other on a fundamental way based off their shared experience [40]. Near-peers are the experts in NMS. They were just in the shoes of the junior students and are able to anticipate challenges and transitions that junior medical students may face and understand the key components of successfully navigating them. The ability of near-peers to anticipate these problems, identify key components, and communicate with junior students at the "right-level" results in social and cognitive congruence [39].

The NMS program is a feasible model for student-led initiatives to strengthen the learning environment and improve student navigation and connection at other institutions. While longer-term follow-up and expansion of the program at other institutions are needed, it can be reasonably inferred that the high levels of voluntary participation in this program across all four years of medical school reflect strong buy-in to the pay-it-forward culture among our students. Pay-it-forward cultures foster generosity between strangers through a "social contagion" mechanism in which receiving and observing generous behavior increases the likelihood of extending generosity to others [41]. "Giving" cultures have been critical to the rapid and sustainable success of Silicon Valley entrepreneurs and is a central ethos of top-tier business schools [42,43]. The success of this student-led program is, in large part, due to the considerable energy and effort of the senior medical students and will be important if this program is considered in other settings.

The NMS program impacted medical student mentoring in its first year. The implementation of a student-led near-peer mentoring program increased peer mentoring between senior and junior medical students and promoted self-directed learning, which is associated with high-academic performance. [16,44–47] Senior medical students recognize the value of shared experience and were eager to serve as near-peer mentors to junior medical students in either the NMS Guides program or the NMS Seminar series. The benefits and importance of near-peer mentors are reflected in the high rates of medical student participation in this program.

Interestingly, third-year medical students reported the highest rates of resident/fellow mentors, 34% versus 14% and 13% among first- and second-year medical students, respectively. This reflects a change in the mentoring needs of medical students as they progress through training. Senior medical students have a much lower threshold to reach out and engage potential faculty and resident/fellow mentors than junior medical students in their preclinical years. By increasing communication and connection between junior and senior medical students through the NMS program, senior medical students are able to continually reinforce and recommend reaching out to faculty and resident/fellow mentors early on in medical school. Pre-clinical medical students may value near-peer mentoring as they adjust to the demands of medical school and senior medical students may value resident/fellow mentoring as they begin to approach the next phase in training.

In order to assess the effect of near-peer mentoring on student performance, we evaluated the impact of student mentoring on self-regulated learning behaviors. Self-regulated learning refers to the process of setting goals and self-generating thoughts and behaviors to systemically accomplish them. These behavior patterns are consistently associated with high-achieving students. [5,44,45,47–49] Our hypothesis, was that students who benefit from improved peer connection and mentorship through this program would demonstrate higher levels of self-regulated learning as assessed using SRLPS. A key finding was that students who lost a near-peer mentor demonstrated significantly greater drop in self-directedness which was not seen for those who gained a near-peer mentor. This suggests that one impact of student mentoring is fostering self-directed learning behaviors. This is supported in the literature [15,50-52].

Future directions include further evaluation of the impact of the NMS Program on the LE, medical student culture, and self-regulated learning and academic performance. The program has developed a collaboration with the North Carolina Medical Society and will offer formal leadership workshops grounded in the Insights Discovery (Austin, TX) Program that will enhance the quality of leadership training NMS leadership and Guides receive. This is anticipated to provide them with the tools to lead other students and the foundations for leadership in residency. An online platform for professional networking is currently in beta-testing; implementation is planned in the 2018–19 academic year.

Limitations

The results in this study represent the initial evaluation of a student-led program to improve the LE. There are four limitations to consider. One, completion of the post-seminar surveys was voluntary, resulting in selection bias. Completion of post-seminar surveys has been encouraged by allowing for time at the end of each seminar for

participants to complete the survey before leaving as well as offering an incentive. Second, we were unable to evaluate those students who attended one seminar, but did not attend others. This has been addressed by development of a more robust attendance tracking system able to accommodate the high rates of student participation. Third, while few curricular changes occurred during this period, we cannot entirely exclude that the changes in social connection reported in this study were not related to other unmeasured factors. Fourth, the SRLPS is an indirect indicator of student performance. Self-regulated behaviors are strongly associated with high-achieving students, and the effect of increased near-peer mentoring and self-regulated behaviors in association with academic performance will be assessed in future studies

Conclusions

The NMS Program is a student-led, faculty-supported initiative to address the changing learning environment. The NMS program facilitates the development of an individualized student navigational "compass" consisting of a (1) faculty mentor, (2) near-peer guides, (3) colleague support, and (4) friends and family. Through the use of a layered approach consisting of the NMS seminar series, NMS guides program, and the NMS networking platform, this program facilitates student-to-student connection and the development of individualized navigational compass. This program improves the student experience by engaging students in a "pay-it-forward" program that promotes a culture of peer support and mentoring. The NMS program serves as a feasible student-led, faculty-supported model to address the changing learning environment at other institutions.

Declarations

Acknowledgments

The author would like to thank the Jennifer Mroz in the Office of Instructional Design and Educational Solutions at Wake Forest School of Medicine for assistance with the graphics.

Competing interests

The authors declare that they have no competing interests.

Funding

Funding to support the NMS Program was provided by the Wake Forest School of Medicine Department of Counseling and Wellness Services and a Gold Humanism Honor Society Chapter Grant from the Arnold P. Gold Foundation. This funding was used to support the development and implementation of this program and its evaluation.

Consent for publication

Not applicable.

Ethics approval and consent

This study, including its compliance with ethical guidelines and consent process, was approved by the Wake Forest University Institutional Review Board.

Availability of data and material

The datasets generated and analyzed during the current study are not publicly available but are available from the corresponding author on reasonable request.

Authors' contributions

TC and RS conceptualized this program and the current study and were responsible for drafting of the manuscript. All authors read and approved the final manuscript and were instrumental in the development, implementation, and evaluation of this program and the current study.

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