Using Design Thinking to Explore Rural Experiential Education Barriers and Opportunities

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ABSTRACT

INTRODUCTION: Design thinking is a creative problem-solving framework that can be used to better understand challenges and generate solutions in health professions education, such as the barriers to rural education. Rural education experiences can benefit students, providers, and patients; however, placement in and maintenance of rural education experiences offer unique challenges. Design thinking offers strategies to explore and address these challenges.

METHODS: This study used a design thinking framework to identify barriers of student placement in rural locations; this was accomplished using strategies to empathize with users (e.g., students, practitioners, and administrators) and define the problem. Data were collected from focus groups, interviews, and a design thinking workshop. Design activities promoted participant discussion by drawing pictures, discussing findings, and creating empathy maps of student experiences. Qualitative data were analyzed to identify salient barriers to rural experience selection and opportunities for support.

RESULT: Focus group (n = 6), interview (n = 13), and workshop participants (n = 18) identified substantial advantages (e.g., exposure to a wider variety of patients, less bureaucracy and constraints, more time with faculty) and disadvantages (e.g., isolation, lack of housing, and commuting distances) of rural experiences. Participants identified physical, emotional, and social isolation as a significant barrier to student interest in and engagement in rural experiences. Workshop participants were able to generate over 100 ideas to address the most prominent theme of isolation.

DISCUSSION: Design thinking strategies can be used to explore health professions education challenges, such as placement in rural settings. Through engagement with students, practitioners, and administrators it was identified that physical, social, and emotional isolation presents a significant barrier to student placement in rural experiences. This perspective can inform support systems for students, preceptors, and communities that participate in rural educational experiences.

KEYWORDS: design thinking, rural education, experiential education, creativity, methodology

RECEIVED: September 28, 2021. ACCEPTED: January 13, 2021.

TYPE: Original Research

FUNDING: The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This project was funded, in part, by a 2018 North Carolina AHEC Campus Innovation Grant: the findings do not necessarily reflect the policies or views of AHEC.

DECLARATION OF CONFLICTING INTERESTS: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Introduction

The practice context: Challenges in rural education

Health disparities in rural populations remain a significant obstacle in the United States.¹² Rural practice sites have been recognized as prime locations to address social determinants of health and other factors that can adversely impact access to and provision of care, especially when these sites are used for health professions education.³⁴ Placement of learners in rural settings has been associated with higher student satisfaction scores, greater exposure to a wide array of experiences, multidisciplinary engagement, and opportunities to learn about other cultures.⁷⁸ It can also promote interest in and understanding of careers in rural communities for health professions students while encouraging practitioners to continue practicing in those areas.⁷⁻¹³

Despite the apparent benefits of rural healthcare and rural experiential education, numerous challenges plague healthcare practice in these communities. Rural healthcare providers report limited facility resources, reduced access to specialty services, community stigma around healthcare, and few health promotion policies.¹⁴¹⁵ Similarly, experiential placements are often limited due to lack of student housing, excessive driving distances, and lack of student interest.¹⁶¹⁷ Previous international research has identified significant barriers to rural placements such as student concerns about isolation, limited opportunities for career advancement, negative social attitudes toward rural health, and shortages of clinical teachers/
preceptors. Strategies that have been evaluated to address these challenges include creating longitudinal integrated clerkships in rural settings and engaging community partners to support learners.22-27

Ensuring rural sites are effectively utilized for experiential placements requires understanding of the factors that influence the appeal of rural settings and engaging with communities to identify opportunities to support learners in these settings. For these reasons, placement and engagement of learners in rural experiences can be considered a complex problem for some institutions—one that appears insurmountable because it involves a large number of individuals, requires a significant number of resources, or it is interconnected with other problems.28,29

A methodological approach: Design thinking for creative problem-solving

To address complex problems, creative problem-solving frameworks—such as design thinking—are highly valuable because they offer a mindset and collection of strategies to systematically gather, analyze, and utilize data to inform novel solutions. Design thinking is a problem-solving framework widely applied in other disciplines with growing value in healthcare and medical education.30-33 It offers a diverse set of adaptable problem-solving and idea generation processes that can help participants optimize their approach to ill-defined problems, develop a more creative mindset, and foster interdisciplinary exploration.34,35

A growing body of research highlights the benefits of design thinking for solving challenges in healthcare and health professions education. Studies using design thinking as a framework for problem solving have demonstrated improved patient outcomes, enhanced student learning, improved institutional efficiency, and increased satisfaction.30-33 Design thinking focuses on addressing the human experience and reimagining our approach to everyday problems we encounter. This approach creates a heightened awareness of learner needs and allows participants to better identify the problems people experience and perceive.

The study: Using a different approach to explore practical concerns

In this research, we present a different method—the design thinking framework—to explore a practical concern—barriers associated with rural learning experiences and community partners. Specifically, we aimed to empathize with rural education stakeholders (eg, learners, practitioners, administrators), better understand local challenges associated with rural experiential education, and generate novel solutions that could address these challenges. This study is organized around contributions and implications of using the design thinking framework in the context of a studying rural education, which offers some practical contributions.

Methods

Setting and participants

This study was structured in 3 phases that paralleled components of the design thinking framework. Phase 1 focused on empathizing with students to better understand their perspectives and experiences through a focus group. Phase 2 aimed to define the challenge, which required insights from students (phase 1) and additional perspectives through interviews with rural practitioners and experiential education faculty/administrators. Phase 3 centered on idea generation by engaging stakeholders in creative problem-solving techniques during a workshop. A summary of the phases, participants, and methods is provided in Figure 1.

For each phase, we used purposeful sampling procedures, specifically criterion sampling, as it was important that the participants had direct knowledge about or experienced learning in rural settings.36,37 The research team relied on their professional relationships and knowledge of the state’s healthcare system to compile a list of prospective participants who completed practice experiences in rural locations or practice in rural locations currently. To draw a convenience sample, the researchers corresponded via email with people that met the criteria for each phase. The researchers then asked those participants to snowball the sample by identifying additional study participants that they believe met the criteria for the study. Participant identities were not shared with others by the researchers and participants were asked to keep referrals confidential. No incentives were provided for participation.

Data collection and analysis

The data collection and analysis process are described according to phase. All data were collected by research team members MW and JM who were not directly involved in teaching, implementing or managing experiential education rotations—their expertise focuses on conducting educational research within the health professions schools. All study procedures were approved by the University of North Carolina Institutional Review Board (IRB #19-1381).

Phase 1—Empathize (focus group). The first phase of the research focused on empathizing with the user, which includes understanding student perspectives and experiences in rural education. To accomplish this phase, students across health professions schools (ie, medicine, pharmacy, nursing, and dentistry) were recruited to participate in a 60-minute focus group. Participants completed a brief survey at the beginning of focus group, which included questions about their exposure to rural experiences and criteria they considered when selecting learning experiences. Participants were then asked to draw a picture of what came to mind when thinking about “rural education.” Having participants draw a picture is a common design thinking strategy that helps participants collect their thoughts and articulate their feelings.38,39 Participants shared and explained
Figure 1. Summary of study phases, participants, and methods using design thinking as a framework to explore rural experiential education challenges.
do, and say while they were at the assigned rotation. These ideas were placed on sticky notes to populate a larger board that grouped ideas. A short debrief reviewed the comments and identified the most significant challenges based on the providers’ perspectives. Workshop participants also received the 1-page summary of the interview and focus groups findings and they commented on their agreement with the findings. Photos of the empathy maps and a list of significant challenges were recorded as artifacts of the discussion and a compilation of the sticky notes were documented as evidence of the conversation.

Next, participants completed a design thinking activity around brainstorming potential solutions to the identified challenges. Individuals were requested to select several challenges and generate as many solutions as possible to address the challenge. Rules for the brainstorming process focused on the quantity of ideas rather than the quality and individuals were encouraged to think of ideas regardless of funding potential or implementation concerns. Ideas were put on individual sticky notes and placed onto boards where participants as a collective could review and group similar solutions. The list of ideas were documented as evidence of the conversation and summarized in a 1-page document. The document was distributed to workshop participants after the event to confirm the findings; the member checking of the results was done to provide feedback if the findings were inaccurate or incomplete.41

Results

Phases 1 and 2—Empathize and define (focus group and interviews)

Six students from medicine (n = 1), pharmacy (n = 3), nursing (n = 1), and dentistry (n = 1) participated in the focus group session. Five students identified as female (83.3%) and participants were a median age of 23 years (range 22-35 years). All participants indicated they were somewhat or very interested in completing rural rotations; only 1 student (medicine) had completed a rural rotation and 1 student (pharmacy) had a rural rotation scheduled. None of the students reported spending more than 50% of their time residing in a rural location.

Thirteen practitioners and experiential education faculty/administrators participated in the one-on-one interviews; 10 participants identified as female (76.9%) with a median age of 43 years (range 31-66 years). The interviews included physicians (n = 1), pharmacists (n = 4), nurses (n = 1), dentists (n = 4), and 3 staff members who assisted the school of medicine with experiential education. Six participants (46.2%) reported spending more than 50% of their time residing in a rural location and 4 (30.7%) worked in a rural location at the time of the interview. Of the 10 practitioners interviewed, 5 (50%) completed rotations in rural locations during school and 2 (20%) completed postgraduate training in a rural location.

Figure 2 includes example pictures drawn by participants depicting their perceptions of rural education. When describing their picture, participants often focused on scenic locations (eg, the mountains, beach, fields, etc.) and various attributes about the locations such as a sense of community, intense familial connection, economic decline, and physical isolation. There were several references to health-specific features such as opioid abuse, obesity, food scarcity, severe health disparities, poor health literacy, and limited access to care.

When asked about explicit advantages and disadvantages related to rural education experiences, focus group and interview participants highlighted positive features that may make rural experiences more appealing while also identifying disadvantages that could be addressed to improve student experiences or interest.

Figure 2. Sample drawings from focus group and interview sessions where participants were asked to draw “What comes to mind when you think of rural education?”.
in rural placements (Table 1). Examples of advantages included potential to make greater impact, exposure to wider variety of patient and payer mix, less bureaucracy and constraints, and more time with faculty/preceptors. Examples of disadvantages included isolation from other students/people, lack of housing, greater commuting distances, and perceptions of residency programs.

When asked to identify the most pertinent barriers to rural experiences, isolation was the prevailing theme. Participants described physical, social, and emotional isolation as a significant factor that made these experiences unappealing. An additional theme included a concern about the lack of resources, especially if students were used to having access to specialists and specialty equipment in more urban locations. Faculty and practitioners also discussed observations of learner misconceptions regarding the types of experiences, challenges, and resources present in rural settings; their concern was that students may have inaccurate perceptions about rural experiences and their value.

In a survey of factors associated with rotation selection, students and practitioners consistently selected site location, diversity of experiences, and travel distance as the most important factors students consider (Table 2). Of note, practitioners and workshop participants rated rotations in a specialty of interest as being very important to student rotation selection (n = 11, 91.67%), however, only 1 student (16.7%) rated this as very important.

### Phase 3—Idea generation (workshop)

Eighteen individuals attended the design thinking workshop; 13 participants identified as female (77.8%) with a median age of 33 years (range 24-51 years). The workshop included 14 participants from pharmacy (77.8%), 2 participants from medicine (11.1%), and 2 participants from dentistry (11.1%)—all participants were faculty and staff who work in MAHEC, except for 1 pharmacy student. Nine participants (50%) worked exclusively in a rural setting and 11 participants (61.1%) have spent at least 50% of their life residing in a rural location. Twelve participants (66.7%) completed a rural rotation as a student and 4 participants (22.2%) completed postgraduate training in a rural location.

During the workshop, participants created an empathy map as a group (Figure 3) that explored the thoughts, feelings, sights, sayings, and actions of students who may be assigned to a rural experience. The compiled notes were reviewed as a group to identify salient features that made up the experience (Figure 3). The results were consistent with findings from the focus group and interviews, which identified isolation as the most pertinent barrier to engaging in rural education. For example, the empathy map showed students may feel “out of place” and “disconnected” and may think “I miss my family” and “my beliefs are different than theirs”. This served as the focus for subsequent activities in the workshop focused on brainstorming strategies to address feelings of isolation in rural experiences. Over 130 ideas were created and discussed by the teams as possible solutions to address the challenge (Table 3)—major themes included strategies to enhance student housing, transportation, opportunities to connect with the community, and opportunities to connect with the sites, students, and other professions.

| ADVANTAGES OF RURAL EXPERIENCES | DISADVANTAGES OF RURAL EXPERIENCES |
|----------------------------------|-----------------------------------|
| • Potential to make a greater impact | • Isolated from other students / people |
| • Greater appreciation of services | • Limited specialties |
| • Greater necessity for “outreach” | • Limited resources & luxuries |
| • Variety of patient & payer mix | • Lack of housing |
| • Breadth of scope of practice | • Greater commuting distances |
| • Greater independence/autonomy | • Unfamiliar sites |
| • More problem-solving skills utilized | • Political disagreements |
| • More “realistic” experiences | • “Feeling like an outsider” |
| • Scenic environment & activities | • Disconnected from the institution |
| • Less bureaucracy & constraints | • Not “up-to-date” (eg, paper charts) |
| • More team-based activities | • Boredom |
| • “Closer to the patient” (fewer layers) | • Requires a certain “type” of student |
| • Greater balance outside of rotation | • May look bad to residency programs |
In this study, we applied the design thinking framework to showcase how it can be applied to address practical concerns in health professions education. One complex problem is understanding and addressing barriers to rural experiential education to make these experiences more appealing. This study used a 3-phase design thinking approach to engage learners, preceptors, practitioners, and administrators to

### Table 2. Factors considered to be “very important” to the student rotation selection process, by research phase.

| SELECTION FACTORS                          | PHASE 1: STUDENT FOCUS GROUP (N=6) | PHASE 2: PRACTITIONER & ADMINISTRATOR INTERVIEWS (N=12)* | PHASE 3: WORKSHOP PARTICIPANTS (N=18) |
|--------------------------------------------|------------------------------------|---------------------------------------------------------|----------------------------------------|
| Site location                              | 6 (100)                            | 9 (75)                                                  | 11 (61.1)                              |
| Diversity of rotation experiences          | 6 (100)                            | 7 (58.3)                                                | 10 (55.6)                              |
| Travel distance                            | 5 (83.3)                            | 6 (50)                                                  | 12 (66.7)                              |
| Diversity of the patient population        | 4 (66.7)                            | 5 (41.7)                                                | 9 (50)                                 |
| Complexity of patient care                | 4 (66.7)                            | 5 (41.7)                                                | 9 (50)                                 |
| Networking                                 | 3 (50)                             | 5 (41.7)                                                | 8 (44.4)                               |
| Future employment potential                | 3 (50)                             | 4 (33.3)                                                | 7 (38.9)                               |
| Housing options                            | 2 (33.3)                            | 6 (50)                                                  | 6 (33.3)                               |
| Cost of housing                            | 2 (33.3)                            | 6 (50)                                                  | 11 (61.1)                              |
| Activities outside of rotation             | 2 (33.3)                            | 4 (33.3)                                                | 8 (44.4)                               |
| Preceptor background                       | 2 (33.3)                            | 4 (33.3)                                                | 10 (55.6)                              |
| Difficulty of rotations (easy / hard)      | 2 (33.3)                            | 1 (8.33)                                                | 6 (33.3)                               |
| Previous relationships with sites          | 1 (16.7)                            | 4 (33.3)                                                | 6 (33.3)                               |
| Parking                                    | 1 (16.7)                            | 3 (25)                                                  | 1 (5.6)                                |
| Rotations with a specialty of interest     | 1 (16.7)                            | 11 (91.7)                                               | 12 (66.7)                              |
| Proximity to friends or family             | 0 (0)                              | 5 (41.7)                                                | 6 (33.3)                               |

*One participant who completed the interview did not finish the survey.

Discussion

In this study, we applied the design thinking framework to showcase how it can be applied to address practical concerns in health professions education. One complex problem is...
Table 3. Workshop participant ideas for solutions to address student isolation.

| HOUSING & COMMUTING | CONNECT WITH FAMILY & FRIENDS |
|---------------------|-------------------------------|
| Host/foster family (preceptor & non-preceptors) | Stipend for family/friend visit around midpoint |
| Exchange student program (rural & urban) | Provide video-talk technology (more advance than Facetime) |
| Airbnb room arrangements | Arrange for better internet to allow for connections & services |
| IPE housing (multiple disciplines together) | |
| RVs | |
| Tiny houses (on someone’s property) | |
| Car pools (professionals or community members) | |
| Bikes available at the location | |
| Housing midway between sites & larger cities | |
| Collaboration with nursing homes or local bed & breakfasts | |

| WELLBEING |
|-----------|
| Therapy animals (dogs, cats, horses, etc.—may reside in housing) |
| Create a dating service |
| Provide a gym membership |
| Help them find work, life, and family support, if needed |
| Preceptor development on how to emotionally support students |
| Provide a workshop for students to prepare for culture |

| CONNECT WITH THE COMMUNITY | CONNECT WITH PERSONNEL & STUDENTS |
|---------------------------|----------------------------------|
| Identify a community liaison to “follow” or attend events | “Match” students prior to placement |
| Encourage participation in community events | Have multiple students at a site together (especially from multiple professions) |
| Assign reading the local newspaper or listen to radio | Place more students in rural sites (eg, required experiences) |
| Community champion / “cruise director” for the region to support connections | Use ECHO, Zoom, or video conferencing to connect learners |
| Community resource guide of events & activities | Connect students & practitioners across sites |
| Arrange community service & volunteer events | Create an online network for students to connect (eg, “HAM” radio network) |
| Community treasure hunts | Create online network for practitioners to share resources/ ideas |
| Integrate community days into the experience | Practice site game night |
| Organize monthly community events (eg, potluck, social, festival) | Gift cards/stipends for preceptor-student lunch |
| Have a community board of events at the site | IPE events (eg, group hikes, paint ball, weekend trips, laser tag, water balloons) |
| Create activities that relate to the community/helping them | Create a google doc of ideas (student & preceptor maintained) |
| Game night at site, invite community | IPE mixers |
| Get involved in local community groups (music, political, etc.) | Give students an idea of what your life is like outside of work |
| Regular longitudinal service opportunities in rural setting | Create recreational teams / intramural sports (eg, connect with UNC-A teams or local leagues) |
| Regular longitudinal social/network opportunities | Students from urban sites spend a day at rural sites (e.g. Mission students in rural sites occasionally) |
| Recruit community champion to welcome/intro student | Student prepared “immersion” video |
| Shadowing member of community in day to day life | Students share stories of their experiences |
| Video of the services offered | Talk about different resources (healthcare or other) available in the community |
| Videos of + stories (patients, providers, students) | Weekly meet-up groups of health profession learners in same rural areas |
| Volunteer community “ambassador” | Video blog or social media platform to share and collect their experiences |
| Learn about community you’re going to prior to going | Create learner affinity groups |
| Connect multiple practice sites / communities together | Create longitudinal practice experiences in rural sites |
| Welcome lunch w/patients & providers & students | Arrange meals or events with the provider teams |
| “Wall of fame”/community wall about history, patient stories | Have student mentors who have done the rotation before |
| Create a welcoming committee to organize activities | Create strategies to conduct patient handoffs between students |
| Work with local organizations to create experiences | Student hand-offs (previous student shares tips/experiences with incoming students) |
| Mentorship program with non-health care leaders in community | Biltmore passes that students + preceptors can use |
| Private/community “podcast”?/Vlog that includes people, students, & practitioners | Students do or learn with their preceptor (have a list of ideas - dance, photography, improv, etc.) |
| Provide a tour of the community (eg, food tour, biking tour) | |

better understand the challenge and brainstorm possible solutions as partners.

Methodological contributions

This research contributes to a small, yet growing, body of literature in the health professions education literature that used design thinking as a framework for creative problem-solving.32 Engagement with relevant stakeholders and users is a useful strategy to explore complex problems and generate viable solutions—that is the foundation of design thinking. Student interest and engagement in rural education represents a complex problem in health professions education and requires problem solving strategies focused uniquely designed to address.
complex issues. Design thinking was used in this study to better understand stakeholder perspectives about rural education. The strategies employed in this study represent a few design thinking strategies that can help researchers empathize with their users, define the specifics of a problem, and generate possible solutions. Empathy mapping and drawing activities, for example, were used to help disassemble the user experience (ie, student and practitioner perspectives) with specific prompts. This is a unique benefit of design thinking—that various data collection and analysis strategies can be employed depending on the question to be addressed.34,35 The study was also beneficial as it corroborated findings across 3 groups of participants using design thinking strategies that incorporated qualitative and quantitative data to describe barriers to placement in rural experiences. Triangulation of the results across 3 different stakeholder groups helped support validity of the findings.

**Practical contributions**

Findings from the focus group, interviews, and workshops corroborated similar barriers to student placement in rural experiences in international research.8,12,18-21 Notably, the most common barrier identified among the groups was the concern of physical, social, and emotional isolation. Participant drawings of rural experiences, for example, often depicted isolation through images of long driving distances, abundant landscapes, and large distances between described resources. Moreover, participants shared that students can easily feel lost or disconnected in these practice settings, especially if they are accustomed to more urban locations. This finding was consistent with research of health professions students that described isolation as a significant barrier to rural placement along with concerns of career advancement, concerns about learning opportunities, negative social attitudes toward rural health, as well as shortages of clinical teachers and preceptors.8,12,18-21

In addition, the results aligned with previously reported findings that rural experiences provide a positive benefit for students, providers, and patients in those regions.3-8 For example, participants shared these experiences grant students greater autonomy, foster adaptability, and allow for a greater patient impact. These advantages should be highlighted when recruiting students to these spaces and may be marketed as unique features that cannot be obtained in urban settings, where applicable. Of note, there were some concerns by practitioners and staff that students may have misconceptions about rural experiences and the populations that reside in those settings; these misconceptions—such as the availability of resources, the diversity of patient populations, and the quality of care—may be an instrumental area of focus. Third- and fourth-year pharmacy students participating in a rural placement program in Australia identified interprofessional interaction with other team members and fellow students as one of the key factors to satisfaction to their program;12 others have suggested this as an important opportunity to make these experiences more valuable.22 These findings suggest that certain types of interactions may help overcome feelings social and professional isolation.

**Limitations and future research**

While the findings corroborated and expanded upon previous research regarding rural experiential education there were several limitations to this study. First, the study focused on a relatively small sample of students and practitioners associated with rural health professions education in North Carolina, which may limit generalizability. However, the methods used for collection and analysis provided a unique perspective on relevant information to the challenge and promoted trustworthiness of findings. The research also demonstrated how community engagement can be stimulated in rural clinical education.26,27 Second, the proportion of various health professionals engaged were not representative of the health professions workforce and did not include all professions involved in rural healthcare. Of note, accessibility and availability of participants in these regions for the study was a challenge. As such, the results from this study should not be extrapolated to assume that all health professions or rural communities experience similar barriers to rural education placement. Third, the work focused on the early phases of design thinking (ie, inspiration, ideation) and did not include the implementation or evaluation of identified solutions. Although currently outside the scope of this study, evaluating the effectiveness of any implemented solutions would be critical for further illustrating the utility of design thinking.

This study offers an example of how design thinking can be used as a framework to explore practical concerns, such as challenges with rural experiential education. From a methodological perspective, additional research should evaluate how design thinking can be used to define other health professions education challenges, generate solutions, and test prototypes of those solutions. From a rural education perspective, future research should explore whether the barriers identified here are applicable to other rural locations (eg, do all rural communities have similar limitations), and consider how the design thinking framework can further support the identification and design of solutions to complex problems within rural education and beyond. Future research should explicate how different types of participants (eg, participants from urban settings, non-US nations) experience rural settings based on their own experiences and positionalinity.

**Conclusion**

This research provides an example of how design thinking can be used as a framework to explore complex problems in health professions education. In this example, the barriers to rural education were explore using a 3–phased approach. Physical, social, and emotional isolation were identified as a significant barrier to learner placement in rural educational experiences. These barriers and opportunities to support learners in rural locations were explored through design thinking, which helped to engage relevant stakeholders and community partners in the process.
Authors’ Contributions
Each author has made substantial contributions to both the conception and design of the article and draft the article or revising it critically for important intellectual content. All authors have read and approved the manuscript. MW was responsible for study design, workshop development, data collection, data analysis, and creation of the manuscript. JM was responsible for obtaining funding, study design, workshop development, and review of the manuscript. DH was responsible for reviewing study design, workshop development, and review of the manuscript. CW and SK were responsible for reviewing study design and review of the manuscript.

Ethics Approval and Consent to Participate
This study was reviewed and approved by the University of North Carolina Institutional Review Board (IRB 19-1381). All participants provided verbal and written consent to their engagement in the study and the publication of their data.

Consent for Publication
All participants provided verbal and written consent to their engagement in the study and the publication of their data.

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Availability of Data and Materials
The datasets generated and/or analyzed during the current study are not publicly available but are available from the corresponding author on reasonable request.

Supplemental Material
Supplemental material for this article is available online.

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