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EDITORIAL

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Thank you to the *Journal of the Medical Library Association* reviewers in 2024

Jill T. Boruff, AHIP; Michelle Kraft, AHIP, FMLA; Alexander J. Carroll, AHIP

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A decade of Does: celebrating the 125th anniversary of MLA through an annual meeting conversation with past Janet Doe lecturers

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See end of article for authors' affiliations.

At the Medical Library Association (MLA) 2024 Annual Meeting in Portland, Oregon, the Janet Doe Lectureship Series plenary session featured a panel of past Doe lecturers from the last decade. Reflecting on their lectures they were challenged to imagine how the Association's Core Values could guide and inform decision making in response to current and emerging challenges to the profession and in the environment. Panelists' reflections included themes of inclusivity, collaboration, leadership, technology, space planning, and the role of medical librarians in addressing issues of mis- and disinformation, bias, equity, and open access, today and in the future. Common themes included the centrality of collaboration as a necessary component of health sciences librarianship, and the ongoing criticality of the profession's commitment to ethical practices. The panelists shared insights on how MLA's Core Values can guide the profession and association through the challenges and opportunities of the evolving healthcare and information landscape, including the rise and the rapid evolution of advanced technologies.

Keywords: Medical Library Association, History; Janet Doe Lecture; Ethics, Professional; Libraries; Leadership; Diversity, Equity, Inclusion; Health Equity; Technology; Open Access Publishing

INTRODUCTION

The Janet Doe Lectureship series was established in 1966 to honor Janet Doe, former librarian of the New York Academy of Medicine and past Medical Library Association (MLA) president. The series aims to recognize individuals for their unique perspectives on the history or philosophy of medical librarianship. The Lectureship is a standing plenary session as part of the MLA Annual Meeting, featuring a single committee-vetted speaker nominated by association membership. Since 2022, the Annual Meeting has been a hybrid in-person and online meeting.

For 2024, circumstances necessitated a change in the standard single speaker format and instead featured panel presentations from lecturers from the last 10 years. The session was moderated by a library director colleague, J. Dale Prince, who introduced the panelists and led the question-and-answer period following the panelists' initial comments.

This article describes and summarizes the perspectives shared by the panelists. Given as a prompt before the session, panelists were asked to reflect on their lectures and address how MLA Core Values could guide and inform decision-making in response to current and emerging challenges to the profession and in the environment. Panelists were given the option to pre-record a video of their comments; one did. Panelist comments were limited to five minutes or less. The session was organized as a conversation, and panelists responded to questions from the in-person and virtual audience.

PANELISTS

J. Dale Prince served as moderator. Panelists included:

- Margaret Bandy, AHIP, FMLA (Doe Lecturer 2014 https://pmc.ncbi.nlm.nih.gov/articles/PMC4279930/);
- Barbara Epstein, AHIP, FMLA (2015 https://pmc.ncbi.nlm.nih.gov/articles/PMC4722639/);
- MJ Tooey, AHIP, FMLA (2016 https://pmc.ncbi.nlm.nih.gov/articles/PMC5234446/);
- Elaine Russo Martin, FMLA (2018 https://pmc.ncbi.nlm.nih.gov/articles/PMC6579597/) represented by Tooey;
- Gerald Perry, AHIP, FMLA (2019 https://pmc.ncbi.nlm.nih.gov/articles/PMC6920003/);

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- Chris Shaffer, AHIP, FMLA (2020 https://pmc.ncbi.nlm.nih.gov/articles/PMC7772973/);
- Sandra Franklin, AHIP, FMLA (2021 https://vimeo.com/1035668889/f00e05408c?share=copy);
- Michael R. Kronenfeld, AHIP, FMLA (2022 https://pmc.ncbi.nlm.nih.gov/articles/PMC10259618/); and
- Michelle Kraft, AHIP, FMLA (2023 https://pmc.ncbi.nlm.nih.gov/articles/PMC11189140/).

The panelists spoke in chronological order based on the date of the receipt of their award of the Doe Lectureship.

PANELIST PRESENTATIONS

Margaret Bandy focused on pivoting for a more inclusive and collaborative MLA. She discussed the concept of pivoting encouraging hospital librarians to confront challenges and find new ways to thrive in their organizations. She referenced a meditation by Deng Ming-Dao [https://dengmingdao.com], emphasizing the need to change one's life and form new paths. She shared her experience of collaborating with healthcare professionals and moving outside library walls, inspired by MLA Past Presidents Elaine Russo Martin and Jane Blumenthal.

Leadership qualities informing the past, present, and future of MLA were addressed by Barbara Epstein. For her 2015 lecture, oral histories of MLA presidents were reviewed to identify recurring themes and lessons for contemporary practitioners. Generational shifts in the profession and the importance of collaboration and group work in achieving organizational goals were noted. She shared her experience on a task force identifying MLA notables and the realization that in recent years the work of the association is mostly advanced by groups rather than individuals. The foundational role of MLA values in guiding professional leadership and decision-making were emphasized by M.J. Tooey within the context of the qualities of past and contemporary MLA leaders. Tooey highlighted the need for medical and health sciences library leaders in embracing and modeling MLA values, especially in the context of artificial intelligence (AI) and related advanced technologies. She challenged attendees to boldly embrace and live MLA values in their leadership roles, emphasizing the importance of integrity and collaboration.

Elaine Russo Martin was unable to attend the meeting but shared her presentation with Tooey before the session. Tooey spoke on Martin's behalf. Martin addressed the concept of spatial justice and its importance in library renovation projects. She shared her experience leading a multi-year, multi-million-dollar renovation of the Harvard University Countway Library of Medicine [https://countway.harvard.edu/renovation], incorporating social justice ideals into the newly renovated space. The importance of community dialog, environmentally friendly building materials, biophilia, accessible spaces, inclusive seating, and engaging diverse voices in library design were stressed. She underscored the role of library spaces in promoting inclusivity, accessibility, and community engagement.

The importance of ethics and health equity in advanced health information technologies were discussed by Gerald (Jerry) Perry. He focused on the need for librarians to address potential biases in AI and other advanced technologies and to advocate for equity in their application. Perry shared his involvement in the Mobilizing Computable Biomedical Knowledge (MCBK) movement [https://mobilizecbk.med.umich.edu] and the importance of centering equity in health information technology. He encouraged attendees to engage in MCBK-related work and to consider the ethical implications of AI and other advanced technologies in healthcare.

Chris Shaffer discussed the long history of medical librarians in promoting barrier-free open access to information and the importance of sharing knowledge and data. He highlighted the role of medical librarians in developing technologies like Web of Science, Medline, and services such as interlibrary loan. Shaffer emphasized the need for open science and data sharing to ensure that health information is accessible and transparent. He expressed concerns about the potential negative impacts of AI on open access and the importance of librarian involvement in AI projects to ensure equitable and informed use of data.

The importance of diversity, equity, and inclusion in MLA and the broader health sciences community were stressed by Sandra Franklin. She highlighted the establishment of special interest groups (SIGs) and the importance of caucuses in MLA in support of diverse communities and in fostering a sense of community within the Association. Franklin emphasized the need for MLA to continue to value and support accessibility for all stakeholder groups. She shared her experience as chair of the MLA Diversity and Inclusion Task Force and the impact of their work on MLA's values and initiatives.

While unable to attend the meeting, Mike Kronenfeld shared a pre-recorded video wherein he discussed the transition from print-based to digitally based health information environments and the role of health information professionals (HIP) in this transition. He emphasized the importance of upgrading skills and services to support the emerging data-driven health information ecosystem. Kronenfeld highlighted the need for HIPs to understand the significance of the transition and to continue developing their skills and knowledge. He encouraged MLA to support the profession's transition by

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continuing to develop overviews of the digital health information environment and the role of health information professionals.

Michelle Kraft focused on the challenges of educating others to find quality health information in the face of fake news and the importance of AI in this context. She emphasized the need for librarians to be aware of the accuracy and relevance of information and to help patrons use information for good. Kraft underscored the importance of understanding the data within AI and other resources and the potential for misuse of information. She encouraged attendees to be proactive in addressing misinformation and disinformation, continuing to explore ways to provide accurate and relevant information to their communities.

DISCUSSION: PIVOTING, AN EVOLVING ASSOCIATION, AND THE CENTRALITY OF COLLABORATION AND A COMMITMENT TO ETHICS

Explicitly or implicitly, each of the panelists related the nature and impact of their work to the various collaborations and interprofessional engagements they experienced in their professional lives. They described an association that has grown and evolved over time, consistently in the direction of envisioning expanding horizons for the scope and nature of health sciences librarianship. They related a "growth mindset" attitude to the scope, nature, organization, and values of the profession. They also linked their work to the ethics of librarianship.

Collaboration and Change!

Margaret Bandy, whose career was deeply rooted in hospital librarianship, encouraged her hospital librarian colleagues to collaborate with the healthcare professionals in their organizations. According to Bandy, "My experience was that the more I involved myself in their work, the more I and they learned how library services could support them. For me, my professional life was enriched by collaboration and professional organizations, and in my position at St. Joseph Hospital [Denver], sometimes I had to invite myself to the table in order to be included. Fortunately, all our meeting rooms had lots of chairs."

Bandy relayed her experiences working with healthcare professionals outside of the library as a means of having greater influence and impact. Epstein also stressed the ability to collaborate and complete group work as a key leadership quality. She linked these abilities to the need for openness to change and adaptability. As Epstein noted in her Doe Lecture and in our panel, "Our profession is changing rapidly, and so is our association. We're seeing a generational shift as baby boomers move toward retirement, and a new cohort of medical librarians enter positions of leadership in the association and in our institutions. As this new generation creates the future, it's useful to remember that progress is rarely a smooth progression of preordained successes, but rather a series of false starts, wrong turns, frustrations, insights, 'aha moments' and course corrections."

Epstein's comments aligned with Bandy's focus on the necessity of pivoting**.** Bandy stated, "As an organization, MLA has pivoted many times, often urged by members, as in the establishment of the Research Training Institute, but also by outside events. When COVID hit, MLA pivoted to online, virtual meetings and hybrid meetings. MLA pivoted by approving the motion by the Diversity and Inclusion Task Force requesting the addition of a new association value – of an open, inclusive, and collaborative environment within and outside the profession."

Franklin's comments brought the audience deeper into the pivotal time and place in the life of MLA when diversity, equity, and inclusion finally took center stage.

> I was honored to give the 54th Janet Doe lecture during the second virtual MLA conference in 2021. It was quite a time to be the lecturer - the deaths of Breonna Taylor, George Floyd and Dante Wright fresh in the news. Foremost, we were all impacted by the COVID 19 pandemic. We lived through a change in lifestyle under quarantine coupled with the loss of colleagues, friends, neighbors, loved ones and acquaintances. News headlines showcased unacceptable health disparities, conditions such as diabetes, hypertension and asthma that tend to plague African American communities more than other groups, adding to the COVID 19 death count. Income inequities and disparities in access to health care tend to hurt minority and lower income populations more than others, and that is still the case today. This was the environment in which we found ourselves in as medical and health sciences library professionals attending a virtual conference, supporting the transformation of our health systems and hospitals, medical and health sciences schools, and our society, while we too, examined diversity in our profession.

Franklin's reflections on diversity, equity, and inclusion as values of the profession were rooted in the ethics of the association. Franklin drew a direct connection between the emergence of the new DEI value and the emergence and growth of identity-based caucuses within the Association. She noted,

> The African American Medical Librarians Alliance (AAMLA) had its beginning at a dinner in New Orleans during the 1988 annual meeting. AAMLA officially became a SIG in 2000 at the Vancouver, Canada annual meeting, and any of the AAMLA members can tell you about all the wonderful initiatives that AAMLA sponsors on a regular basis every calendar year. The Hispanic SIG held its first meeting in May 2014, and our MLA President Elect candidate, Brenda Linares, was among the founders of what is now the Latinx caucus. A caucus for the Asian American and Pacific Islander communities was proposed at the time of my lecture in response to acts of violence against the Asian community. That caucus is now joined with the social justice and health disparities caucus. These caucuses provide members with community within MLA. Caucus participation allows MLA members to assume leadership roles, lead initiatives,

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and make our MLA memberships richer for the colleague connections they create.

Moral Leadership

Tooey's work to understand the common traits of leadership surfaced the centrality of professional ethics as essential to advancing mission-based goals. She told the audience,

> The [Doe] lecture became a springboard for me for learning, exploring, and teaching, and one of the things I learned was that truly good, effective, and impactful leaders have strong moral beliefs and values and foundations, and that is where MLAs values come in for all of us. They are foundational to the way we do our work and the way we lead within our careers, our institutions, our professions, our professional home, MLA and even the way we live. They are our moral compass, and they tell us what we stand for. MLA values evidence. We value high quality information, lifelong learning, research and evidence-based practice, inclusion and collaboration, and accessibility for all. We have ethical standards. We even have a code of ethics stating that knowledge is essential for informed decision making in healthcare, education, and research, whether it is for society, clients, institutions, our professions, or ourselves. And diversity, equity and inclusion are values foundational and supporting absolutely everything.

Martin's 2018 Doe lecture was grounded in the ethics of the profession and the moral argument for social justice. Her comments called for equity. She updated her original thoughts by relating her efforts around equity through facilities planning, work that was deeply grounded in centering the interests of clients. Martin asked, "How can we create library spaces promoting our democratic ideals, equity, accessibility, community, engagement and the health and welfare of our users and social justice? Understanding the relationship between library space and social justice is imperative as many of us embark on renovation projects in our libraries."

According to Martin, "Since COVID, library spaces have become even more important as gathering spaces and social hubs for our campus community. With remote work, hybrid work and return to work initiatives, our users are yearning for a place to go and reconnect with their friends and colleagues. The library can serve this need." Describing her building renovation project, Martin said, "We embraced user design and user participation principles in the planning process and the conceptual redesign of spaces. We co-created spaces. We found ways to gather feedback and engage the community in dialog about library spaces through focus groups, feedback sessions and furniture fairs… We committed to only using healthy building materials and worked with vendors to adopt these into their products. We incorporated biophilia, ways to connect with nature, into the design. We used sustainable building materials such as terrazzo flooring instead of carpeting and incorporated natural light and wood into building design."

Perry's 2019 lecture picked up on Martin's social justice theme and conveyed its impacts on his personal and professional life. For the panel, he related his most recent efforts advancing librarian engagement in computable biomedical knowledge, noting that this work was a continuation of his social justice work, similarly predicated on a commitment to the ethics of care. He noted,

> In recognition of the 125th anniversary of our association and this particular event, I wanted to talk about the value of ethics and center my comments on that particular and specific value. The core of my Doe lecture was on the concept of equity. And at the time, I had been thinking about equity for LGBTQ+ plus people. I had also been thinking about the history in the association around equity for librarians. But lately, I've been thinking about this concept of equity in advanced technologies and the work of mobilizing computable biomedical knowledge. When we think about advanced technologies and equity, we need to think about making sure that these technologies correct for the potential for bias to exist and address the potential negative impacts of that bias especially on communities who are traditionally marginalized and minoritized. I believe we have a key role to play in that space. When we think about the work that librarians do, when we work with metadata, when we work with preservation, when we look at things like the FAIR Principles [https://go-fair.org/fair-principles] and CARE Principles [https://gida-global.org/care], finding information and getting information to the right hands at the right moment, at the right time, all of this work, really is work that we're familiar with as librarians. But we haven't seen librarians come to the MCBK table to date, very robustly.

Shaffer reminded us of the centrality of open access as an ethical stance hinging on effective partnerships across the information ecosystem. According to Shaffer, "In 2020 I spoke about the long history of the Medical Library Association and medical librarians in bringing information to the communities they serve, whether those are health professionals, patients, caregivers, in public health environments and so forth. We have been moving towards open and pushing towards open access to information, to free and accessible information, since the very beginning of our association." He went on to ask, "Why are we giving the results of health sciences research, of information about the best way to care for people when they are at their most vulnerable, to commercial entities to exploit and to sell back to us?" Shaffer suggested, "As we think about the principles of open science and open access, we also need to consider the principle that information about how to take care of people, how to help patients, how to make people be healthier, how to encourage people to live healthier lives, should not be locked up. And the movement of open science is a continuation of that, the idea that all of the information that we're using in order to do this research should be shared, from the very beginning of an experiment through the end, that there shouldn't be hidden information."

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Values that Guide Across Time

Reflecting on how the values of the Association and specifically the value of practicing our profession in an ethical manner, Tooey said, "We need our values to guide and underpin our professional leadership decisions. Small and large, we need to be models of integrity, leading through example in all our leadership roles. We can't afford not to do so. After all, we have an entire Association behind us. I challenge all of us to boldly embrace, model, and live those values compassionately, courageously, and completely as we embrace all the leadership roles we undertake."

According to Epstein, "As I reviewed MLAs core principles and values, I have to conclude that though the goals have evolved through the years, the themes remain constant: promotion of scientific evidence and access to high quality health information along with reliance on evidence-based practice ethical principles and lifelong learning."

Kronenfeld's comments also made note of changes but also consistency – for the Association and the profession – across the span of time. He reminded us of the many critical historical collaborations and partnerships with entities such as the US National Library of Medicine that have informed the work of the association across the decades. According to Kronenfeld, "With the emergence of the digital information environment, we are faced with a challenge and the opportunity in our transformation from medical librarians facilitating access and use of the print based, knowledge-based information collections provided by our libraries to new roles as health information professionals (HIP). We are now HIPs working collaboratively with the units and staff we support, facilitating the effective access, use and management of digitally based, increasingly accessible, KBI/data."

Kronenfeld acknowledged the leadership role of MLA when he noted, "Led by their professional organizations, the Medical Library Association and the Association of Academic Health Sciences Libraries, medical librarians, HIPs, need to understand the significance of the transition from the print to the digital health information environment, the shift of medical librarians to HIPs, who have been becoming more closely embedded in the programs and research teams they work with over the last 20 years. This has represented the start, and the shift from narrow support staff to that of full collaborators, as the data driven health information ecosystem being guided by NLM continues to emerge. It is crucial that the skills and services of our HIPs continue to upgrade and develop."

As the last panelist but most recent Doe lecturer, Kraft reminded us of the "forever" ethics-based work of remaining vigilant to the harmful impacts of dis- and misinformation in the larger health information ecology. Kraft said, "I would like to challenge everybody…to look at how the information we are providing or the information that our patrons are using is accurate and relevant, and how that information can be used to influence healthcare, healthcare policy and other policies. We need to be aware of how it can be misused, not only as misinformation and disinformation, but through the twisting of information, perhaps very reliable information, to further an agenda. These are things that we as librarians, as information specialists have the ability to help people with - to use the power of information for good, to understand how it can be used and how it can be changed."

Shaffer echoed Kraft's comments, noting, "What do we do when [bad actors] inject misinformation at a real deep scale for science into the systems that we're using that we don't understand how they work. We don't know exactly what's going to come out of them… I challenge all of you, especially the younger IT-oriented librarians in the room to start looking for ways to influence this." Shaffer also spoke to the challenges brought about by the advent of AI at scale, for instance through large language processing systems. "At every institution that we work at, somebody is doing something with AI and librarians should be there, arm in arm with them, figuring out how to make these things equitable, figuring out how to make them informative and figuring out how to keep open open."

Tooey further challenged the audience to be vigilant to the challenges ahead: "Unless medical or health sciences library leaders embrace and model the solid values and foundations espoused by MLA, the leadership attributes I have mentioned ring hollow and are, a) hard to achieve; b) potentially worthless; and c) could spell the end of our profession in these days of misinformation, disinformation and downright lies."

The session concluded with audience questions and panelist responses.

DISCUSSION: AUDIENCE QUESTIONS

J. Dale Prince as program moderator fielded questions from the audience and relayed those received via the online meeting platform to the panelists.

What might you have done differently in your career?

Shaffer started the discussion by saying, "The main thing I would have done is to be more aware of the human relationships with the people I was working with, taking more time to get to know people as people, especially patrons." Franklin said that she wished she had more deeply engaged in research. "Now with data science and AI, it's really important that librarians have research skills and get out there and be equals, if you will, in that level of the community, so that we can talk the talk and show examples of doing the work to have credibility within our spaces." Perry said he wished he had pursued an advanced degree in natural language processing, a long-

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held interest that is related to his current engagement with computable biomedical knowledge.

Kraft took a philosophical approach to the question and noted that she wishes she had learned not to self-limit but to strive for whatever she was interested in, or to not worry about limitations or boundaries. She said it was also important to have the grace and self-awareness that one can't do everything, to not be overly critical of ourselves, and to know we're good at what we do. She called out the need to celebrate our achievements and victories.

Tooey followed up on that notion, saying, "Celebrations are so important, acknowledgement of good and little victories, and not to obsess over things that, in the big scheme of things, 36 years later, did they matter? No. Nobody died, you know, over anything that was a small mistake that I made… So being kinder and gentler on my successes, failures, and other people, listening to them, and being humble and kind."

What are your thoughts on providing leadership and direction in arenas that you may not fully understand or are changing so rapidly it's difficult to ever feel like you have a grasp of things?

Shaffer encouraged connecting with subject experts. He said, "One of the first things you have to do is find subject matter experts in that area that you trust. And they may be the people that are working for you or working with you, they may be other people, but you have to find a trustworthy source that can help you vet ideas and proposals and projects and so forth. And, of course, educate yourself. If I'm not in a position to understand a question well enough to answer it, is there somebody on my staff or somebody that I work with, who does, who I trust, and I can then go to them and say, What should we do, or talk to me about how we should make this decision."

Franklin reflected on Shaffer's comments, noting that she took the risk of hiring subject experts who did not have a terminal degree in librarianship. She was convinced that having subject experts on her team would lead to greater impact and success. She noted that despite the criticism she faced she did not regret the decision.

Epstein said, "I think it's important for "leading in the dark" to have people that will tell you when you're wrong and tell you when you're going in the wrong direction, and won't be afraid to tell you the truth and tell you what's going on, as opposed to what you think you see is going on."

What are some suggestions for breaking the cycle of perpetual discussions of challenges in the profession?

Epstein reframed the question, stating, "I would say that we're not, when we talk about change, going around in the same circle. We're going around in circles that move forward." Kraft added that this is the nature of work, stating, "There's always going to be challenges. If we don't have challenges, then I think there's something going wrong, because that means we're not evolving. That means we're not moving forward. We can't stay stagnant. So, to break the cycle of challenges, or change the cycle of challenges, I think we just need to do things one step at a time and keep moving forward."

Perry appreciated the question and recognized the sense that as a profession we seem to talk about the same challenges over and over. He framed the issue as one for attention by library leaders, challenging them to talk to people who are expressing an interest in the profession, and understand what's their thinking and what is their approach? He said, "There's all sorts of different ways that folks are coming forward now with expectations and understanding of the nature of their work and the kinds of things that they're looking to achieve. New people are questioning received notions about what it means to deal with hierarchies and work cultures. What it means to work with bosses who are functional or dysfunctional. To work in organizations that are healthy and not healthy, and to really look at that with eyes wide open." He encouraged reading outside of the literature of the professional for fresh ideas to longstanding concerns.

As the National Library of Medicine searches for a new leadership and a new vision, what characteristics and skill sets would you like to see in our new NLM director?

Tooey acknowledged that she is serving on the search committee for the leadership role, and said, "The new director of NIH Dr. Monica Bertagnolli has quite a vision and excitement about NLM. And making NLM the nexus of not only what used to be the publication literature, but also data, objects at NIH… I don't know what characteristics you'd want to see, but I know that there is great support at the uppermost levels of NIH."

Kraft said, "I would like to see somebody who can encourage more collaboration between different types of libraries, including the hospital libraries."

CONCLUSION

Originally intended as a "one-off" event in recognition of MLA's 125th anniversary, audience feedback for the Decade of Does panel was very positive. It was even suggested that a similar, every decade session be held to stop and reflect collectively as an association. Overall, the session was the second highest rated plenary of the Portland annual meeting, according to attendee evaluations. Among the anecdotal comments found in attendee "my favorite session" meeting assessments was the statement that it was "so cool to have a bit of history and then application for the future." One attendee noted that they "enjoyed having a panel and the excellent preparation and thoughtfulness of the presenters." Another complimented the panelists as "down to earth."

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This feedback will be considered by future annual meeting planners. The panelists all agreed that it was an honor to participate and reflect on their original lectures while considering how MLA's values have and will continue to be a source of support and inspiration to our membership.

AUTHORS USE OF GENERATIVE AI

A transcription of the Decade of Does MLA 2024 Annual Meeting panel event was created in September 2024 by Association staff and provided to the authors, who used it as a primary source for drafting the article, including panelists' quotes. The authors provided panelists with a draft of the article, including quotes, to verify intent and meaning.

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Development and validation of LGBTQIA+ search filters: report on process and pilot filter for queer women

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See end of article for authors' affiliations.

Introduction: A search filter for studies involving lesbian, gay, bisexual, transgender, queer, intersex, asexual, and additional sexual minority and gender identities (LGBTQIA+) populations has been developed and validated; however, the filter contained very small gold standard sets for some populations, and terminology, controlled vocabulary, and database functionality has subsequently evolved. We therefore sought to update and re-test the search filters for these selected subgroups using larger gold standard sets. We report on the development and validation of two versions of a sensitivity-maximizing search filter for queer women, including but not limited to lesbians and women who have sex with women (WSW).

Methods: We developed a PubMed search filter for queer women using the relative recall approach and incorporating input from queer women. We tested different search combinations against the gold standard set; combinations were tested until a search with 100% sensitivity was identified.

Results: We developed and tested variations of the search and now present two versions of the strategy with 99% and 100% sensitivity. The strategies included additional terms to improve sensitivity and proximity searching to improve recall and precision.

Conclusions: The queer women search filters balance sensitivity and precision to facilitate comprehensive retrieval of studies involving queer women. The filters will require ongoing updates to adapt to evolving language and search platform functionalities. Strengths of the study include the involvement of the population of interest at each stage of the project. Future research will include development and testing of search filters for other LGBTQIA+ subgroups such as bisexual and transgender people.

Keywords: LGBTQIA+; lesbians; women who have sex with women; WSW; queer women; bisexual women; search hedge validation; search filter validation; relative recall; systematic reviews as topic

INTRODUCTION

Locating studies on lesbian, gay, bisexual, transgender, queer, intersex, asexual, and additional sexual minority and gender identities (LGBTQIA+) populations is particularly complex. Researchers may be interested in specific subgroups, such as women who have sex with women (WSW), lesbians, men who have sex with men (MSM), or transgender people, or in combinations of subgroups. Populations may be defined by sexual preference, sexual behavior, how one identifies, or gender identity [1]. Terminology has evolved rapidly over the past several decades and researchers do not always use standard terms to describe the population [2]. Research data on specific subgroups are often buried in articles that use umbrella terms and acronyms such as LGBTQIA+ or sexual orientation and gender identity (SOGI) minorities. These result in searches that retrieve a large number of false positives when trying to identify research data on specific subgroups.

Search filters, also called search hedges, are collections of keywords, variations, and (where available) controlled vocabulary, combined with Boolean operators, that represent concepts in a database search [3]. Filters are useful for exhaustive searches, such as those conducted as part of systematic reviews and other evidence synthesis projects. Filters have been developed to capture a wide range of frequently used concepts, ranging from research methodologies to geography to populations [4]. The relative recall method is a common method of internal search filter validation that involves testing the performance of the filter against a 'gold standard' set of database records, defined as "a reference standard against which to establish the performance of the filter" [5]. In the relative recall method, the 'gold standard' set of articles is developed by 1) identifying relevant search terms, 2) using

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those search terms to search for relevant review articles in a database, and 3) screening those review articles to identify a set of original research articles, the 'gold standard' set, relevant to the concept [5]. Finally, various search combinations are tested in a database to try to retrieve 100% sensitivity, or 100% recall of the articles in the gold standard set [5].

A PubMed filter for LGBTQIA+ populations has been previously developed by Lee et al. [6] and internally validated by Parker et al. [7] using the relative recall method. Parker et al. [7] concluded that larger gold standard sets for less researched subgroups, such as WSW and bisexual people, would improve validation and performance of the search filter. Furthermore, relevant new Medical Subject Headings (MeSH) were subsequently introduced, including 'Sexual and Gender Minorities' in 2018 and 'Intersex Persons' in 2020. Several members of the Medical Library Association (MLA) LGBTQIA+ Caucus formed a team to update and re-test the search filters for the underrepresented subgroups using the relative recall internal validation approach and larger gold standard sets with input from the LGBTQIA+ community. Based on subsets with very small development and validation sets from previous work by Parker et al. [7], subgroups of the larger LGBTQIA+ population were prioritized for further development and internal validation of search filters that can be applied in PubMed to comprehensively retrieve relevant records. These groups include: 1) transgender people, 2) bisexual people, 3) queer women (e.g., lesbians, bisexual women, women who have sex with women, etc.), 4) intersex people, and 5) asexual people. In this article, we will focus on one example subgroup, queer women, which we used to pilot our process. The purpose was to develop a sensitivity-maximizing search filter [8] that would retrieve more relevant articles on queer women.

METHODS

Action Plan and Protocol

This article focuses on the development and validation of a search filter for queer women and is written by the four authors who conducted this subset validation project. The queer women search filter validation project is part of the larger LGBTQIA+ search filter project initiated by a larger group of researchers from the Medical Library Association (MLA) LGBTQIA+ Caucus. This larger team created an action plan and research protocol to coordinate the work of the larger project. The LGBTQIA+ search filter action plan was adapted from the action plan developed for the MLA Latinx Caucus and their Hispanic/Latinx Inclusive Terminologies Project [9]. Our action plan covered logistical issues such as project and team management, tools for collaboration, and goals for dissemination. The protocol outlines the research objectives and approach, as described in the rest of this methods section. We did not conceive of the protocol as a strict guideline for the methods, but as a living document that we modified through conducting this pilot with a single subgroup. See the link in our Data Availability Statement to view our action plan and protocol.

Defining Subgroups

Definitions are crucial in research involving LGBTQIA+ populations where there is a need to balance precision with inclusion. Terms such as LGBTQIA+ and SOGI collate together populations distinguished by sexual orientation and gender identity. Sexual orientation is in turn assessed along the dimensions of attraction, behavior, and identity [1]. For our pilot with the queer women filter, our definition encompassed both sexual behavior (women who have sex with women) and identity (women who identify as lesbian, bisexual, or queer). We defined 'women' based on how the author of the included study described the population, rather than on assignment as female at birth (AFAB). For example, articles describing transgender women who have sex with women were included, whereas articles focusing specifically on nonbinary or transgender AFAB people who did not identify as women were not. We intentionally used the phrase 'queer women' for our filter and throughout this article to describe this population and encompass the broad spectrum of women whose sexual orientation is not exclusively heterosexual. Although the term 'queer' has been used as a slur against LGBTQIA+ people in the past, today it has been reclaimed by many in the LGBTQIA+ community as an inclusive term that includes the broad spectrum of gender and sexual orientation identities within the community [10]. We define 'queer women' as women who identify as lesbian, bisexual, pansexual, queer, not exclusively heterosexual, or who have (or have had) sex with women.

Creation of the Gold Standard Set

We searched PubMed using the WSW filter from Parker et al. [7] along with additional terms brainstormed by the current team. The population search concept was combined with a search filter for systematic or scoping reviews using a strategy developed by Salvador-Oliván et al. [11] to retrieve research review publication types; no date limit was applied. The previous study Parker et al. [7] worked from a set of only 39 articles for the WSW filter. We aimed to develop a test set of at least 200 records, which is double the 100 records Sampson et al. [5] suggested for internal validation. To ensure that the filter applies to a variety of topics, we specified that references from a minimum of five reviews would be used to develop the gold standard set.

To identify original research articles for the development of the queer women gold standard set, potentially relevant reviews were screened by two team members using the following eligibility criteria. Reviews had to focus

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specifically on WSW or queer women populations or more broadly on the larger LGBTQIA+ population. We included systematic reviews, scoping reviews, narrative reviews, and other types of evidence-synthesis and secondary literature related to the target population. To meet the inclusion criteria, at least one study included in the review must have focused on queer women and the review must separately report data related to queer women. We selected a purposive sample of reviews for reference checking to ensure a breadth of topics and domains (e.g., psychology/social work, biomedical, clinical medicine) and demographics (e.g., youth, geriatric, adult). Reviews were sorted by 'most relevant' in Covidence and reviewed for selection in that order. This sorting feature in Covidence review management software uses machine learning to prioritize records similar to those selected for further review or inclusion after at least twenty-five have been screened [12].

We conducted reference checking for the selected reviews using Scopus on January 11 and February 7, 2023, and exported them to Covidence. We independently screened retrieved records in duplicate first by title/abstract, and then by full text. Because not all records were indexed in MEDLINE, we periodically searched MEDLINE for the records marked for inclusion until we reached just over 200 studies.

During screening, we continued to refine the eligibility criteria. Included studies could report on multiple LGBTQIA+ sub-populations if they presented separate data for queer women. We included studies where data on queer women was only available at full text level. We excluded studies that did not contain separate data for queer women. We also excluded the following types of studies unless it was apparent from title/abstract that the article was about queer women specifically:

- Studies that measured attitudes (e.g., heterosexual/general population attitudes toward/knowledge of homosexuality, same-sex marriage, etc.). This was done to restrict the gold standard set to only original research studies on the health of queer women rather than attitudes toward queer women as well as other members of LGBTQIA+ populations.
- Non-human subjects research (e.g., theoretical models/frameworks, narrative reviews, systematic reviews, or policy position papers that did not contain data from original research). However, we included meta-analyses that reported data specific to queer women.
- Qualitative studies with mixed populations, as it is often difficult to ascertain which data are associated with the queer women participants in these studies.
- Studies published in languages other than English.

Development of Search Strategies

The research team used several sources to develop a set of terms to search PubMed to identify review articles for the creation of the gold standard set. Sources included terms from Parker et al. [7], personal lived experience, LGBTQIA+ glossaries, mining relevant articles identified through PubMed searches, and the synonyms and alternative terms listed in relevant MeSH and Emtree records. The list of search terms was developed in September and October 2022 and included the following index terms: "Sexual and Gender Minorities"[Mesh:noexp], "homosexuality, female"[Mesh], 'women who have sex with women'/exp, 'homosexual female'/exp, and 'bisexual female'/exp. To develop the final search filter, the team reviewed articles in the gold standard set to identify additional search terms.

Relative Recall Validation

Figure 1 is a flow diagram representing the overall internal validation process for the two versions of the queer women search filter developed in this project. We used the gold standard set to internally validate the search filter using the relative recall method of validation described by Sampson et al. [5]. Each term was searched in PubMed and tested against the gold standard set to identify terms contributing to retrieval of articles in the gold standard set. Relative recall was calculated using total gold standard articles retrieved by the search (on the day of testing) divided by the total number of articles in the gold standard set. The resulting number was then multiplied by 100 to calculate the sensitivity of the search as a percentage. Combinations of terms were tested until a search with 100% sensitivity was identified. A search with 99% was also identified to provide an option for a more precise version of a sensitive search.

Involvement of Queer Women

Three out of four of the authors on the queer women filter validation team identify as queer women and their personal lived experiences were considered when developing the study action plan, search terms and strategies, and the gold standard set. Multiple other members of the larger LGBTQIA+ filter validation team who provided input also identify as queer women. This was done intentionally to ensure that members of the population of interest were included at every stage of the project. We also shared our draft search filters and methodologies through our Medical Library Association (MLA) and Canadian Health Libraries Association (CHLA) networks to solicit additional feedback from queer women librarians and informationists.

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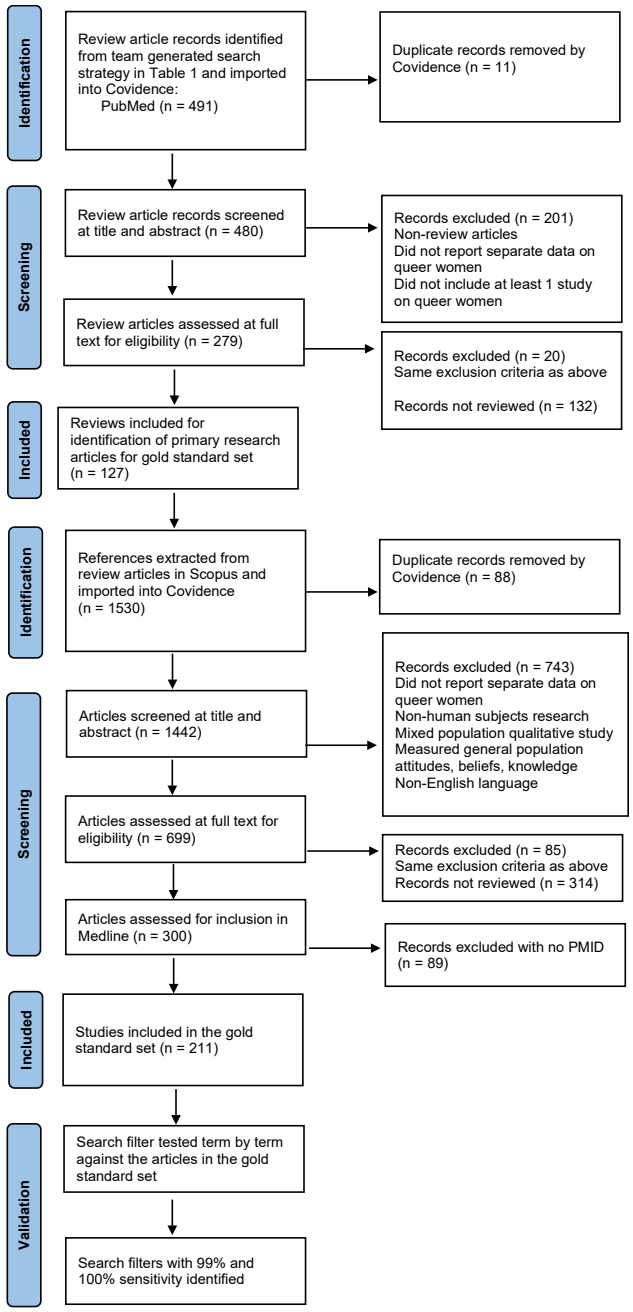
Figure 1 Flow diagram for validation of queer women search filter



RESULTS

Gold Standard Set

The initial set of reviews for the creation of the gold standard set were identified by searching PubMed in October 2022 using the terms listed in Table 1 from Parker et al. [7] and terms identified to be relevant by the current research team.

Table 1 Search terms for generating the review set

Term source	Terms
Parker et al. * [7]	"homosexuality, female"[Mesh] OR lesbian*[tiab]
Team generated **	"Sexual and Gender Minorities" [Mesh:NoExp] OR "homosexuality, female"[Mesh] OR lesbian*[tw] OR "women who have sex with women"[tw] OR WSW[tw] OR "female homosexual*"[tw] OR "homosexual female*"[tw] OR "homosexual women"[tw] OR "homosexual woman"[tw] OR Lesbigay[tw] OR "women loving women"[tw] OR "gay women"[tw] OR "queer women"[tw] OR "queer woman"[tw] OR "bisexual women"[tw] OR "bisexual woman"[tw] OR "bisexual female*"[tw] OR "pansexual women"[tw] OR "sexual minority women"[tw] OR lesbophobi*[tw]

*"Sexual and Gender Minorities" [Mesh:NoExp] added after 2018 as noted in the limitations section of Parker et al. [7].

**The team generated terms were combined with the Salvador-Oliván et al. [11] systematic/scoping review filter as described in the "Creation of the Gold Standard Set" section. The Salvador-Oliván et al. [11] can be found in the original publication and in the Action Plan and Protocol for this project linked in our Data Availability Statement.

The team-generated search in Table 1 combined with the Salvador-Oliván et al. [11] systematic and scoping review filter resulted in 491 records of review articles, eleven of which were duplicates identified by Covidence. 480 records were screened within Covidence; each record was screened independently by two team members at title and abstract and full text levels. This selection process identified 127 reviews related to queer women, the references of which were extracted using Scopus. We screened the references obtained from Scopus to verify their relevance to queer women. The title and abstract and full text screening of this set formed the gold standard set for developing the search filter; each record was screened by two team members. Screening continued until the target number of 200 relevant records had been met or exceeded, as described in the methods section. Of the 1,530 references from the reviews imported into

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Covidence, 88 were identified as duplicates. One thousand four hundred and forty-two were screened at title and abstract, with 743 excluded as irrelevant and 314 not reviewed. Records were screened at full text independently in duplicate until we reached 300 relevant records. Of the 300 records, 211 had PMIDs, producing a PubMed gold standard set that was used to develop the search filters.

Table 2 Performance of search terms against PubMed gold standard set

Terms to test	Total records retrieved in PubMed (A) (date: 4/26-4/2/723)	Total gold standard articles retrieved (B)	Sensitivity % (B / total number of articles in gold standard development set X 100)
"Sexual and Gender Minorities"[Mesh:NoExp]	10,229	**39**	**18.5**
"homosexuality, female"[Mesh]	4,192	117	**55.5**
lesbian*[tw]	8,805	181	**85.8**
lesbian*[tiab]	8,804	181	**85.8**
"Lesbian women"[tw]	600	24	**11.4**
"Lesbian woman"[tw]	21	1	**0.5**
lesbians[tw]	1,929	68	**32.2**
"women who have sex with women"[tw]	205	3	**1.4**
WSW[tw]	200	1	**0.5**
"female homosexual*"[tw]	177	2	**0.9**
"homosexual female*"[tw]	31	1	**0.5**
"female homosexual"[Title/Abstract:~3]	154	1	**0.5**
"homosexual women"[tw]	111	2	**0.9**
"homosexual women"[Title/Abstract:~3]	347	6	**2.8**
"homosexual woman"[tw]	7	0	**0.0**
"homosexual woman"[Title/Abstract:~3]	20	0	**0.0**
Lesbigay[tw]	5	0	**0.0**
"women loving women"[tw]	9	0	**0.0**
"gay women"[tw]	27	0	**0.0**
"queer women"[tw]	80	2	**0.9**
"queer woman"[tw]	7	0	**0.0**
"queer women"[Title/Abstract:~3]	141	3	**1.4**
"queer woman"[Title/Abstract:~3]	11	0	**0.0**
"bisexual women"[tw]	725	47	**22.3**
"bisexual woman"[tw]	12	0	**0.0**
"bisexual women"[Title/Abstract:~3]	1,079	57	**27.0**
"bisexual woman"[Title/Abstract:~3]	21	0	**0.0**
bisexual female*[tw]	110	4	**1.9**
"bisexual female"[Title/Abstract:~3]	198	1	**0.5**
"bisexual females"[Title/Abstract:~3]	148	5	**2.4**
"pansexual women"[tw]	5	0	**0.0**
"sexual minority women"[tw]	576	35	**16.6**
lesbophobi*[tw]	8	0	**0.0**
sexual minority female*[tw]	59	1	**0.5**
sexual minority women[tw]	576	35	**16.6**
"sexual minority females"[Title/Abstract:~3]	68	2	**0.9**
"sexual minority female"[Title/Abstract:~3]	99	3	**1.4**
"sexual minority women"[Title/Abstract:~3]	729	40	**19.0**
"sexual minority woman"[Title/Abstract:~3]	7	0	**0.0**
"nonheterosexual women"[Title/Abstract:~3]	23	3	**1.4**
"same sex women"[Title/Abstract:~3]	307	4	**1.9**

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Table 3 Performance of select search combinations

Test search (5/15/2023)	Total records retrieved in Pubmed	Gold standard articles retrieved (out of 211)	Sensitivity %	Number Needed to Read
"homosexuality, female"[Mesh] OR lesbian*[tiab] from Parker et al. [7]	9850	191	90.52%	51.57
Strategy used to get reviews for gold standard (Table 1)	17862	201	95.26%	88.87
Optimized Sensitive Search (Table 5)	12203	209	99.05%	58.39
Most Sensitive Search (Table 4)	17236	211	100.00%	81.69

Table 4 Most sensitive search

"homosexuality, female"[Mesh] OR lesbian*[tw] OR "sexual minority females"[tiab:~3] OR "sexual minority female"[tiab:~3] OR "sexual minority women"[tiab:~3] OR "bisexual women"[tiab:~3] OR "bisexual female"[tiab:~3] OR "bisexual females"[tiab:~3] OR "homosexual women"[tiab:~3] OR "female homosexual"[tiab:~3] OR (("women"[tw] OR "female"[tw]) AND ("sexual minorit*"[tw] OR "non-heterosexual*"[tw] OR nonheterosexual*[tw] OR **"same sex"[tw]**)) OR **(("women"[tw] OR "female"[tw]) AND ("same gender"[tiab:~3] OR "same sex"[tiab:~3]) AND "attracted"[tiab])**

Table 5 Optimized sensitive search

(("homosexuality, female"[Mesh] OR lesbian*[tw] OR "sexual minority females"[Title/Abstract:~3] OR "sexual minority female"[Title/Abstract:~3] OR "sexual minority women"[Title/Abstract:~3] OR "bisexual women"[Title/Abstract:~3] OR "bisexual female"[Title/Abstract:~3] OR "bisexual females"[Title/Abstract:~3] OR "homosexual women"[Title/Abstract:~3]) OR (("women"[tw] OR "female"[tw]) AND (sexual minorit*[tw] OR non-heterosexual*[tw] OR nonheterosexual*[tw]))) or "female homosexual"[Title/Abstract:~3]

Search Strategies

The relative recall (sensitivity) of each term from the initial set from Table 1 is reported in Table 2. Table 2 also shows the total recall from PubMed for each term on the dates of searching, April 26 and 27, 2023. As a limited function of proximity searching was introduced for PubMed in November 2022 [13], phrases were searched using up to three words between the quoted terms.

We conducted iterative testing of the terms in Table 1 through combinations based on retrieval of at least one record in the PubMed gold standard set. Further testing of combinations was completed based on examination of the records not retrieved by the baseline search from Parker et al. [7] and adding phrases with proximity operators and truncation to the base search. We used the combination field search [TW] on individual terms for increased sensitivity, but at the time of the search, PubMed's proximity search only permitted use of the slightly more focused combination field search [TIAB]. Similarly, at the time of testing searches, proximity searching in PubMed did not permit use of truncation on any of the terms within the phrase.

Table 3 shows the performance of the various search combinations, along with the Most Sensitive and Optimized Sensitive Search strategies that retrieved 100% (Table 4) and 99% (Table 5) of the PubMed gold standard set, respectively. The additional terms that improved the retrieval of the Most Sensitive Search filter are highlighted in bold. The Optimized Sensitive Search substantially reduced the Number Needed to Read (NNR) [14] compared to the Most Sensitive search when calculated from the gold standard set and PubMed retrieval numbers on May 15, 2023 (58.39 vs 81.69). NNR represents search precision and is calculated for each search strategy with the following formula: NNR = Total # records retrieved / # GS records retrieved.

For full data on testing of the filters and each of the various terms, as well as the search strategy for the PubMed gold standard set, please refer to the Data Availability Statement at the end of this article.

DISCUSSION

One of the strengths of our methodology was the inclusion of queer women on the study team to center the knowledge and experience of people in the study population. Including people with lived experience, borrowed from Weeks and Hoskins [15], helped the team to consider current and emerging language used by people in the target study population that may not be commonly found in the research literature. Because the language used in research literature is often mismatched with everyday language used by populations, not all the emerging terminology considered by the team made it into the final search filter, as it was not needed to capture

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the published research related to this population. However, because language is constantly evolving, knowledge of emerging terminology is important. Many terms used by the population may eventually make it into the published research literature, so keeping up to date with emerging terminology is important for future updates of the search filter.

Another strength of our methodology was the incorporation of feedback from other health sciences librarians outside of the study team. We presented our preliminary findings at the Canadian Health Libraries Association (CHLA) meeting in Halifax, Nova Scotia in June 2023 [16]. We shared a Google folder with our protocol, search strategies, and search testing. We asked participants to provide feedback on any aspect of our study, including the protocol and development of the gold standard set and search strategies and terms. After the meeting, we shared the same Google folder with the MLA LGBTQIA+ Caucus for further feedback, especially from those who identify as queer women. We did not receive much feedback, but feedback we did receive included helpful suggestions for new and emerging terms relevant to the queer women population, but these terms have not yet made it to the published research literature and therefore were not included in the search filters.

The two versions of our queer women search filter built and expanded upon previous filters [6, 7]. As such, we updated the filters to consider additional MeSH and keywords based on a larger gold standard validation set. We expanded the gold standard set by including articles on the broader LGBTQIA+ population in which data were reported separately for queer women, in addition to articles that focused specifically on queer women. In alignment with the Parker et al. [7] findings, we found that data pertaining specifically to queer women are often buried in studies about the broader LGBTQIA+ population, making it challenging for researchers to find data on this subpopulation. This is demonstrated in this validation study by the significant decrease in precision necessary to achieve 100% retrieval of the gold standard set with the Most Sensitive Search, compared to the Optimized Sensitive Search. In addition to the paucity of research that specifically targets queer women, we observed that most of the studies that are specific to queer women were psychosocial rather than biomedical. These findings highlight the need for further biomedical, as well as general health, research that is specific to queer women.

Because data regarding queer women are so often embedded within studies for the broader LGBTQIA+ population, our Most Sensitive queer women search filter had to be broad to capture all the relevant data. This means that the search filter, in addition to retrieving data on queer women, will retrieve articles on the broader LGBTQIA+ population as well. Researchers who use either of the two versions of this search filter will have to spend more time and effort to extract the relevant data for queer women from these articles, but the time and effort spent will result in more comprehensive data and allow for more informed conclusions and recommendations. Both versions of the search filter represent a balance of sensitivity, to capture queer women data embedded in larger LGBTQIA+ studies, and precision, to specifically target studies concerning queer women. We have also reported the second most sensitive search, the Optimized Sensitive Search, as an option to improve precision and further reduce the number needed to read to identify relevant studies. When used for evidence synthesis research, population search filters are combined with search strategies for one or more additional concepts, such as intervention, exposure, or context. Therefore, selecting the Most Sensitive or Optimized Sensitive filter will depend on the purpose of the search and the degree of precision and sensitivity that can be achieved in the strategies for the other concepts. For example, for topics with very little available evidence, such as some biomedical concerns, researchers may opt for the Most Sensitive Search filter to improve retrieval of any relevant studies. On the other hand, for social phenomena that are harder to search precisely, such as social determinants of health [17], the use of the Optimized Sensitive Search would contribute to feasibility by decreasing the number of records needed to screen while remaining robust for sensitivity.

The Most Sensitive search that captured all articles in our gold standard set included less common search terms such as 'same sex' and 'same gender' that were used in articles published in geographical areas outside of North America. As using these search terms reduced precision, we combined them with gender-specific terms to retrieve phrases such as "women attracted to the same sex" but not "men attracted to the same sex." Though these variations add complexity to the search filter, they improve recall and precision and were found to be important for capturing studies that include bisexual and nonheterosexual women. This resulted in a more comprehensive data set which captured the nuances of the wider population of queer women. As language evolves, the search filters will have to be updated with new and emerging terminology. For example, constructive feedback from the community offered terms not included in the search filters, such as 'sapphic' or 'omnisexual', which were not used by any articles in our gold standard set. Other phrases such as "women who have sex with women" are not included in the final iteration of the filters because they did not improve sensitivity within the gold standard set. "Sexual and Gender Minorities"[MeSH] was not included in the final iteration of the filters because it incorporates the entire LGBTQIA+ community and would dramatically decrease precision and increase NNR. Though these terms were not necessary to capture 100% of the articles relevant to queer women in the gold standard set, future research could explore external validation using both emerging and inclusive terms such as these.

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Changes to the PubMed search platform influence search retrieval in both positive and negative ways. Proximity searching functionality was added to PubMed in November 2022 [13]. This allowed us to incorporate additional terms while also maintaining more precision than would be possible without proximity. On the other hand, fully automated MeSH indexing, which was implemented in April 2022 [18], may result in decreased search retrieval precision or sensitivity going forward if relevant articles are indexed incorrectly or with the broader and related MeSH terms (e.g., "Sexual and Gender Minorities"[Mesh] or "Homosexuality"[Mesh]) [19]. It is inevitable that search platforms such as PubMed will continue to change and evolve, which will influence search retrieval in various ways. As the platform evolves, the search filter will have to be updated to adjust to new functionalities.

LIMITATIONS

As previously mentioned, a limitation of the search filter is the need to include a wide range of search terms to capture data on queer women that are often buried in full text of studies on the broader LGBTQIA+ population. This says more about the paucity of research, especially biomedical research, that specifically focuses on queer women's health than the validity of the search filter.

A limitation of our methodology is that we could have developed a gold standard set of larger than 200. As previously mentioned, we settled on a gold standard set of 200, which is twice the number of a minimum gold standard set recommended by Sampson et al. [5] and significantly more than the thirty-nine article gold standard set in Parker et al. [7]. A larger target set may have enabled us to identify records using a few additional less common and emerging terms, resulting in development of an even more comprehensive search filter. We chose to stop at 200 to balance time and effort spent, in recognition of the impact on search filter stability of the evolving nature of language and social constructs such as sexual orientation and identity.

A related limitation concerns the use of relative recall to create the gold standard set for internal validation, as pulling references from published reviews is inherently retrospective. We will address this limitation for the future stages of the project by also screening records that have cited the reviews from which we will pull references, creating a second gold standard set to use for external validation of the search strategies developed for the other subgroups.

We used PubMed to search MEDLINE because it is the largest and most used free biomedical and health sciences search platform. A limitation of using PubMed is that the PubMed phrase index does not include some phrases used in our search filter, which may result in additional terms contributing to retrieval on other search platforms, such as Ovid MEDLINE. This impact may have been partially mitigated using PubMed's recently added proximity search feature. However, at the time of the search, PubMed's proximity search could only be done using the [Title], [Title/Abstract], or [Affiliation] fields. Thus, for phrases that required the precision of proximity searching, we used the [Title/Abstract] instead of the [Text Word] tag, which may have resulted in a loss of articles that included these phrases that may have been included in the additional [Text Word] fields not included in the [Title/Abstract] fields.

Another limitation is that our search filters are designed for use in evidence synthesis projects, where records are generally screened by title and abstract as opposed to affiliation or journal title. Finding literature based on the affiliation or journal title fields is outside the scope of our project.

Directions for Future Research

These queer women search filters are part of a larger project to update and re-validate previously validated PubMed search filters for LGBTQIA+ populations. The goal of our larger project is to consider the impact of new MeSH terms and keywords on the relative recall of particular subpopulations of the LGBTQIA+ community. In addition to the queer women filters, our goal is to also develop larger gold standard sets for bisexual, transgender and nonbinary, intersex, and asexual populations. In addition to the creation of the subpopulation filters, new MeSH terms and keywords we identify will also be incorporated into a larger LGBTQIA+ search filter to capture research pertaining to the broader population.

A future phase of this project will involve eliciting feedback on each subgroup filter from members of that community. We will use this feedback to develop a larger list of relevant terms to describe each subgroup (and relevant research related to the population in question), recognizing that not all terms may be currently used in health-related literature and acknowledging that harmful language may have been used historically [20]. The resulting search filters will be validated using the relative recall method to create gold standard sets, with more recent records identified by screening the citations of articles citing the included reviews.

CONCLUSION

Population search filters provide a helpful starting place for researchers conducting evidence synthesis. However, because language is constantly evolving, published population search filters can never represent all relevant search terms and emerging language. The search filters will need to be revisited on an ongoing basis to account for the continual evolution of language. They also need to be adapted for the needs of each evidence synthesis

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project and its use in research. For example, the Most Sensitive Search for queer women uses a complex PubMed search strategy with proximity operators for maximum retrieval, such as would be used in large systematic or scoping reviews in combination with searches for one or more well-defined concepts. The Optimized Sensitive Search also has very high sensitivity and uses proximity functions to retrieve relevant records with a reduced screening burden, useful for rapid reviews or for topics that are hard to define or have a high volume of search results. The search filters for queer women reported here serve as an evidence-based starting point for anyone seeking health research for this understudied population.

DATA AVAILABILITY STATEMENT

Data associated with this article are available in the Open Science Framework at https://osf.io/brxwt.

DISCLOSURE STATEMENT

The authors report there are no competing interests to declare.

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AUTHOR CONTRIBUTIONS

Hannah Schilperoort: Conceptualization; Data curation; Investigation; Visualization; Writing – original draft; Writing – review & editing. Andy Hickner: Conceptualization; Data curation; Project administration; Resources; Investigation; Writing – original draft; Writing – review & editing. Jane Morgan-Daniel: Conceptualization; Data curation; Investigation; Writing - review & editing. Robin Parker: Conceptualization; Formal Analysis; Investigation; Methodology; Visualization; Writing – original draft; Writing – review & editing.

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CASE REPORT
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Non-clinician involvement in interprofessional health sciences education: educator experiences and attitudes

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See end of article for authors' affiliations.

Objective: The objective of this study was to assess educator views on the knowledge, skills, and abilities needed by IPE facilitators and to explore their attitudes toward and experiences with non-clinician facilitators of IPE activities, particularly health sciences librarians.

Methods: This qualitative study utilized a novel questionnaire that included both multiple-choice and free-text questions. The latter were grounded in critical incident technique (CIT), a methodology that uses direct observations of human behavior to solve practical problems. The questionnaire was distributed electronically to the study's population of health sciences administrators, faculty, and staff in Texas who were involved with IPE. Multiple-choice data were analyzed via descriptive statistics, while free-text data were coded and analyzed via inductive thematic analysis principles.

Results: There were 48 responses out of 131 individuals contacted directly for a response rate of 36.64%. Educators recognized a wide range of characteristics needed by IPE facilitators but viewed interpersonal skills as most important. While many reported experience with non-clinician facilitators of IPE activities, fewer had experience working with health sciences librarians in these roles. Educator attitudes toward non-clinician facilitators of IPE, including librarians, were largely positive.

Conclusions: The findings of this study indicated that educators view interpersonal skills and the ability to elicit engagement as more important skills for IPE facilitators than a relevant clinical background. With proper facilitator training, non-clinicians could build upon their existing skillsets and increase their involvement with IPE, creating a larger pool of potential facilitators. A greater availability of skilled facilitators could increase the incidence of IPE, potentially resulting in more collaborative care and improved patient outcomes.

Keywords: Interprofessional education; facilitation; critical incident technique; qualitative research; inductive thematic analysis; collaborative practice

See end of article for supplemental content.

INTRODUCTION

According to the World Health Organization (WHO), interprofessional education (IPE) "occurs when students from two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes" with the goal that students who take part in IPE will be prepared for the kind of collaborative practice that can improve outcomes in real-world health care settings [1]. A recent review found that the top disciplines contributing to the IPE literature are medicine, nursing, pharmacy, dentistry, occupational therapy, and physical therapy [2]. While health sciences libraries have been deeply involved in health sciences education, particularly in evidence-based practice (EBP) [3-14] and the online learning arena [15-20], they have played a smaller role in the provision of IPE. This may be because most IPE activities are focused on clinical simulations and experiential training [21], where librarians' experience is less relevant.

In 2010, WHO introduced a framework on the health and education systems that highlighted the importance of local context and IPE to build a collaborative practice-ready health workforce to strengthen the health system and improve health outcomes [1]. The WHO framework served as a starting point and inspiration for an updated conceptual framework informed by the results of this

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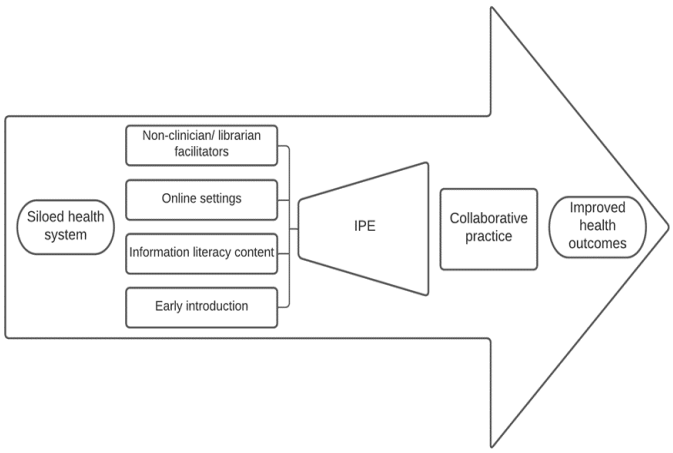
study. The new framework begins with the currently siloed health system. Utilizing non-clinician/librarian facilitators and online settings, incorporating lower-stakes learning content such as information literacy skills, and introducing interprofessional experiences early in the curriculum are all factors that could contribute to institutions increasing their offerings of IPE activities for students. In turn, these more robust IPE programs could potentially lead to stronger collaborative practice skills and ultimately improve health outcomes. Figure 1 displays this conceptual framework visually.

Figure 1 Strategies to Increase IPE Conceptual Framework



Focusing on the non-clinician/librarian facilitators facet of the framework, a search of the literature revealed limited documentation of direct librarian support for in-person IPE, including designing conferences, workshops, and continuing education modules [22-24]. Likewise, there are multiple reports of librarians planning and leading interprofessional book clubs [25-26]. At individual institutions, librarians have been involved in designing formal IPE programs for institutional staff and clinicians [27-29]. There are also a few examples of direct librarian involvement in online IPE activities that included online learning modules and tele-mentoring [30-33].

Librarians do not just support IPE activities; they also take part in interprofessional activities. While interprofessional teams are typically thought of as being made up of clinicians, there are examples in the literature of librarianship being considered one of the professions on an interprofessional team. This concept is not new. Clinical medical librarians have been involved in rounding since at least the 1970s, and they often round as members of interprofessional clinical teams, recognizing information needs and providing evidence to support clinical decision-making [34]. Another significant example of librarians serving as accepted members of interprofessional teams comes from the Interprofessional Education Collaborative's (IPEC) core competencies which list library science as one of the involved professions [35]. Further evidence of the legitimacy of this role for librarians has been provided in published reports of individual projects within academia [26, 30, 36].

In addition to the valuable contribution that librarians can make, libraries can also provide much needed space. Libraries have been described as interprofessional, collaborative spaces that bring different programs together [25, 37]. IPE, as it has traditionally been conducted, requires space. In order to facilitate and encourage IPE, faculty and administrators may need to look beyond their own departments' siloed spaces and find locations that are accessible and welcoming to all. Libraries can do this directly by holding IPE activities within their walls, or indirectly by purposely creating an environment conducive to serendipitous interprofessional interactions [37-38].

These examples that include librarian involvement make up only a small proportion of the overall literature on IPE and highlight the potential for librarians to contribute to health professions education in this area. The lack of literature on non-clinician IPE facilitators in general also underscores the need to develop an understanding of educator views on IPE facilitation. Identifying the perceived facilitator characteristics that lead to successful IPE activities can illuminate a path forward to increased librarian involvement. In turn, deepening the pool of potential facilitators can increase the number of meaningful IPE experiences available to students during their health professions education. This study was designed to assess educator views on the knowledge, skills, and abilities needed by IPE facilitators and to explore their attitudes toward and experiences with non-clinician facilitators of IPE activities, particularly health sciences librarians.

The following research questions guided this study:

1. What knowledge, skills, and abilities do health sciences educators deem necessary for facilitators of IPE activities?
2. What are health sciences educators' experiences with and attitudes toward non-clinician facilitators of IPE activities?
3. What are health sciences educators' experiences with and attitudes toward health sciences librarians in particular as facilitators of IPE activities?

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METHODS

Instrument

This study used a novel questionnaire designed to collect data which addressed the posed research questions. No existing validated tools addressed this study's specific research questions, necessitating the creation of a new questionnaire. The questionnaire consisted of a mix of multiple-choice and free-text entry questions. Multiple-choice questions captured demographic data and length of experience with IPE. Additional questions asked about experience with non-clinician facilitators of IPE. Attitude-measuring questions used five-point Likert scales and were designed to measure participants' attitudes toward non-clinician IPE facilitators. Specifically, two of the questions asked participants if they thought non-clinicians, and librarians in particular, possess the ability to facilitate in-person IPE. The answer choices ranged from "Not at all" to "A great deal." The other two questions asked if participants were willing to collaborate with non-clinicians, and librarians in particular, on IPE facilitation in the future. The answer choices ranged from "Unwilling" to "Willing."

The remaining data were collected via free-text entry questions. Some of these questions were adapted from critical incident technique (CIT), a methodology that uses direct observations of human behavior to solve practical problems. A key feature of CIT is asking research participants to recall and describe a time when the phenomenon of interest occurred. This occurrence of the phenomenon of interest is the "incident." Framing the question in this way is intended to improve recall and provide more specific and relevant data [39]. CIT can be used as a methodology to determine what factors help or hinder a particular activity [40]. CIT was used in this study to examine participants' experiences with non-clinician facilitators of IPE. The participants were asked to recall a time when they participated in an IPE activity that included non-clinician facilitators and then share more about that experience.

The remaining free-text entry questions directly asked research participants about characteristics needed by IPE facilitators and the rationales behind their levels of willingness to collaborate with non-clinician IPE facilitators (and librarians in particular) in the future. The questions were ordered such that these questions appeared subsequent to the questions that asked participants to recall a time when they participated in IPE with non-clinician facilitators. This was to prime the participants to base their responses on any past relevant incidents they have experienced, taking further advantage of the CIT method.

The reliability of this study was strengthened through Robson and McCartan's principles of avoiding common pitfalls in data collection such as transcription errors and using an audit trail to show others that the research has been carried out thoughtfully, carefully, and honestly [41]. Validity was strengthened through triangulation, peer debriefing and support, negative case analysis, and the use of an audit trail [41].

Participants

The population for this study consisted of health sciences administrators, faculty, and staff in the state of Texas who were involved with IPE. The study participant sample was primarily drawn from the subpopulation of members of the Texas IPE Consortium (TX IPE), a group formed in 2015 by leadership in academic health sciences centers located in the state of Texas to "foster cross-institutional collaboration in order to expand learning opportunities and reinforce value for IPE as a critical aspect of health professions education" [42].

The individual members of the TX IPE were contacted via email with a link to the online questionnaire. The email was also shared with the TX IPE listserv and forwarded to faculty and staff involved in Texas Educators Academies Collaborative for Health Professions-Southeast (TEACH-S). Additionally, a link to the questionnaire was shared in the chat of a virtual IPE summit that was held during the data collection period and had been promoted throughout Texas. The participants in this study constituted a purposive sample, as the TX IPE members were targeted in a nonrandom manner to represent a cross-section of the larger population of educators involved with IPE in Texas.

Procedures

The University of Houston Institutional Review Board reviewed this study and determined it was exempt on October 14, 2021.

The questionnaire was constructed and distributed via Qualtrics, a web-based survey platform. The questionnaire was opened and disseminated successfully via email to 116 out of 131 individual members of TX IPE with valid email addresses on October 18, 2021. The questionnaire link was also provided to the TX IPE listserv, faculty and staff members of TEACH-S, and the attendees of a virtual IPE summit in October and November 2021. The supplementary groups largely consisted of the same individuals as the TX IPE membership. Reminder emails were sent to TX IPE members once. The questionnaire remained open for 30 days. Responses were anonymous, and no compensation was provided for participation in the study.

The majority of the data analysis in this study focused on the categorical data obtained from the CIT-based free-text entry questions. This was conducted via inductive thematic analysis principles [43]. As this study was examining an emerging area, it was not appropriate to identify themes prior to data collection and analysis; inductive thematic analysis ensured the themes were

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grounded in and emerged from the data. The researcher coded the responses line-by-line and pooled into themes the critical incidents; knowledge, skills, and abilities; and rationales identified. These themes were further organized under broader domains to create frameworks which were explored narratively.

RESULTS

There were 48 responses, resulting in a response rate of 36.64% of the 131 individual TX IPE members. The responses to the questionnaire's demographic items showed an experienced and diverse set of study participants. Most (61.29%) reported a faculty status of assistant, associate, or full professor, with assistant professor being the most frequent response (25.81%). Over two-thirds (70.97%) of the participants reported being a practicing clinician, either currently or in the past. Among the clinicians, the most common clinical fields reported were Nursing (22.73%), Counseling (18.18%), and Physical Therapy (13.64%), with those three combined making up over half the responses (54.55%). Appendix B provides a graphical representation of the participants' fields of clinical practice.

Most participants (63.04%) reported being very experienced in IPE, indicating six or more years of involvement. Very few participants (6.52%) indicated less than one year or no experience with IPE. Additionally, more than half (55.88%) indicated that they had taken part in IPE with non-clinician facilitators. Nearly half (46.15%) of these non-clinician facilitators were administrative staff. Only two (7.69%) participants reported experience with librarian facilitators. Additionally, two (7.69%) participants reported experience with students taking roles in IPE facilitation.

Knowledge, Skills, and Abilities Required for IPE Facilitation

All participants, regardless of whether they had experience with IPE that included non-clinician facilitators, were asked to provide free-text feedback on the knowledge, skills, and abilities required for in-person IPE facilitation. There were responses to this question from 30 participants. These responses were analyzed in order to develop a framework on IPE facilitators. The responses to this question revealed that interpersonal skills were valued above other areas including knowledge and management skills.

The ***Interpersonal Skills*** domain ranked highest with the ability to elicit discussion and participation from all students being the most frequently cited necessary skill. Participants mentioned the need to "draw in students who are not participating in discussion," and to encourage and guide participation. The importance of guiding the conversation without monopolizing it and listening rather than teaching were also emphasized. Additionally, several participants specifically mentioned creating an environment of "psychological safety." One participant summed up the importance of this domain in writing, "So much of IPE is about communication and teamwork, not clinical knowledge."

For the ***Knowledge*** domain, participants cited the need for the planners and facilitators of IPE to represent a variety of professions, and thus have personal knowledge of interprofessional work while also modeling it. While some participants wrote that facilitators must have "expert knowledge" of the content being covered, others specified that only a "basic knowledge of the topic at hand" was needed and that the facilitator "does not have to be an expert in the content." Many of the responses focused on knowledge of the planned IPE activity or knowledge of the participating health professions' roles and responsibilities, things that could be taught to facilitators of any background during a training session. Other participants specifically called out knowledge that must be obtained through clinical experience.

Figure 2 IPE Facilitators' Needed Knowledge, Skills, and Abilities Coding Framework

Question	What knowledge, skills, and abilities do you think are necessary for facilitators of **in-person** IPE activities?
Domain	**Interpersonal Skills (60)**
Codes	Encourage discussion/participation (20) Facilitation skills (16) Engaging leader/presenter (9) Communication skills (8) Debrief skills (4) Team orientation (3)
Domain	**Knowledge (34)**
Codes	Content/activity knowledge (17) Roles/responsibilities/identities (6) Interprofessional planners/facilitators (5) Clinical experience (4) Teaching ability/experience (2)
Domain	**Systems and Competencies (10)**
Codes	TeamSTEPPS (5) IPEC core competencies (5)
Domain	**Management Skills (7)**
Codes	Preparation/Organization (4) Time management (3)

Systems and Competencies was made up of the pre-packaged TeamSTEPPS® curriculum and the IPEC core competencies document, which were referenced as tools that should be utilized by IPE facilitators from all backgrounds. Participants also infrequently mentioned

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Management Skills, including preparation, organization, and time management. Figure 2 above provides a complete listing of this framework's domains, individual codes, and their frequencies.

Success Factors for IPE with Non-Clinician Facilitators

Of the 34 participants who reported having participated in an IPE activity that included non-clinician facilitators, 13 (38.2%) provided written responses to the free-text questions that asked them to describe the factors contributing to the IPE activities' success or lack thereof. These written responses were analyzed in order to construct a framework on the success factors for IPE with non-clinician facilitators.

Designing for Engagement emerged as the top domain, with participants highlighting the need for "dynamic/compelling activities for students" that should also be clinically relevant, small groups to encourage discussion, and a good interprofessional mix of students. One participant pointed out that having students lead the IPE activity naturally led to high levels of student engagement. Next, it was shared that having enthusiastic, well-trained ***Strong Facilitators*** from a variety of professions led to success.

Additionally, having ***Engaged Students*** who actively participate, ***Effective Planning*** (well-designed curriculum, utilizing support people throughout) and ***Successful Technology*** (utilizing technology tools effectively, being familiar with the online platform, and having technology function during the activity) were mentioned as success factors.

The data that were coded on the nonsuccess side of non-clinician facilitator IPE resulted in four domains. ***Problems With Facilitators*** was mentioned most often of any nonsuccess factor. One participant stated that "non-clinicians struggle to connect with the clinical students. Their energy level and learning points don't always ring true for what is happening in the simulation…or in real life." It was also mentioned that facilitators could be unprepared or lack skills or buy-in. One response discussed the difficulty with training facilitators from areas that had high turnover at the institution.

The next domain detracting from the potential success of IPE with non-clinician facilitators was ***Lack of Student Engagement***. It was brought up that students may have been unwilling to participate or lacked the knowledge and experience to participate meaningfully. Notably, a participant wrote that "some students did not respect staff being facilitators and they did not fully participate." Completing the nonsuccess framework were ***Ineffective Planning*** (scheduling problems and too many participants) and ***Technical Issues***.

This framework demonstrated the importance of engagement in successful IPE activities that include non-clinician facilitators, as well as the need for facilitator training to produce strong facilitators who will not detract from the event's value. It also indicated that non-clinician facilitators may not be appropriate in all roles and/or all types of IPE activities. Figure 3 provides a complete listing of the code domains and frequencies that emerged from the data on success factors for IPE with non-clinician facilitators.

Figure 3 IPE with Non-Clinician Facilitators Success Factors Coding Framework

Question	Please consider the instance of IPE with a non-clinician facilitator you described in the previous question, and describe any factors that contributed to it being a **successful** IPE activity.
Domain	**Designing for Engagement (13)**
Domain	**Strong Facilitators (8)**
Domain	**Engaged Students (4)**
Domain	**Effective Planning (3)**
Domain	**Successful Technology (3)**
Question	Please consider the same instance of IPE with a non-clinician facilitator and describe any factors that contributed to it being an **unsuccessful** IPE activity.
Domain	**Problems With Facilitators (7)**
Domain	**Lack of Student Engagement (6)**
Domain	**Ineffective Planning (2)**
Domain	**Technical Issues (1)**

Attitudes Toward Non-Clinician IPE Facilitators

All participants, regardless of previous experience, were asked questions to elicit their attitudes toward non-clinicians generally, and librarians in particular, as facilitators of in-person IPE activities.

When asked to rate to what degree they felt non-clinicians and librarians possessed the characteristics necessary to successfully facilitate in-person IPE, the large majority (83.33% for non-clinicians; 80.00% for librarians) chose at least *moderately*, with *moderately* being the most frequently chosen response. No (0.00%) participants chose *not at all* for non-clinicians and only one (3.33%) chose *not at all* for librarians. Figure 4 displays the complete responses to this question.

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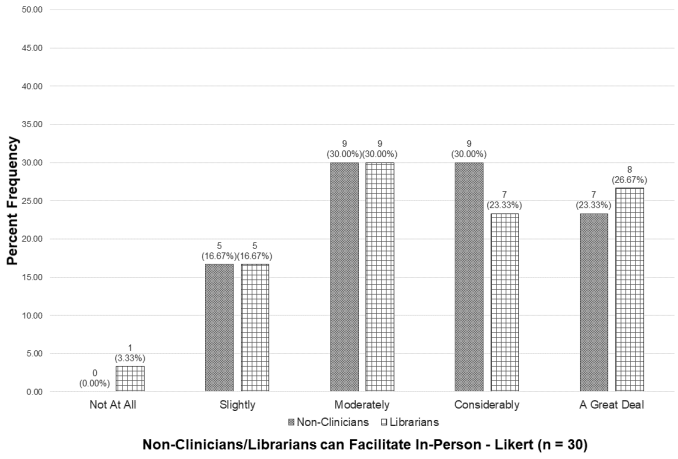
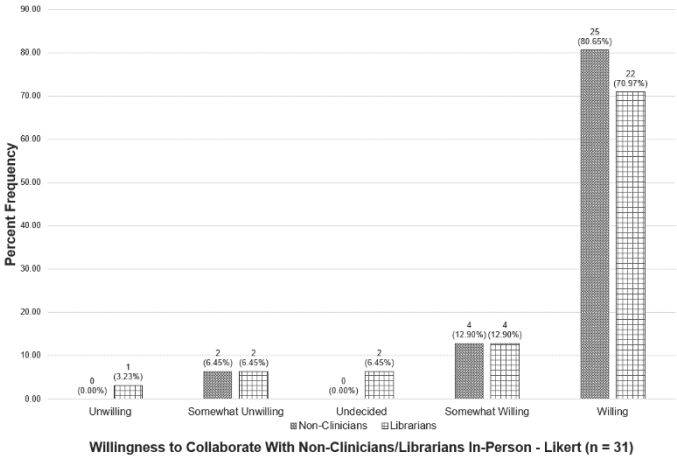
Figure 4 Attitudes Toward Non-Clinician and Librarian In-Person IPE Facilitation



When asked to rate their willingness to collaborate with non-clinicians to facilitate IPE, the vast majority (93.55%) chose at least *somewhat willing*, with *willing* being the most frequently chosen response. No (0.00%) participants chose *unwilling* and only two (6.45%) chose *somewhat unwilling*.

When asked to rate their willingness to collaborate with librarians in particular to facilitate IPE, the responses were slightly less positive. Still, the large majority (83.87%) chose at least *somewhat willing*, with *willing* being the most frequently chosen response. There were three (9.68%) participants who chose *unwilling* or *somewhat unwilling*. Figure 5 displays the complete responses to this question.

Figure 5 Willingness to Collaborate with Non-Clinicians/Librarians on In-Person IPE



The study's two final free-text questions provided participants with the opportunity to share the rationales for their levels of willingness to collaborate with non-clinicians and librarians on IPE facilitation. There were 27 participants who responded to these questions. Coding this data resulted in a framework on willingness to collaborate with non-clinicians/librarians on IPE that was largely focused on knowledge and skills as well as professional roles.

The top domain by frequency of coding for willingness to collaborate with non-clinicians was ***Knowledge/Skills***. Participants called out the potential for non-clinicians to possess valuable expertise and be skilled in communication, database searching, EBP, technology use, and more. Opinions on whether clinical experience was a help or hindrance were mixed, with some participants stating that "no history of clinical experience is not acceptable" and that they "feel they need to understand clinical practice to be totally effective," while others wrote that "the purpose of facilitating is not to know the answers but to guide the activities/discussion" and "knowledge and skills related to teaching/engagement are more important than clinical experience." One participant went so far as to write, "I think that it would be an advantage if the facilitator did not have any knowledge or skill in the fields of the participants." Another participant pointed out that many gaps in non-clinicians' knowledge could be filled with training.

The next most oft-cited domain in this framework was ***Professional Roles***. Some participants noted that non-clinicians could contribute to IPE in ways that reflected their support roles in clinical practice. Other comments from participants pointed out that they themselves were non-clinicians who facilitate IPE, and as such felt confident that other non-clinicians could carry out the same work. Some participants noted that students may lack buy-in when working with non-clinician facilitators, and it may be necessary for clinical students to work with clinician facilitators while non-clinical students work with non-clinician facilitators. Several responses noted the necessity for clarity of roles and self-awareness.

In the ***Collaboration*** domain, participants wrote about the fact that non-clinicians are part of the interprofessional team and thus should be included in IPE. One mentioned advocating for "big tent inclusion" of non-clinician professionals in IPE, while another stated that it simulates the "real world" of frequent collaborations with non-clinicians. Additionally, librarianship was lauded as a particularly collaborative field.

Finally, the least-cited domain was ***Need for Interprofessional Mix***. One participant focused on the idea that "the more diversity of skills, ideas, backgrounds, the better!" with another stating "We need all the help we can get!!!" It was stated that librarians "bring a broader

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perspective across different health care entities" and "a different perspective that clinicians do not have."

This framework demonstrated the value of the diversity of knowledge and skills held by individuals from different professions. The responses largely showed support for non-clinician and librarian future involvement in IPE, although they included some mixed opinions on the necessity for clinical experience, again making the case that non-clinician facilitators may not be appropriate in all roles and/or all types of IPE activities. Figure 6 displays a complete listing of this framework's domains, individual codes, and their frequencies.

Figure 6 Willingness to Collaborate with Non-Clinicians/Librarians on IPE Coding Framework

Question	Please share the rationale for your level of willingness to collaborate with **non-clinicians** on the facilitation of in-person and online IPE activities in the future.	Please share the rationale for your level of willingness to collaborate with **librarians** in particular on the facilitation of in-person and online IPE activities in the future.
Domain	**Knowledge/Skills (14)**	**Knowledge/Skills (21)**
Codes	Clinical experience necessary/beneficial (4) Facilitation skills (4) Clinical experience unnecessary/insufficient (2) Interpersonal skills (2) Teaching skills (1) Training (1)	Expertise (6) Information gathering/assessment skills (5) Clinical experience necessary/beneficial (2) Facilitation skills (2) Teaching skills (2) Clinical experience unnecessary/insufficient (1) Interpersonal skills (1) Technology skills (1)
Domain	**Professional Roles (11)**	**Professional Roles (12)**
Codes	Not a clinician (3) Differs from clinician role (2) Facilitator-student match (2) Awareness of own role (2) Lack of student buy-in (2)	Differs from clinician role (6) Clear roles (2) Lack of student buy-in (2) Facilitator-student match (1) Not a clinician (1)
Domain	**Collaboration (8)**	**Collaboration (11)**
Codes	Part of interprofessional team (4) Collaborate with non-clinicians (2) Collaboration experience (2)	Part of interprofessional team (4) Collaborate with librarians (4) Librarianship is collaborative (3)
Domain	**Need for Interprofessional Mix (10)**	**Need for Interprofessional Mix (6)**
Codes	Enriched by diversity (8) Need more help (2)	Enriched by diversity (4) Need more help (2)

DISCUSSION

The results of this study show that interpersonal skills and knowledge are highly valued in IPE facilitation. In particular, when asked what characteristics are necessary for IPE facilitators, the top responses were focused on encouraging discussion and participation, facilitation skills, and content/activity knowledge (see Figure 2). Additionally, Figure 3 shows that designing engaging IPE activities that are skillfully facilitated can lead to their success. Librarians who are already finding success in supporting IPE at their institutions through designing professional development programming [22-24, 27-29], interprofessional book clubs [25-26], and online learning modules [30-32] are likely skilled facilitators who elicit discussion and participation from participants while being knowledgeable about the professions and content involved. Going forward, librarians seeking to make inroads with IPE at their institutions can concentrate on building and showcasing their proficiency in these areas.

A small subset of participants' responses in this study underscored a lack of familiarity with the profession of librarianship. Librarians frequently encounter this lack of understanding from both their colleagues and the public, necessitating a continuous and proactive effort on their part to communicate the important leadership role librarians can have in IPE. These responses serve as a powerful reminder of the imperative for librarians to engage in active advocacy, effectively articulating their professional competencies and the significant contributions they make at their institutions. By actively promoting the profession and highlighting their diverse skill set, librarians can bridge the perceptual divide and ensure that their leadership role is recognized.

The purpose of this research was to explore one arena in which the collaborative and inclusive nature of librarianship can be leveraged for the benefit of health professions education, and the results were encouraging. While not true of all IPE educators, most view non-clinicians and librarians as skilled colleagues who possess many of the characteristics needed to effectively facilitate IPE (see Figures 4 and 6) and have a willingness to collaborate with them on this work (see Figure 5). The health professions educational landscape is primed for librarians to take on a leadership role in IPE through coordination, collaboration, and facilitation.

With these results in mind, health sciences programs should consider utilizing non-clinician IPE facilitators as brokers of knowledge between discipline-based experts. In utilizing non-clinicians, they should recruit those with strong interpersonal skills over professional discipline-based experience and knowledge. Potential facilitators include non-clinical faculty, administrative staff, instructional designers, librarians, and upper-level students. Training can ensure they are familiar with the roles of the professions involved and the planned activity in order to help secure success. Resources geared toward non-traditional facilitators and learning modalities can be utilized to build facilitator training programs that emphasize interpersonal skills and the effective use of technology [44-45].

Programs should identify more mechanisms through which non-clinicians can support, empower, challenge assumptions, and enable discipline-based professionals in discovering new approaches. In addition to supporting IPE by creating web-based information guides and providing journals and books on IPE, non-clinicians could search the literature to find cases to be used in the activity.

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Additionally, consider incorporating activities that are less clinically focused, such as information literacy/EBP workshops, into the institution's IPE portfolio. This would help to ensure that students from different programs have similar baseline levels of skills [31] while enabling them to interact interprofessionally. Another option is interprofessional book clubs [25-26]. These possibilities would allow IPE to be introduced early in the curriculum while enabling a wider range of individuals to participate as facilitators.

Moreover, non-clinicians working in health sciences educational programs should feel empowered to approach the team in charge of IPE at their institutions and offer to help lead the change. Librarians should make the case that interpersonal skills and engagement are as important as clinical skills. Participating in the provision of IPE can also benefit the non-clinicians or librarians in terms of the opportunities for outreach and connections, widening and strengthening the understanding of their leadership role.

Many IPE activities continue to take the form of simulations which are heavily focused on high-stakes clinical content. A partial realignment of this focus could enable institutions to provide more robust IPE programs in order to better prepare their students for real-world collaborative practice. This study's results highlighted the importance of interpersonal skills and communication for IPE. Additionally, they made it clear that engagement is the most important factor contributing to IPE's success. IPE does not need to be limited to simulations of high-stakes clinical scenarios. Engaging activities can help students build interpersonal skills outside of the clinical simulation or case-based IPE paradigm.

The future of IPE should include more programs that are based on incorporating non-clinician and librarian facilitators, utilizing online settings for learning activities, teaching information literacy content, and introducing IPE experiences early in the curriculum. Increasing these factors would enable institutions to provide more robust IPE programs, allowing students to build solid foundations of interpersonal skills for collaborative practice, working up to the clinical simulations necessary for clinical learning later in the curriculum. If designed thoughtfully, conducting learning activities on library skills with interprofessional student teams would provide opportunities for students to build interprofessional communication skills in engaging formats. This strategy would introduce efficiencies while overcoming the barriers to large-scale clinical simulation-based IPE, allowing institutions to increase the number of IPE activities offered.

LIMITATIONS

Since all study participants were likely Texas residents, the study was not representative of other geographic regions. As there was a low response rate to demographic questions, and participants were not asked about race, ethnicity, gender, or socioeconomic status, the diversity of the pool of participants in these areas could not be examined for representativeness of the population; thus, the results were not generalizable. Additionally, there were not enough responses to the demographic questions to make meaningful statistical comparisons between demographic groups. There were few participants who reported experience working with librarian facilitators of IPE, somewhat limiting the direct applicability of this study to librarians. Since responses were anonymous, the researchers could not follow up with participants to seek clarification or more information. This study was conducted as part of an author's doctoral research with limited resources and only one coder. The lack of a second coder for the free-text question responses detracted from the study's reliability. Finally, the focus on attitudes and experiences rather than outcomes assessment means this study serves as a starting point to inform future research in that area.

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DATA AVAILABILITY STATEMENT

Data associated with this article are available in the University of Houston Dataverse Repository at https://doi.org/10.18738/T8/IDIZOM.

AUTHOR CONTRIBUTIONS

Rachel Helbing: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Visualization; Writing – original draft; Writing – review & editing. Robert Hausmann: Conceptualization; Methodology; Supervision; Writing – original draft; Writing – review & editing.

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SUPPLEMENTAL FILES

- **Appendix A**
- **Appendix B**

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ORIGINAL INVESTIGATION
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Physical therapy students' perceptions of embedded medical librarians within evidence-based practice courses: a mixed-methods pilot study

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See end of article for authors' affiliations.

Objective: Previous work within academic medical centers has indicated the potential value of embedded medical librarian programs within health sciences professional degree programs. This study sought to determine the perceived benefit that an embedded medical librarian (EML) provided to an evidence-based practice (EBP) course within an entry-level physical therapy degree program.

Methods: Learners completed an anonymous survey at the end of an EBP course about the impact of the EML on the course and their own EML utilization. Frequency and percentages were calculated for quantitative data; qualitative data were analyzed using an iterative process for code development.

Results: Forty (98%) learners completed the survey. Seventy-five point six percent of learners utilized the EML 1-2 times per class session and 31.7% outside of class sessions. Learners overwhelmingly "agreed" (53.7%) or "strongly agreed" (39.0%) that they would consult the EML for literature searches required in future courses. Seventy point seven percent "strongly agreed" that the EML improved their ability to conduct a literature search. All learners either "agreed" (43.9%) or "strongly agreed" (56.1%) that the EML added value to the course. Ninety point two percent considered the EML as an integral part of the course. Themes from the qualitative analysis agreed that the EML added value to the course and facilitated skills that would be useful throughout the curriculum.

Conclusion: Learners believe that having an EML improves their ability to conduct a literature search. Providing learners with EML access during their education experience facilitates development of this skill. Early and continued instruction throughout the entry-level DPT curriculum in informatics ensures program compliance with accreditation standards.

Keywords: Health Informatics; evidence based medicine; Physical Therapy; Academic Health Sciences Libraries

See end of article for supplemental content.

INTRODUCTION

The Commission on Accreditation in Physical Therapy Education (CAPTE) is the only body recognized by the US Department of Education and the Council for Higher Education Accreditation that can accredit entry-level Doctor of Physical Therapy (DPT) education programs. Accreditation attests that graduates of a PT program receive the quality of education required for entry-level PT practice. Accredited programs must meet all of the *Standards and Required Elements for Accreditation of Physical Therapist Education Programs* [1]. Required Element 7D40 states that entry-level DPT education programs instruct learners in the "use of health informatics in the health care environment" [1]. CAPTE defines health informatics as "the interdisciplinary study of the design, development, adoption, and application of IT-based innovations in healthcare services delivery, management, and planning" [2]. Failure to demonstrate evidence of fulfilling Element 7D40 has been identified as among the top ten areas of programmatic citation during accreditation review processes, which highlights the importance of creating and documenting initiatives related to Element 7D40.

In addition to expertise utilizing electronic health records, health informatics encompasses the ability to develop the skills necessary to locate quality information efficiently. A popular method for introducing information-seeking and evidence-based practice skills to health sciences students is the embedded medical librarian (EML) model. The EML model positions medical librarians into a proactive role by placing them virtually or physically in settings where

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learners are [3, 4]. This model promotes a proactive and participatory interaction, enabling an embedded librarian to work with faculty and learners across teaching, research, and clinical settings [4, 5].

Embedded medical librarian models have been implemented in academic medical centers in programs such as medicine, nursing, dentistry, pharmacy, public health, and music therapy [3, 6, 7, 8, 9]. Advantages of using the EML include ongoing collaboration to improve learners' information literacy and research skills [9]. By comparison, the depth of prior work examining the EML model within rehabilitation professions like PT and occupational therapy (OT) is limited. DaLomba et al. provided preliminary evidence to highlight the importance of using an EML to help learners in the rehabilitation sciences develop the skills necessary to locate the best evidence for enhancing clinical decision-making and improving patient outcomes [10]. Such investigations have not been conducted in DPT programs.

Since 2015, the College of Allied Health Sciences (CAHS) at August University has had an "embedded" librarian who conducted regular office hours and taught in a limited number of class sessions for all programs. However, the DPT program recognized the benefits of incorporating the EML model to meet accreditation standards and provide learners the best resource to seek evidence-based materials. A major change to the EBP course was having the EML play an active role in the delivery of the course content throughout the entire semester. Specifically, she worked with the course director to develop the course syllabus and all in-class literature search activities. The course syllabus included the location of the EML's designated office in the Department of Physical Therapy and specific office hours. The EML also was available by email and appointment.

The purpose of this study is to evaluate the perceived value of having an EML within this entry-level DPT program's EBP course. We hypothesize that learners would utilize the EML during and outside class sessions, consider the EML as an important part of the course, and report improved confidence in conducting literature searches.

METHODS

Class Instruction

The first lecture session focused on developing a searchable clinical question using the patient/problem, intervention, comparison, outcome (PICO) strategy, various databases to locate literature, and the use of Boolean operators. Instruction also included ways to maximize search success through the use and manipulation of medical subject headings (MeSH terms) and key words. All class sessions included an activity for learners to practice using the PICO strategy to locate evidence to answer a clinical question. The EML attended every class session and facilitated this activity. The activity began with a clinical scenario pertinent to PT practice. Learners analyzed the clinical scenario and placed key words in the PICO format. Next, they developed a searchable clinical question and used the PubMed database to identify an article to best answer the question. Afterward, the EML conducted a debriefing session that focused on the following: 1) important information included in the clinical scenario; 2) terms used in the PICO strategy; 3) format of the searchable clinical question; 4) use of MeSH terms and Boolean operators; and 5) locating the intended article.

Learners also completed a pass/fail activity outside of the regular class session that accounted for 10% of the overall course grade. They received 3 scenarios that they might encounter in clinical practice. One scenario required learners to locate an article that compared outcomes for individuals with patellofemoral pain who completed an intervention comprised of hip-based exercise to those who performed knee-based exercises. The next scenario was to determine the diagnostic accuracy of the Thessaly test for identifying a knee meniscal tear. The final scenario examined the ability of the Morse Fall Risk Scale to predict fall risks for patients in an acute care setting. Learners were graded on their ability to use the PICO strategy to develop a searchable clinical question. They also were graded on their search string (use of MeSH headings, key words, and Boolean operators) to locate an article to answer the question. All learners successfully completed the activity on their initial attempt.

Course Evaluation Surveys

Forty-one first-year DPT learners (2020 summer semester) enrolled in their first EBP course (PTHP 7101, Research 1) were invited to participate. Participants were not required to sign an Augusta University IRB-approved informed consent document because this study was granted exempt status. Participants completed two anonymous surveys at the end of the 11-week course via Qualtrics^{XM} (Qualtrics, Provo, UT). Survey questions were adapted from Blake et al [11], who examined patron perception and utilization of an EML program. For the quantitative arm of this study, learners used a 4-point Likert scale (strongly disagree, disagree, agree, strongly agree) to answer four statements about the impact of the EML on the course (Appendix). They also answered two questions about the number of times they utilized the EML during a class session and outside a class session. For the qualitative arm of this study, learners were asked four open-ended questions about their beliefs regarding the following: 1) role of the EML; 2) value added by the EML; 3) skills gained from the EML; and 4) use of the EML for EBP (Appendix). The participants were informed prior to completing the surveys that investigators would not access survey results

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until all learners completed the course and received their final course grade.

Data Analysis

For the quantitative data, frequency and percentages were calculated for each question. For the qualitative data, we used a qualitative thematic analysis with an iterative process for code development [12]. Three investigators (LB, MN, LS) independently reviewed all comments from the survey. They met and developed preliminary codes for the data as well as code definitions for a finalized codebook. The codebook was used to independently code each comment for a second time. The investigators met and finalized coding by consensus. Themes were verified by reviewing comments and assessing for disconfirming evidence.

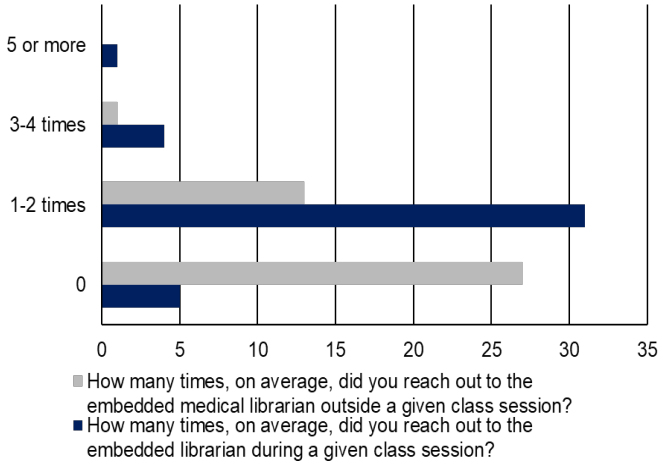
RESULTS

Ninety-eight percent (40/41) of the learners agreed to allow use of their responses for this study.

Quantitative Data

Seventy-five point six percent of learners reported utilizing the EML 1-2 times per class session and 31.7% outside of class sessions (Figure). Most learners "agreed" (53.7%) or "strongly agreed" (39.0%) that they would consult the EML for literature searches required in future courses. Seventy point seven percent "strongly agreed" that the EML improved their ability to conduct a literature search. All learners either "agreed" (43.9%) or "strongly agreed" (56.1%) that the EML added value to the course. Ninety point two percent considered the EML as an integral part of the course.

Figure 1: Frequency of the number of times learners contacted the embedded medical librarian over the course semester



Qualitative Data

Within learners' responses to open response questions on the value of an embedded librarian within the course, three themes emerged: search process instruction, search process facilitation, and search process efficiency. The definition of each theme, along with exemplar quotes for each, are included in Table 1.

Table 1 Learners' perceived values of interacting with an embedded librarian within their physical therapy evidence-based practice course

Theme	Exemplar Quotes
Search Process Instruction: EML provided didactic knowledge to complete a literature review by teaching learners how to use PubMed, providing added technical expertise on the importance of EBP, guiding learners in formative activities, and providing repetition in search strategies and question formation.	*"She provided useful guidance and pertinent research search strategy information."* *"...she effectively taught us the material and reviewed it many times so that we would understand it. She also provided us with a lot of helpful examples."*
Search Process Facilitation: EML facilitated the actual search process by demonstrating how to use the PICO format, use MeSH terms, and construct search strategies.	*"....helped me to better understand how to narrow down my searches and formulate good questions for research."* *"...provided guidance and pertinent research search strategy information."*
Search Process Efficiency: EML improved the effectiveness by which the learners used tools to begin to incorporate relevant evidence into clinical decision-making.	*"She helped teach a more efficient way to search different sites to find research that will be the most beneficial for us."* *"I learned how to access articles with a higher efficiency while the article were also at a much higher quality."*

DISCUSSION

The purpose of this study was to determine the value of having an EML in an EBP course for entry-level DPT learners. We hypothesized that learners would utilize the EML during and outside class sessions, consider the EML as a valuable part of the course, and report improved confidence with conducting literature searches. Findings from this study confirmed our hypotheses. The data gathered from this study's qualitative arm provided insight into learners' beliefs about the role of the EML,

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value of the EML, skills gained from the EML, and use of the EML in EBP.

The findings of this study align with prior evaluations of embedded librarian programs within health sciences degree programs. Blake et al [11] examined patron perception of EML across colleges (i.e., they did not examine by specific program) within a health sciences university. Ninety-four percent of their respondents either agreed or strongly agreed that they were satisfied with the EML service. Eighty-four percent of their respondents reported that they would seek EML help in the future, which is lower than the current study's 92.7% response rate. The ongoing interaction (i.e., development of a working relationship with the EML) between the EML and our learners most likely explained our higher response rate.

To date, we are not aware of any other entry-level DPT programs' use of the embedded librarian model and can attribute success in our program to various factors. Most importantly, the EML was actively engaged with the learners during most class sessions and played an integral role in content delivery. Anecdotally, as the course progressed, learners reached out to the EML more and more during each session. We believe that these in-class interactions fostered communication with the EML outside of class. Prior works have shown that EML visibility increases the likelihood of learners consulting the EML [13, 14]. Learners also reported more confidence in their search skills over the course of the semester. While many were familiar with databases like PubMed and Google Scholar, they were introduced to other databases more specific to PT practice like CINAHL Plus, SPORTDiscus, and ProQuest. We believe that the use of these databases contributed to learners developing more robust literature searchers [14]. Another important consideration was the administrative support provided by the Dean of the CAHS. The Dean ensured that the EML had dedicated office hours and encouraged all academic programs to integrate the EML into EBP activities. Although not a study focus, the EML was a member of the college-level faculty governance council. Her participation on this committee provided an additional avenue to foster collaboration with other faculty members. Programs that want to implement the embedded librarian model should consider the importance of communication to promote collaboration between the EML and instructors [3, 5]. They also should ensure adequate administrative support (e.g., designated office hours and physical space) and opportunities for engagement between faculty and learners [3, 5, 11, 13].

Our findings suggest that entry-level DPT programs looking to document their compliance with CAPTE's Element 7D40 (health informatics) competency could consider utilizing an embedded librarian program. Incorporating the EML model, especially within an EBP course, may provide learners with a means for developing the skills needed to be an efficient evidence-based practice clinician. Learners who develop fundamental information-seeking skills within early course sequences could then build on these skills by applying them within clinical decision-making settings later in their course sequence.

LIMITATIONS

The study has limitations to address. First, our study lacked a pre-test/post-test design, thus prohibiting the ability to determine changes in the learners' attitude from interactions with the EML. Having data from this design could provide insight on the degree to which the embedded librarian model shaped learners' perception of the EML. Second, this study was designed to assess learners' perceptions, not actual attainment, of improved literature search skills. Although all learners successfully passed a single graded activity (e.g., using the PICO strategy to locate an article to answer a clinical question), it was not sufficient to comprehensively assess actual skill gains. Finally, this study only included a single cohort of DPT learners. The EML worked exclusively in the CAHS, which houses the DPT program and allowed our learners to have significant access to the EML throughout the course. We cannot determine the success of this model when using an EML that supports other disciplines like medicine, dentistry, and nursing. Together, these limitations impact the overall generalizability of study findings to other programs.

FUTURE DIRECTION

The purpose of this pilot study was to determine the benefits of an EML having a significant role in delivering content in an entry-level DPT EBP course. Our findings suggest that having an EML integrated early into a DPT curriculum is valuable to the learners and that learners appreciate learning skills early in their course of study that they can utilize throughout the curriculum. Future studies should incorporate a pre-test/post-test design to examine changes in perceptions of the value of the EML and competency in conducting literature searches. Researchers also should examine the amount of EML interaction required to develop proficient search skills. Another need is to determine the extent that a cohort of entry-level DPT learners consult the EML in future evidence-based clinical courses. Generalizability would be improved by having other entry-level DPT programs replicate our survey. Finally, additional studies should determine the impact that the EML has on faculty productivity with respect to instruction and scholarship as well as contributions on college-level committees.

DATA AVAILABILITY STATEMENT

Data associated with this article cannot be made publicly available because they contain personally identifiable

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information. Access to the data can be requested from the corresponding author and may be subject to IRB restrictions.

AUTHOR CONTRIBUTIONS

Lori Bolgla: conceptualization, investigation, methodology, data curation, formal analysis, project administration, writing – original draft, writing – editing & revision; Malorie Novak: data curation, formal analysis, project administration, writing – original draft, writing – editing & revision; Lachelle Smith: conceptualization, investigation, methodology, data curation, formal analysis.

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Supplemental Files

- **Appendix A:** Questions for the Study Quantitative Arm

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The structure and experience of interim roles in academic health sciences libraries

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See end of article for authors' affiliations.

Objective: Interim leadership roles are commonly used in academic libraries to ensure continuity and oversight within the organization. Interim roles can be rewarding but fraught with challenges, including the assumption of responsibilities in unstable environments, unclear expectations, and poor organizational preparedness. This article presents findings from a survey of librarian's experiences serving in interim leadership positions.

Methods: A survey was designed to capture perceptions of the structure of the leadership position and the experience of the interim leaders. It was distributed via social media and through health sciences library listservs. Responses were analyzed using descriptive statistics and exploratory one-way ANOVA to test for response differences between respondent sub-groups.

Results: Fifty-four complete responses were collected. Respondents were predominantly White (89%) and female (77%). Seventy percent of respondents had worked in health sciences libraries for 11-25 years. Respondents indicated that expectations, expected duration, and transition plan for the role were unclear. Policies and procedures related to the interim role were lacking. Respondents agreed that full authority and acceptance were given as part of the role. There were statistically significant differences in responses relating to authority, retention, and acceptance by gender and race.

Conclusions: Results show that interim leaders were given adequate authority and support, but that organizations were not necessarily prepared for the interim leader, lacking policies, procedures, and clear expectations related to the position. Libraries can better prepare for the future by creating permanent structures and policies to facilitate the transition into and out of interim leadership.

Keywords: Leadership; interim; Library management; Surveys and Questionnaire; academic health sciences libraries

See end of article for supplemental content.

OBJECTIVE

Interim leadership positions are one way for organizations to ensure continuity during staffing changes, recruitment, financial uncertainties, or other events beyond the control of the organization. While some interim leaders remain in their positions for a year or more, these positions are often intended to provide a temporary solution until a permanent manager or administrator is hired. Academic librarianship offers some insights into interim leadership, but there is limited health sciences library scholarship regarding how libraries and librarians can prepare for interim roles.

Existing literature on interim leadership in libraries includes personal narratives [1, 2], literature reviews [3], and, more recently, mixed methods studies of the experience of serving as an interim library leader [4, 5]. A consistent thread throughout the literature for both the organization and the individual is the importance of preparing for the interim position and setting shared expectations between the interim, the organization, and members of the organization [3–5].

Literature from other disciplines reveals a growing number of temporary leaders who serve in corporate settings, healthcare, and higher education. These temporary leaders often take on interim roles during times of transition, tension, or volatility, making their success in the position of particular importance to the organization [5]. Those selected for interim leadership positions come from both inside and outside of the organization. Those brought from the outside often have specialized skills and are usually brought in to not only bring about stability but also to address already identified areas of concern [6, 7]. Others are appointed from within because of their organizational knowledge and experience. While some

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individuals may be reluctant to take on an interim role, those that do may do so out of commitment to the organization [6, 8].

Interim leadership roles create significant opportunities for leadership development and maintaining continuity within health sciences libraries. However, interim positions may create additional uncertainty for the individual and organization if not planned appropriately, making it critical that individuals considering these opportunities carefully consider their career goals and the current state of their organization. Merritt, et al. suggest four points of consideration for individuals preparing to enter into an interim role: understanding expectations, adjusting expectations, accommodation (focus of pragmatic short-term action), and phasing out (setting the stage for a permanent leader) [9]. This proposed framework describes the cycle of work involved in a transitional leadership role, but does not articulate how the role may be shaped by organizational forces, such as planning and support.

In 2020, at a single institution, three librarians were each asked to serve in term-limited interim leadership positions at different levels of the organization. After completing these temporary assignments, the authors sought to better understand the landscape of interim roles in libraries and the expectations of interim leaders compared to their actual experiences. The goal of this research is to understand the perceptions and the experienced realities of those involved with interim leadership roles.

METHODS

As there were no existing, validated instruments that captured all of the elements of interest to the researchers, the authors drew from existing research across multiple disciplines to create a survey specifically tailored to interim library leaders [3, 4, 10, 11]. The survey was composed of 27 questions on a 5-point Likert rating scale (strongly disagree=1 to strongly agree=5) and broken into three parts: structure of the interim position, experience in the interim position, and demographic information (see Supplemental File). This study was determined to be exempt from review by the Virginia Commonwealth University Institutional Review Board (HM20021475). The survey was created in QuestionPro [12] and distributed through listservs and through the social media platform Twitter, now X, in an attempt to solicit responses from those who held interim leadership positions in the last ten years. The survey was posted on Twitter using the library Twitter handle and through the following online mailing lists: Medlib-L, ACRL HSIG, and AAHSL-all. Because the exact number of health sciences librarians who have held interim leadership positions is not known, the researchers were unable to anticipate the exact number of responses that would be received.

Descriptive statistics were used to summarize the data from the responses. Complete responses were exported from the survey instrument into Microsoft Excel for analysis. Descriptive statistics (frequencies and percentages) were used to summarize survey respondents. Biostatisticians performed exploratory analysis using one-way analysis of variance (ANOVA) models to investigate associations between individual experience in the interim position and each of the following (separately) as predictors: (i) the level of the interim position, (ii) time in the library profession, and (iii) the race and gender of the participant. A one-way ANOVA model was also used to investigate the association between the structure of the interim position and the type of institution. While broader data on demographics were collected, demographic variables were grouped as follows for analysis: sex (male and female), race (white or Caucasian, other, and missing), level of position (department head/assistant or deputy director and director or dean), years in the profession (0-10, 11-20, 21-30, 31+), institution type (academic health sciences, college/university, and other). All summaries and statistical analyses were computed in the R statistical software [13].

RESULTS

The survey received 54 complete responses. Demographic summaries of the respondents can be found in Table 1. The majority of respondents were white (89%), female (77%), and working in health sciences libraries with 25 or fewer full-time employees (74%). Seventy percent (70%) of respondents reported 11-25 years of experience in libraries. Most held interim positions at the Director level (61%) while more than a quarter held interim positions at the Department Head level (26%). In addition to demographic information, participants were asked to respond to two sets of statements: one describing aspects of the structure of the interim position and the other describing their experience in the interim position.

Structure of Interim Position

Questions in this section of the survey asked respondents to indicate their agreement regarding organizational preparedness and existing structures put into place for an interim leadership position (Figure 1). Most respondents disagreed (disagree and strongly disagree) with the statement that there was an understanding of the expectations of the interim position or duties anticipated by the organization during the interim period (53.7%). Similarly, most respondents disagreed that their organization had policies and procedures in place related to interim appointments (53.7%).

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Table 1 Demographic characteristics of respondents for groups for which there were responses. A full list of the demographic variables collected by the survey can be seen in the Supplementary Material.

Demographic Variable	Number of Responses (n=54)	%
Institution Type		
Academic health sciences	38	70.37%
College/University	13	24.07%
Hospital	1	1.85%
Medical or health sciences association or society (non-profit)	1	1.85%
Research or health research center	1	1.85%
Library FTEs		
1-5	10	18.52%
6-10	9	16.67%
11-25	21	38.89%
26-30	5	9.26%
31-35	3	5.56%
36-40	2	3.70%
41-45	1	1.85%
46-50	2	3.70%
More than 50 FTE	1	1.85%
Level of Interim Position		
Department Head	14	25.93%
Associate or Deputy Director	5	9.26%
Director	33	61.11%
Other	2	3.70%

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Gender Identity		
Female	44	77.19%
Male	10	17.54%
Cisgender	3	5.26%
Racial or Ethnic Group		
American Indian or Alaska Native	1	1.82%
Asian	3	5.45%
Black or African-American	1	1.82%
Hispanic, Latino, or Spanish Origin	1	1.82%
White or Caucasian	49	89.09%
Years of Library Experience		
0-5 years	2	3.70%
6-10 years	2	3.70%
11-15 years	15	27.78%
16-20 years	10	18.52%
21-25 years	13	24.07%
26-30 years	7	12.96%
31 or more years	5	9.26%
Years at Present Institution		
0-5 years	8	14.81%
6-10 years	16	29.63%
11-15 years	10	18.52%
16-20 years	11	20.37%
21-25 years	4	7.41%

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26-30 years	4	7.41%
31 or more years	1	1.85%

Figure 1 Responses to Questions on the Structure of the Interim Position

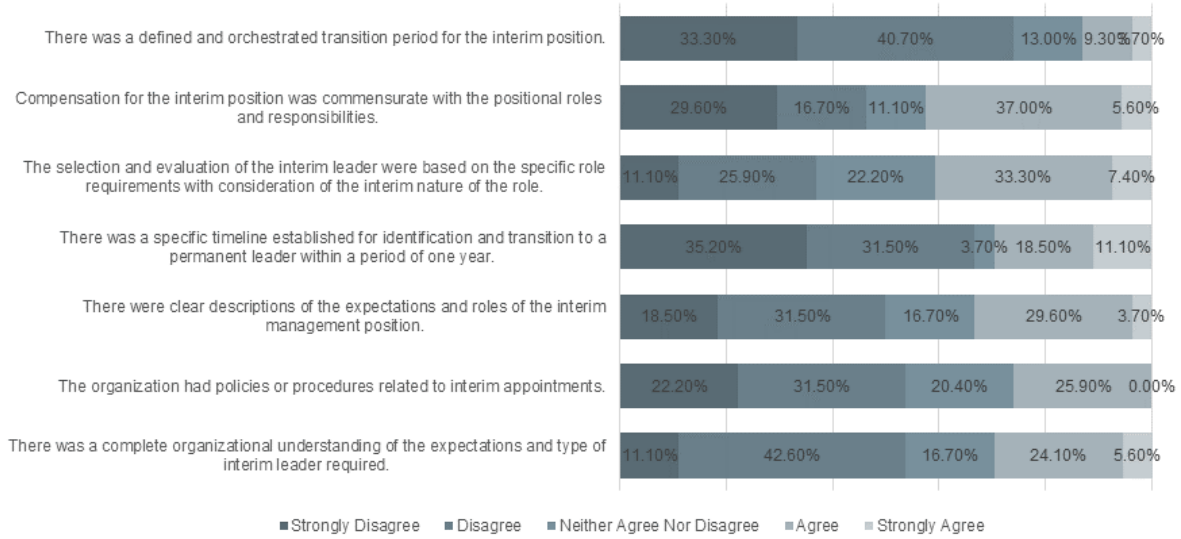
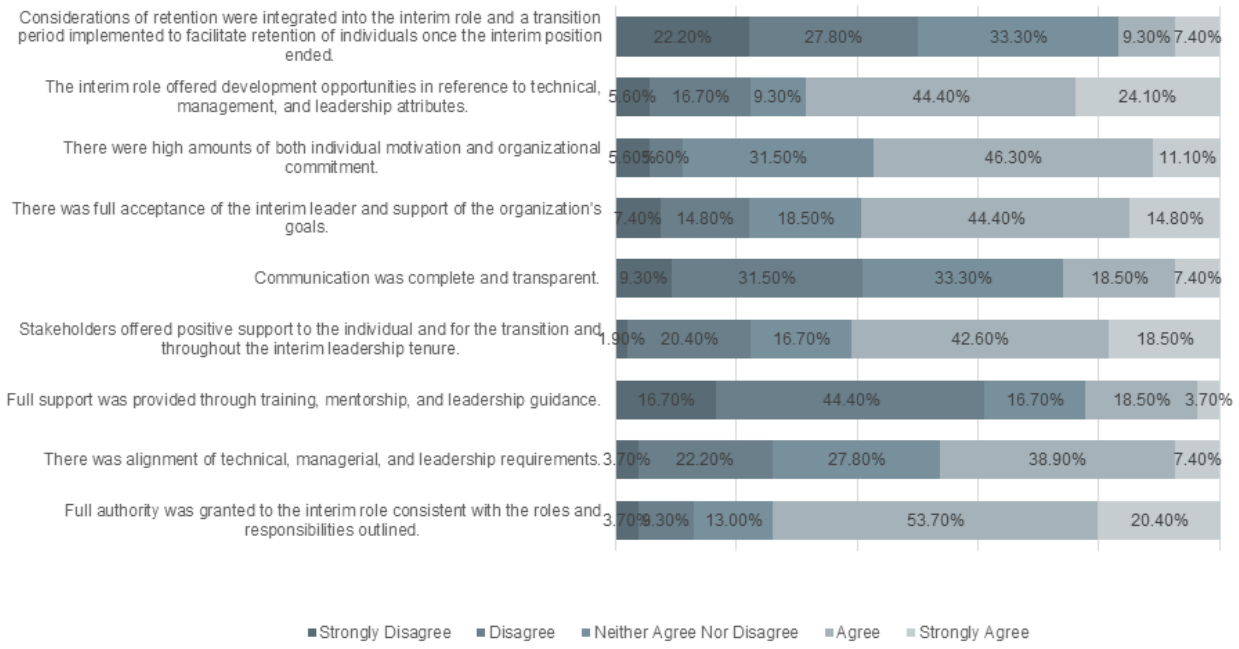


Figure 2 Responses to Questions on Experiences in the Interim Position



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Opinions among respondents were slightly divided regarding whether or not the expectations of the interim role were clearly described for their organization with half of the respondents disagreeing or strongly disagreeing (n=27, 50%) and one-third agreeing or strongly agreeing (n=18, 33.3%). A greater degree of disagreement was observed among respondents regarding whether a timeline for transitioning from an interim to permanent was established with two-thirds of respondents disagreeing or strongly disagreeing with the statement (n=36, 66.7%). Respondents were neutral on the issue of whether the interim leader was selected and evaluated based on the role requirements with nearly one quarter of respondents neither agreeing nor disagreeing (n=12, 22.2%). Responses were divided on whether compensation for the interim position was commensurate with the positional roles and responsibilities with 46.3% (n=25) disagreeing or strongly disagreeing and 42.6% (n=23) agreeing or strongly agreeing.

The majority of respondents felt that transitioning into and out of the interim position was not well planned with 74% (n=40) disagreeing or strongly disagreeing that there was a defined transition period for the interim position. The ANOVA results indicated no significant differences in responses across institution types for any statement related to the structure of the interim position

Experience in the Interim Position

Questions in this section of the survey asked respondents to indicate their level of agreement regarding their firsthand experience in the interim leadership position (Figure 2). Most respondents agreed that the interim position was granted full authority based on the understood roles and responsibilities (n=40, 74.1%). There was a moderate amount of agreement regarding whether there was alignment between the technical, managerial, and leadership requirements required in the position with 46.3% either agreeing or strongly agreeing (n=25).

More than half of the respondents (n=33, 61.1%) disagreed that they received support in the form of training, mentorship, or leadership guidance while in the role. However, many respondents (n=33, 61.1%) indicated that they received positive support from stakeholders while in the interim position. Respondents were more divided on whether or not communication was complete and transparent during the interim position with 40.8% disagreeing and one third (33.3%) neither agreeing nor disagreeing.

Many respondents (59.2%) agreed that there was full acceptance of the interim leader and the organization's goals for this position, and more than half of respondents (57.4%) agreed that levels of individual motivation and organizational commitment were high during the interim period. Additionally, the majority of respondents (68.5%) agreed that the interim role offered opportunities for the development of managerial and leadership skills. Despite this, 50.0% of respondents disagreed that considerations of retention of the interim leader were integrated into the role including a period of transition out of the role.

ANOVA testing (see Table 2) revealed no significant differences in responses on experience in the interim role by the level of the interim position or the time in the profession. A statistically significant difference in response rates was found between male and female for the statement on whether full authority was granted to the interim role ($p = 0.0284$). Males (mean (SE)=4.40 (0.31)) were more likely than females (3.64 (0.15)) to report that full authority was granted in the interim position (p-value = 0.0284). Significant differences in responses were also observed by race on the statements relating to whether considerations of retention were integrated into the interim role ($p = 0.0305$), where White race (2.44 (0.16)) were less likely than other races (3.60 (0.50)) to agree with statements relating to considerations of retention after the interim positions (p-value = 0.0305). Also, White race (3.38 (0.15)) were less likely than other races (4.60 (0.47)) to agree that there was full acceptance of the interim leader and support of the organization's goals. (p-value = 0.0166). Significant results of the analysis are presented in Table 2 with the remaining analyses available in the Supplementary File.

Table 2. ANOVA Model Results for Significant Differences

Parameter	DF	Sum Sq	Mean Sq	F Value	P-Value
Full authority was granted to the interim role consistent with the roles and responsibilities outlined.					
Gender	1	4.75	4.75	5.09	0.0284*
Residuals	52	48.58	0.93		
Considerations of retention were integrated into the interim role and a transition period was implemented to facilitate retention of individuals once the interim position ended.					
Race	1	6.12	6.12	4.95	0.0305*
Residuals	51	63.01	1.24		
There was full acceptance of the interim leader and support of the organization's goals.					
Race	1	6.80	6.80	6.14	0.0166*
Residuals	51	56.45	1.11		

Other Findings

The survey also asked several questions outside of either of the two domains or demographics to better understand factors that may have contributed to the experience of an

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interim leader. For instance, more than one third of respondents (n = 19; 35%) indicated that they were still in an interim role at the time of the survey. Based on data provided by 17 of these 19 respondents (two respondents did not provide an interim appointment start date), the average time in an interim role was 11.5 months, but the length of the appointment lasted anywhere from three to thirty months.

A majority of participants (74.07%; n=40) reported that they maintained all typical responsibilities in addition to taking on the responsibilities of the interim position while 20% (n=11) reported maintaining only limited responsibilities from their previous position. Additionally, 91% (n=49) of respondents indicated that they had taken part in a formal leadership training program before to taking on the interim position. A breakdown of common programs shows that: ten had participated in the National Library of Medicine (NLM)/Association of Academic Health Sciences Libraries (AAHSL) Leadership Fellows Program, nine took part in an institutional leadership program, and eight took part in the Harvard Leadership Institute for Academic Librarians while 19 had taken part in another form of training or program not listed in the survey.

DISCUSSION

In this survey of interim leaders in health sciences libraries, participants indicated that the experience was a good opportunity for professional development and they were largely given adequate authority and support to fulfill their responsibilities. However, responses to questions on authority, retention, and acceptance exhibited statistically significant differences by gender (authority) and race (retention and acceptance). Respondents also indicated that organizations were not necessarily prepared for the interim leader, lacking policies and procedures or clear expectations related to the duration of the interim position, retention of existing duties, and transitioning from an interim to a permanent leader.

This survey found a significant difference between male and female participants' perceptions of whether full authority consistent with the roles and responsibilities of the interim position was granted. The perception of authority granted a position may vary based on several factors. Gender stereotypes play an important role, as they influence how others perceive a leader regardless of their performance. Due to historic underrepresentation within library leadership roles, women are not always viewed as leaders by their colleagues, resulting in actual or perceived reduction of authority [14]. Additionally, research indicates that women in leadership roles are conscious of the risk of not being accepted by their subordinates, which can lead to lower expectations of influence and more negative self-evaluation of leadership opportunities [15]. At the same time, research shows that stereotypes of leadership within primarily female organizations tends to be more feminine, and that female dominated organizations tend to view female leaders as more effective [16,17]. The contrast between the context and the experience of interim leaders in health sciences libraries suggests that other factors may dictate the real or perceived authority granted to interim leaders.

We also found that participants of White race were less likely to agree that considerations of retention were made after the interim period ended. This is an unexpected finding that warrants further exploration. However, there is research that may offer some explanation of this finding. The period immediately following an interim appointment can be difficult for those leaving the role, evoking strong emotional responses ranging from relief and happiness to disappointment or bitterness [18]. For interim leaders that do who not immediately depart the institution or are promoted to a permanent role, remaining at the institution or reverting to a prior role can be challenging. Returning to a prior role with the same responsibilities can be a very uncertain time as the demands and social context have changed [4]. Research on morale and retention in academic libraries has found that turnover is partly linked to dissatisfaction based on the perceived potential for advancement or promotion (to a higher position, not a higher academic rank). Librarians reported that staying at the same institution meant forgoing opportunities and suffering from a lack of opportunities to acquire the skills and experience needed for a more advanced position [19]. These factors, uncertainty of returning to a prior role and perception of low potential for advancement, may dictate the perception of efforts to retain interim leaders and may lead to a situation of involuntary staying- a state where, after a trigger event, an employee is forced to reevaluate their understanding of the organization and their role within it [20].

Our analysis also indicated that participants of White race were less likely than other races to agree that there was full acceptance of the interim leader. Gaining acceptance is an important goal for an interim leader and the organization and should be a key aim of the onboarding process. This socialization helps to integrate the interim leader into the organization by equipping them with the necessary knowledge and skills to exercise the authority¬ they are given [21]. Regardless of socialization, which may be minimized in some libraries based on the responses to questions in this survey about the structure of interim positions, factors like gender and race can impact acceptance. The perception of leadership efficacy varies by race and is affected by social and organizational structures that prioritize whiteness [22]. Given these findings, we might expect the results of this survey to indicate that races other than White were less likely to agree that there was full acceptance of the interim position. Our findings

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show the opposite may indicate that there are other contextual or organizational factors at work.

The lack of structure and policies related to interim positions in health sciences libraries may stem from many sources, including the relative frequency of requiring an interim leader or from the circumstances under which an interim leader is required. When a transition in leadership is anticipated, for instance due to retirement or planned personal leave, there may be sufficient time to fully consider the requirements for an interim position. Unexpected conditions necessitating interim leadership, such as unanticipated health concerns or layoffs, may present greater challenges for the organization and result in less planning for the position [5].

Management literature suggests several potential solutions to the problem of creating a plan for interim roles before they are required. One such solution would be to describe and implement a cycle for interim assignments tailored to the needs of the organization. The cycle of Preparation (determining scope and learning about culture), Entry (establishing authority and priorities), Delivery (completing the objective of the assignment), and Exit (knowledge transfer to permanent leaders) described by Woods provides a useful framework for thinking about interim responsibilities and establishing appropriate resources and support for the position at the organization level [11]. Considering each stage in the cycle could also help alleviate issues related to transitions, specifically how the interim leader transitions out of the role, whether or not they transition back to a prior position, or whether or not they are retained at all. Each of these results has specific implications that need to be considered [23]. Parchment, et al. suggest a similar approach based in the creation of a formal manual outlining a framework for progressing in an interim role from a transition phase to applying and expanding on leadership skills [24]. This model, based on the American Organization for Nursing Leadership competencies, provides detailed suggestions for the topics covered at each phase (Initial Transition, Reality, Accommodation); however, while an exit strategy is mentioned, little time is spent describing the important step of transitioning out of the interim role can be accomplished.

Aside from a deficit in planning for interim positions through policy, responses to the survey indicated that organizations did not appear to be clear on specific skills required of the interim manager for the role. This includes planned development for the interim while in the position. London proposes a number of considerations for interim assignments, including power dynamics and skill development while in the interim role, addressing the respective roles of the organization, senior leadership, and the interim in planning for and navigating these complexities [25]. Other research emphasizes the importance of mentorship throughout the interim period. Mentoring in this case includes receiving assistance navigating new power dynamics as an organizational leader and complex relationships between former peers and a temporary position as a manager or supervisor [26,27]. Providing both general orientations as well as tailored development may be an important way that health sciences libraries can strengthen support for interim leadership.

There are some limitations to these findings that need to be considered. The survey instrument developed for this project was based on research in another discipline, which could create misalignment between the core concepts driving the questions and the perception of respondents. Additionally, the instrument was not validated during development. This survey was conducted during the Covid-19 pandemic, which could have exacerbated unorthodox conditions in which interim leaders were brought into organizations. The respondents to the survey were 89% Caucasian/White and 77% female. A recent survey conducted with Medical Library Association (MLA) members found the organization to be 73% white and 79% female [28]. A similar racial / ethnic distribution was observed in a cross-sectional analysis of interim deans at medical schools in the United States [29]. Based on this data, our sample may overrepresent white librarians who have served in interim leadership roles or indicate a disparity in opportunities for librarians of other races and ethnicities to take on these positions. Lastly, the research team was comprised of two white cis gender males and one white cis gender female librarians indicating that survey questions and structure may be limited based on the privilege and lived experiences of the research team.

Overall, these results showed that participants viewed their experiences as interim leaders as providing many positive experiences. At the same time, libraries and library leadership have work to do in terms of developing permanent structures and policies to facilitate the transition into and out of interim leadership roles. Further research should be conducted to understand how the implementation of specific planning impacts the individual and organizational experience of transitional leaders. Additionally, creating an environment that grants all leaders, regardless of race or gender, the same level of authority and acceptance is critically important for health sciences librarianship. Future research should explore the relationships revealed here between the experiences of male and female participants and between the experiences of participants of different races.

DATA AVAILABILITY STATEMENT

Deidentified data associated with this is publicly available via the Open Science Framework project associated with this work (DOI 10.17605/OSF.IO/4HDXY).

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AUTHOR CONTRIBUTIONS

John W. Cyrus: Conceptualization, methodology, investigation, visualization, writing (original draft); Roy E. Brown: Conceptualization, methodology, investigation, writing (reviewing & editing); Emily J. Hurst: Conceptualization, methodology, investigation, writing (reviewing & editing); Rasha Alsaadawi: Methodology, formal analysis, visualization, writing (review & editing); Roy T. Sabo: Methodology, formal analysis, visualization, writing (review & editing).

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SUPPLEMENTAL FILES

- **Appendix A**: Full Statistical Analysis

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Bibliotherapy for stress management: a wellness intervention for first-year medical students

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See end of article for authors' affiliations.

Objective: This proof-of-concept study aimed to evaluate if a library-initiated program of bibliotherapy could be effective in reducing overall levels of stress and anxiety in first-year medical students.

Methods: This mixed-methods study consisted of an Interrupted Time Series (ITS) where participants established baseline levels of stress and anxiety by completing the 10-item Perceived Stress Scale (PSS-10) three times prior to intervention and three times following, with a bibliotherapy intervention delivered at the halfway point. Four focus groups were held following completion of the ITS with questions designed to solicit feedback related to how enjoyable and valuable participants found the study, as well as priorities for wellness.

Results: An independent samples t-test was conducted to compare mean PSS-10 scores in the pre-intervention group to those in the post-intervention group. The results indicate no significant difference between scores pre-intervention (M= 17.85, SD=6.76) and post-intervention (M=17.21, SD=6.87, t(162)=.604, two-sided p=.547, 95% CI [-1.46, 2.75]). Focus group analysis revealed that participants found involvement in the study to be a useful component of a personal wellness or mental health maintenance program.

Conclusions: Quantitative results did not achieve statistical significance, but analysis of focus groups indicates that participants derived benefit from involvement in the study, particularly related to the regular self-reflection required by completing the monthly PSS-10. The study is a successful proof-of-concept, indicating that medical students derive benefit from a librarian-led bibliotherapy program as part of student wellness.

Keywords: Bibliotherapy; Wellness; medical education

See end of article for supplemental content.

INTRODUCTION

In her memoir *White Coat: Becoming a Doctor at Harvard Medical School*, Ellen Lerner Rothman writes of a "collective doubt" that consumes her first-year classmates, arising from unspoken pressure to know everything, to ace every test, to heal every patient; yet in the midst of this shared experience, she notes, "we feared to acknowledge our private struggles, our perceived weaknesses" [1]. Over the last several decades, studies have shown that medical students struggle with "academic pressure, workload, financial concerns, sleep deprivation, [and] exposure to patients' suffering and deaths" [2]. As a result, the students exhibit "high emotional exhaustion, high depersonalization, and burnout" and a greater likelihood of depression and fatigue, when compared to other US college graduates aged 22-32 [3]. In response to these patterns, the Hirsh Health Sciences Library (HHSL) at the Tufts University School of Medicine (TUSM) launched a series of recreational programs called "Fun Labs," offering students the opportunity to socialize and work on crafts. These activities were explicitly designed to be easy to stage and quick to complete. They required no preplanning and minimal time commitment, as lack of time and poor work-life balance are routinely reported stressors for medical students [4]. While popular and well-received, the ability to offer Fun Labs was halted by the COVID-19 pandemic in March 2020.

The pandemic and related mitigation measures are associated with increases in adverse mental health conditions and substance abuse in the general US population [5]. Health care workers endured additional stressors leading to high rates of burnout and mental health concerns including anxiety, depression, and insomnia [6]. Students in medical school in 2020 confronted additional challenges such as unexpected distance learning, social isolation, limited physical access

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to clinical settings and other students, as well as the fear of contracting COVID-19 and infecting others [7]. Recognizing that the abrupt changes and long-lived effects of the pandemic would increase stress and anxiety among students, we decided to explore the feasibility of starting a bibliotherapy program built on the principle that "information, guidance, and solace can be found through reading" [8].

Bibliotherapy, loosely defined as reading for therapeutic effect, has its modern roots in the Library War Service of the First World War. In collaboration with physicians, librarians "prescribed" books to soldiers recovering from illness or injury, to help boost the spirits and bolster the mental health of patients in military hospitals [9]. In the last 40 years, bibliotherapy has been successfully deployed in clinical settings, often utilizing a self-help text as a treatment or adjunct for conditions including depression, substance misuse, self-harm, panic disorder, and anxiety [10]. While there is awareness of bibliotherapy as a potentially useful tool in medical school settings, there is a lack of research focused on this population [11]. There is some evidence that students in health sciences disciplines respond positively to leisure reading or creative writing interventions which aimed to mitigate stress and anxiety, boost self-esteem, and improve overall psychological well-being [12], [13]. Research into the efficacy of bibliotherapy in the treatment of panic disorders has indicated that bibliotherapy combined with talk therapy is superior to bibliotherapy alone [14], while traditional therapy is vastly superior to any bibliotherapeutic intervention [15]. However, a 2010 trial postulated that in the absence of traditional therapy, having scheduled check-ins and limits may introduce a "deadline effect" that is motivational and could lead to improved patient outcomes [16]. In addition to panic disorder, bibliotherapy without regular therapist contact has shown improvement in cases of social anxiety disorder [17] and depression [18] as compared to no active intervention, although questions remain as to durability of treatment effects. Due to the intense demands on medical students' time and the physical distancing required due to COVID-19, a limited-contact model without additional meetings or talk therapy was adopted for this study. Crucially, as librarians we are neither able to diagnose or treat medical conditions, nor provide professional monitoring. We can, however, provide structure and deadlines.

We opted to replace the conventional self-help books used in many bibliotherapy studies with short readings, a mix of fiction and non-fiction selections from which participants could choose according to their interests. Use of non-fiction was supported by the traditional self-help texts used in bibliotherapy as well as research espousing use of memoir in the practice [11], [19]. Incorporation of fiction is supported by Dijikic et al's findings that reading fiction can lead subjects to develop "a decreased discomfort with ambiguity" [20]. This potential for increasing comfort with the unknown supported the selection of readings related to themes of plague and pandemic. Cognition researcher K.W.M. van Krieken theorizes that consumption of tragic/horror narratives enable readers to mentally prepare for challenging situations [21]. Anecdotally, this assertion appears to be supported by the 2020 reappearance of pandemic novels such as Stephen King's *The Stand* and Albert Camus' *La Peste* on best-seller lists, and the spring 2020 appearance of Stephen Soderbergh's 2011 film *Contagion* at the top of Netflix's most-streamed list [22]. Immersion in a horror narrative, whether via watching a film or television, listening, or reading, has been theorized to help the consumer build practical social skills and emotional resilience in the face of fear and chaos [23]. Building on this concept, this study aimed to determine if a self-paced, librarian-driven bibliotherapy model, in the form of excerpts of fiction and nonfiction related to plagues and pandemics, can serve as an effective intervention to improve perceptions of stress and anxiety among first year medical students.

METHODS

Study Conduct and Oversight

This mixed-methods study was conducted by two Research & Instruction Librarians (RM and ALV) at the Hirsh Health Sciences Library (HHSL) at the Tufts University School of Medicine (TUSM). The study protocol was approved by the Tufts University Social, Behavioral & Educational Institutional Review Board via Expedited means under 45 CFR 46.110 Categories 6 & 7 (IRB ID: STUDY00001125) in November 2020. Participants were recruited via the TUSM MD class of 2024 email listserv in December 2020. All aspects of the study were conducted electronically via Qualtrics and Zoom and administered by RM, and consent was obtained from all participants via a Qualtrics form. Quantitative analyses were performed by RM using IBM SPSS Statistics 28.0.1.0. Focus group recordings were saved to a University networked drive to safeguard data. Data were transcribed by RM using the MacOS Advanced Dictation tool. Zoom recordings were deleted from the local drive following review and transcription correction by both researchers. ALV completed initial hand-coding of focus group transcripts, followed by continuous comparison analysis conducted by RM using NVivo 1.6.2.

Study Design

This study consisted of two parts: a quantitative data component structured as an Interrupted Time Series (ITS) and a qualitative data component composed of a series of small focus groups. The ITS spanned six months, a time period chosen to correspond with the semester structure of the TUSM MD program. Participant data was collected monthly for three months prior to delivery of a bibliotherapy intervention, and again for three months

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following. Data points for the ITS were collected using the 10-Item Perceived Stress Scale (PSS-10). Rather than building assessments based on objectively stressful life events, the PSS aims to illustrate "the degree to which situations in one's life are appraised as stressful" [24], and the instrument has been used in multiple recent studies assessing the efficacy of wellness interventions in medical student populations, although not specifically with bibliotherapy [25], [26], [27].

The PSS-10 consists of ten questions, half of which are phrased positively, and half phrased negatively. It is completed by the test subject, who reports their own reactions and stress levels over the prior month. The PSS-10 is designed as a straightforward 5-point Likert-scale with response options ranging from 0 = "Never" to 4 = "Very often". Questions 1, 2, 3, 6, 9, and 10 are calculated as-written (0= "Never" for 0 points to 4 = "Very often" for 4 points). Question 4, 5, 7, and 8 are reverse-coded (0= "Never" for 4 points to 4 = "Very often" for 0 points) [28]. The final score is determined by adding the results of all 10 questions [29]. Scores can range from 0 to 40, with higher scores indicating higher levels of perceived stress [24]. The PSS-10 was selected for this study because it is brief, easy to understand, and widely used with a variety of populations in both clinical and empirical research settings [28]. All participants who successfully completed PSS-10 surveys were then offered the opportunity to enroll in a focus group. Successful completion of the study was defined as completing the bibliotherapy intervention and at least two pre- and post-reading PSS surveys.

The quantitative component of the study was conducted January – June 2021. The PSS-10 was administered monthly, six times in total. It was distributed on the first day of the month (or the closest weekday to the beginning of the month) with one week to complete and submit answers. A reminder was sent to those who had not submitted the PSS-10 after three days. The intervention was distributed after the March PSS-10, with all eligible participants receiving an additional Qualtrics survey listing six excerpts

PDFs of the excerpts were available for participants to download from Box. Readings were to be completed between March 8 and March 31, 2021. Participants were reminded twice to fill out a Qualtrics survey confirming that the readings were completed.

Following successful completion of the quantitative component of the study, participants received a $100 USD Visa gift card. All qualifying participants were invited to participate in a focus group designed to gather qualitative reflections. Questions were developed by the authors to obtain insight on participants' experience of this proof-of-concept study and to guide future development of bibliotherapy programs at HHSL. Our questions followed the "questioning route" strategy outlined by Krueger. Questions were approved as part of IRB but were not pilot-tested ahead of the focus group meetings [30]. Focus groups were planned to consist of no more than 12 participants at one time, so multiple sessions were scheduled and held via Zoom in June-July 2021. Four focus groups were held, with attendance ranging from 2 to 5 participants. All focus group participants were entered into a raffle for an additional $200 USD Visa gift card, awarded to one participant following the completion of all groups. The focus group Questions are listed in Table 1.

Table 1 Focus Group Questions

Opening Prompt: "I would like to set the stage by having you think back about the last academic year; please share an area of your life where you have changed or grown in response to the challenges you have faced."	
Q1	Think back over the last 6 months as you participated in the study. What did you enjoy?
Q2	Think back over the last 6 months as you participated in the study. What did you find valuable?
Q3	If you were inviting a peer or friend to participate in this project, what would you write or say to them about it?
Q4	If you were in charge of this program, what is one change you would make or what would be different?
Q5	What do you prioritize in selecting activities for wellness or self-care?

Participants

Eligible participants consisted of all first-year students (M1) enrolled in the MD program of the Tufts University School of Medicine class of 2024. All students who started their MD or combined MD/other degree program in August 2020 were eligible, including students in the Maine Track, an MD program offered in partnership with MaineHealth. All communications with participants were maintained through a Qualtrics Contact List and all surveys and instruments distributed using Qualtrics Email Distribution. All surveys (PSS-10, Reading Selection, and Reading Confirmation) were created using the Qualtrics Anonymize Responses feature, which removes the IP address and location data from responses. The researchers could see who had responded but not which responses belonged to which participants. Preliminary research conducted by the authors indicated that medical students perceive that they may be stigmatized for disclosure of mental health conditions, or that asking for help brands them as "less successful, weak or incapable" [31]. This potential for stigma led the researchers to prioritize

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participant privacy, ensuring that all data collected via Qualtrics could not be associated with individuals. This choice removed the ability to compare pre-and-post intervention PSS-10 scores in pairs. While limiting our analysis, it preserved anonymity, which was determined to be essential to cultivating trust and minimizing potential harm. Participants were informed of privacy measures via a consent form they were required to authorize as part of intake and enrollment, and they were given channels to report concerns to the IRB.

Because the initial consent authorized on study enrollment noted that student responses would not be identifiable, the focus group Script contained an additional consent statement that was read before starting any recording of voice or image (see Appendix for full focus group script and consent statement). Participants had the option to leave the session before recording began. Once verbal consent was obtained from all participants, the focus groups were conducted by ALV with RM off-camera. Each focus group concluded with the opportunity for participants to ask questions about the study itself.

Data Analysis

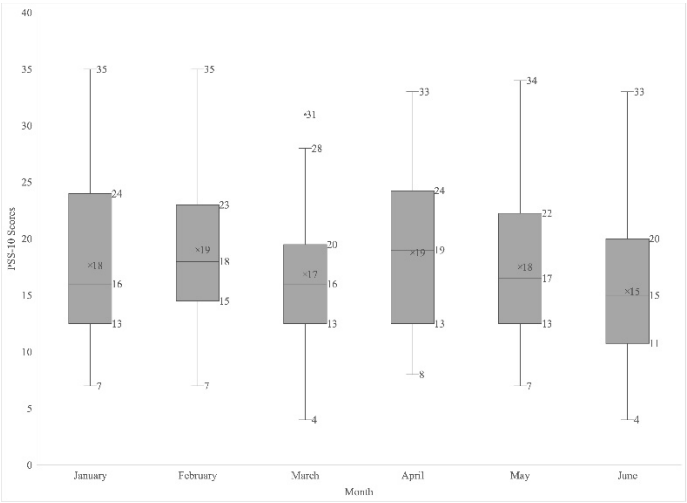
Following completion of six months of PSS-10 surveys, the scores for each survey were calculated according to Cohen's scoring rubric [24]. Mean scores for each month were calculated. As results of the PSS-10 were completely anonymous, we could not pair pre-and-post-intervention scores, and the groups differ in composition due to some participants being removed from the study. Because of these factors, data were analyzed using the independent samples t-test to determine differences between the population mean (pre-intervention) and the mean scores following the intervention, treating groups as mutually exclusive due to variations in makeup each month and the anonymity of participants [32]. Data were assessed using the Shapiro-Wilk test with results indicating normal distribution prior to conducting the independent samples t-test.

Focus groups were recorded to a secure hard drive and transcribed using the MacOS Advanced Dictation tool. Transcript corrections were completed by RM; names of participants were replaced with initials for identification. Transcripts were reviewed for accuracy by RM and recordings of focus group sessions were destroyed following transcription correction. Initial hand coding of transcripts was completed by ALV to identify initial themes. Transcripts were then uploaded into NVivo 1.6.2 and further analyzed using principles of the constant comparison method, a technique using open coding to identify themes within and across the different focus groups, and to reexamine already coded content as new themes emerge [33].

RESULTS

We successfully recruited 30 participants (15% of the class). Of these 30 participants, 29 selected a reading and 27 completed the quantitative phase of the study. Statistical power was not calculated, rather the size of the group for this proof-of-concept pilot was based on a clinical psychology recommendation of a cohort of 25-30 participants per condition when testing empirically supported therapies [34]. Quantitative analysis was performed on 164 total complete scores, 86 pre-intervention and 78 post-intervention. The mean PSS-10 score pre-intervention was 17.85 (SD 6.76) and mean post-intervention score was 17.21 (SD 6.87) out of a possible 40. While post-intervention scores were lower, the difference was not statistically significant, t(162)= .604, two-sided p=.547, 95% CI [-1.46, 2.75]. Figure 1 shows the distribution of pooled PSS-10 scores by month.

Figure 1 PSS-10 scores by month



x-value indicates the mean score for the month and the horizontal line indicates the median

Selection of bibliotherapy excerpts for the intervention was varied and all offerings were selected by more than one participant. The excerpts were a mix of fiction and non-fiction, from which participants were instructed to choose three. All excerpts were evaluated for reading time using Read-o-Meter and based on an average reading speed of 200 words per minute [35]. Selected texts were determined to require between 13 and 35 minutes to complete. The excerpts, estimated time to read, and the percentage of participants choosing each selection are listed in Table 2.

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Table 2 Bibliotherapy Excerpts

Excerpt Name and Description	Time to Read	# of Times Selected	% of Participants who Selected the Reading
The Diary of Samuel Pepys (1665), an eyewitness account of the Great Plague of London	19 min	12	41.3%
Pox Americana: The Great Smallpox Epidemic of 1775-82 by Elizabeth A. Fenn (2002), a narrative of the smallpox outbreak among Colonial troops during the American War of Independence	19 min	7	2.4%
And the Band Played On: Politics, People, and the AIDS Epidemic by Randy Shilts (1987), describing government and civilian reaction to the burgeoning AIDS epidemic	34 min	22	75.9%
The Plague by Albert Camus (1947), concerning the psychological and psychosocial impact of quarantine and isolation	17 min	20	69%
Zone One by Colson Whitehead (2012), a post-apocalyptic zombie novel set in New York City	13 min	17	58.6%
Pale Horse, Pale Rider by Katherine Ann Porter (1939), centered on the protagonist's experience of contracting and recovering from influenza in 1918	35 min	9	31%

The focus groups were analyzed to identify overall themes across the entirety of each transcript, regardless of which question the participants were responding to in the moment; for example, the identified theme of Disconnection could be identified in the answer to any individual question or in the icebreaker segment of the focus group. Through the coding process, we identified 162 discrete statements that we distilled into the following themes: Disconnection, Desire to Discuss Readings, the Fog of Medical School, and Reconnect and Reflect. Two narrower but notable themes were identified as part of Reconnect and Reflect: Value of Check-In and Self-Reliance. Reponses that related to reconnection and reflection, but not the subthemes related to checking in or self-reliance, are coded in a General subcategory. The category of Reconnect and Reflect had the most coded responses, with the majority of responses (87 statements) concerning this theme.

Disconnection

We anticipated that feelings related to disconnection or isolation would emerge, although such sentiments made up fewer than expected coded responses (21 statements). Participants reported difficulty adjusting the demands of medical school, which were exacerbated COVID-19, but also the demands of daily living. Students attended few classes in-person in the 2020-2021 academic year, and participants noted that it was difficult to meet new people, or to get to know people outside of class. Even as restrictions eased in Spring and Summer 2021, the campus maintained limits on gatherings, constraining opportunities for socialization. Of note, several participants specifically highlighted the distance they felt from fellow medical students in different classes and feeling that they "missed out on…a lot of valuable things we learn from upperclassmen."

The Fog of Medical School

Twenty-four coded responses concern what we called "The Fog of Medical School," or the general state of stress, anxiety, depersonalization, and sleep deprivation related to the rigors of MD training. Participants described their reactions to the first year of medical school in terms such as "I have a difficult time taking time for myself," "the last couple of months have sort of been really hard, but also a blur," "I just don't remember that any of that happened, because I'm just so focused," and "there's so much going on that sometimes you just don't stop and think about how you feel." Multiple participants reported that participating in the study helped with the disorientation they experienced in their M1 year. One participant noting that the study was a "reminder not to lose your interests outside of academics, outside of medicine."

Desire to Discuss Readings

This study was explicitly designed to eliminate the "book club" element of a traditional bibliotherapy program, as we determined that it would be impractical from a time management perspective and would be impossible when campus gathering limits remained in place due to COVID-19. In focus group discussions, 30 coded responses concerned the participants' discussion of the excerpts they selected to read for the intervention portion of the study in March 2021. Multiple participants noted confusion about what they were supposed to "do" with the readings, expressing surprise at the lack of a follow-up exam or quiz, and even concern that they had completed the task

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incorrectly. One participant noted that if they had realized there would be no assessment, "I would not have focused so much on content and focused more on…how it made me feel."

Participants also noted that they wished for a forum to discuss the readings. No participants expressed an interest in the more conventional book club format, but did reference modalities such as Zoom, GroupMe, a Slack channel, or a personal journal. One participant noted that they had not thought to reflect on any effect they personally experienced while completing the intervention until the focus group. While designed to specifically exclude the discussion or meeting component common to bibliotherapy programs, it appears that participants missed the opportunity to engage with each other. Some participants noted that the content of the readings was "cool," "interesting," and that the readings did not feel "like a chore," And one participant did note positive feelings about grappling with unfamiliar literature without concerns about completing a required assignment. Other participants indicated that more pandemic content and reading, in addition to the required curriculum and their regular media diet, was not welcome, and that some selections were "dense." Several participants noted that they were glad they had a choice among the selected readings, while others suggested offering interventions in different media, such as short films or podcasts. Participants in each focus group remarked that they thought the study would require a larger time commitment with more structured work.

Reconnect and Reflect

The thematic area "Reconnect and Reflect" was the most frequently coded throughout all transcripts. This theme refers to students' feelings of reconnection with themselves and their values, as well as their reflections on their medical school experience thus far. This thematic area accounted for 87 of the total coded responses. Multiple participants specifically noted that their participation in the study helped them remember "the enjoyment of reading" and expressed that the study forced them to read and reflect on non-curricular material. One participant expressed frustration with having so little free time for activities such as pleasure reading, noting that "medical school is basically hindering me from doing something I valued, and [I] had to rethink and reflect on that." When speaking about reconnecting and reflecting in general, participants often noted that the first year of medical school in a pandemic forced them to reconsider existing and new relationships with family and friends, as well as their ability to entertain non-scholastic activities. Several participants emphasized the importance of friendships outside of medical school, including activities such as watching television shows via FaceTime with friends, "like we used to do in person, and it was really nice because…I never had to talk about med school."

Participants also reflected on the reality that their lives included "a limited number of people you could see or… feel comfortable getting close with and so…Yeah, I think like the quality of my relationships increased, maybe at the expense of quantity." Participants also discussed the concept of "reflection" itself, and the difficulty of prioritizing it.

Within the "Reconnect and Reflect" thematic area, two sub-themes emerged: (1) reflection on the value gained from the act of responding to the PSS-10 survey itself; and (2) reflection on self-reliance, i.e., one's ability to handle the challenges of medical school.

The first sub-theme, *reflection on the value gained from the act of responding to the PSS-10 survey itself,* was the most prominent sub-theme and accounted for 38 responses within the "Reconnect and Reflect" thematic area. Participants overwhelmingly noted that a valuable component of the study was the act of completing the PSS-10, and that the monthly prompt to complete the survey was welcome and helpful. There was general agreement that completing the PSS-10 once per month for six months was "not too hard and they're…a good check up every month." The fact that the PSS-10 is short and designed to be answered quickly was frequently cited as key to its utility, with one participant noting that they worried this aspect of the study would be burdensome, as "even if its intent is good, [a wellness assessment] can be more detrimental if it's not executed properly." Another participant reported that the PSS-10 helped them "put a name to…feelings that I had and…in a way, it kind of normalized [the feelings]." Given our emphasis on building a program that respects the demands on students' time, it appears participants embraced the PSS-10. One participant reported "I think the benefits were greater than the little time I had to spend doing the survey," and another noted "I enjoyed that part. It was like therapy."

The second sub-theme, *reflection on self-reliance*, accounted for 15 responses within the "Reconnect and Reflect" thematic area. Participants noted that their first year of medical school forced them to become more self-reliant and confident in ways they did not anticipate. Participants discovered that they could succeed under unusual circumstances and learn to be more flexible. They reported growing more comfortable coping with uncertainty and "coming to terms with the fact that I wasn't ever going to be 100% confident." Participants also discussed developing self-reliance through learning how to be organized and to strengthen their executive function.

34 responses did not reference either sub-theme in the "Reconnect and Reflect" thematic area but touched on the concept broadly. The following quote typifies student responses coded for the theme "Reconnect and Reflect":

"…I think this study kind of reminded me like, mental health has always been like a big part of my life and like,

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kind of maintaining it…during the pandemic was like a little difficult, but I think like, the whole study, like connecting reading, which is also something I really enjoy like, with mental health specifically, like with the surveys and everything, kind of like reminds me like, yeah, your mental health is going to improve by doing things such as reading and like other things that you enjoy. [nodding from participants] So, I think like the study kind of reached out to other points in my life that also connected back to making you feel better in your daily life."

DISCUSSION

Our study found that a self-paced librarian-directed bibliotherapy program may help medical students with feelings of anxiety, stress, and isolation. Although there was not a statistically significant difference in PSS-10 scores, focus group feedback indicated that students found completing the monthly assessment was beneficial for monitoring their mental health. The high incidence of depression, anxiety and suicidal ideation in health care professionals and trainees is recognized as a threat to the well-being of these workers and a risk to the reliable provision of high quality care and to patient safety [36]. Studies indicate that medical students suffering from depression are unlikely to seek treatment [37]. Both AAMC recommendations and LCME standards emphasize that wellness programming and accessible mental health services are crucial aspects of successful medical education [38], [39]. Feelings of loneliness and isolation were commonly reported among medical students and health professionals prior to the COVID-19 pandemic [40]. Research indicates that medical students experienced increased levels of loneliness in the early months of COVID-19 as compared to pre-pandemic [41]. Our observations related to Disconnection, particularly as it relates to building relationships with other medical students, seem to agree with these findings. Further, our participants' reports of anxiety and stress related to isolation, workload, and adjustment to medical school correspond to previous research [2].

While several systematic reviews attempt to assess the efficacy of interventions on health care worker and medical student well-being during the COVID-19 pandemic, there is an acknowledged lack of robust literature related to student support [42] and to the use of bibliotherapy specifically as an intervention among healthcare workers [43]. Our study suggests that in our population, the bibliotherapy intervention may have less meaningful impact as a measure to mitigate stress and anxiety than the monthly wellness surveys themselves. The study had a high rate of completion (90%) and focus group feedback identified that the PSS-10 was a useful tool for self-monitoring well-being. Participant responses referencing the PSS-10 and the utility of monthly reminders lend support to the idea that deadlines are motivational in bibliotherapy programs, even in the absence of regular therapist interaction [16]. One unanticipated finding is that several participants specifically noted a desire to see their PSS-10 scores over the course of the study and how their scores compared to others in their class. This was not possible due to the practice of anonymous data collection, implemented specifically to protect participants from possible harm related to potential exposure of poor mental health status. In addition to revealing the inherent value of this check-in, several focus group participants highlighted that they appreciated the involvement of HHSL librarians. While TUSM provides a great deal of outreach related to mental health, participants reported that our programming was "low stress…easier to access…probably more helpful" than more formal counseling efforts. This role of the library in medical student wellness is supported by the AAMC recommendation that mental health intervention is best undertaken "by different individuals than those rendering advancement or promotion decisions" [38]. This study may signal that students trust the library and librarians, supporting further development of a bibliotherapy program with less anonymity and greater ability for students to follow their own progress. Positive feedback related to readings and use of the survey instrument indicate that this proof-of-concept study was successful, and that first-year medical students derive benefit from a librarian-led bibliotherapy program.

Limitations of the Study

Limitations of the study include the brief six-month duration of the quantitative component of the program; the interrupted time series model requires more data points to avoid seasonality and build a foundation for robust and informative analysis to determine if the intervention itself is correlated with lower PSS-10 scores. The inability to achieve statistical significance in our quantitative analysis may be attributable to the short study duration, and in addition, the fully anonymous nature of data collection, designed to protect the identities of participants in the most complete manner possible, rendered us unable to conduct a paired statistical analysis to determine intra-participant changes before and after the bibliotherapy intervention. A longer interrupted time-series and linear regression analysis or a deidentified (as opposed to anonymous) data collection process followed by paired testing would each result in more robust analysis and thus a greater indication of association between the intervention and the results.

Other limitations include that the focus groups were not subject to pilot-testing and that there is the potential for some questions to appear leading; in particular, the third question, "If you were inviting a peer or friend to participate in this project, what would you write or say to them about it?" While designed to gather insight on student perceptions of the project, this also assumes that participants would in fact recommend that a peer

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participate, without the obvious option of stating that they would not advise someone to do so. These untested and potentially leading questions provide some useful feedback to the researchers, but cannot be considered unbiased feedback. Because focus groups were not subject to pilot-testing, we did not have the opportunity to receive early feedback that could have prompted question revision to better yield the information we hoped to elicit. Additionally, the focus groups were conducted entirely over Zoom. While convenient, use of Zoom does introduce a potential barrier to robust discussion, especially noting the "Zoom fatigue" associated with the rapid move to online learning in March 2020 and its deleterious effects on students and instructors [44]. In addition, the participants were limited to one cohort of students at one medical school, making generalization of findings difficult. Although none of the participants had direct interactions with either author involving graded coursework, it is possible students felt inhibited from speaking freely with librarians as authority figures. Finally, the two researchers who designed and executed the study also facilitated/observed the focus groups, which could have led to observer bias, particularly in the coding and interpretation of focus group transcripts.

Conclusion

The COVID-19 emergency brought unprecedented disruptions into everyday life. Students starting medical school in 2020 were forced to balance pandemic pressures with the substantial stress and emotional upheaval that accompanies physician training. The Hirsh Health Sciences Library responded by serving as a resource, not only for academic support, but also for self-reflection and growth. The Library has worked hard to establish its physical setting as both an academic resource and a venue for activities focused on student well-being [45]. The results of this study demonstrate that HHSL can increase its role in the student wellness landscape of the School of Medicine. While the quantitative results of this study are not statistically significant, the PSS-10 scores and results of the focus groups may indicate that medical students can derive benefits related to anxiety, stress, and isolation from a self-paced and librarian-directed bibliotherapy program. A somewhat unexpected finding is that students found completing the monthly PSS-10 itself, regardless of the intervention, to be of benefit when monitoring their own mental health. The administration of that survey by the Library, which occupies an important place outside of the grading and advancement structure of the medical school, also appears to be a factor in the students' embrace of the instrument. The bibliotherapy intervention described in this article is an example of how we can build upon established trust to provide the most important information students can have, which is information about themselves. According to the AMA Code of Ethics, "[m]edicine as a profession should continue to refine mechanisms for assessing knowledge and skill and should develop meaningful opportunities for physicians and physicians in training to hone their ability to be self-reflective and attentive in the moment." [46] The Hirsh Heath Science Library's bibliotherapy intervention is an example of how libraries can provide "meaningful opportunities" for students to cultivate self-awareness [46].

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DATA AVAILABILITY STATEMENT

Data associated with this article are available in the Tufts University Dataverse: https://doi.org/10.7910/DVN/LQLRCD.

AUTHOR CONTRIBUTIONS STATEMENT

RM: Conceptualization; data curation; formal analysis; investigation; methodology; project administration; supervision; validation; visualization; writing – original draft; writing – review and editing. ALV: Formal analysis; investigation; methodology; writing – original draft; writing – review and editing.

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Supplemental Files

- **Appendix A:** Focus Group Script

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"I still have not mastered that skill!" Medical student perspectives on a simulation-based evidence-based medicine competency assessment

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Objective: We expect medical students to be able to apply evidence-based medicine (EBM) skills in the context of the clinical care of patients. Previous assessments of this domain have primarily utilized decontextualized knowledge tests, which provide limited insights into students' understanding of EBM skills in the context of patient care. New performance-based EBM competence assessments using Objective Structured Clinical Examinations (OSCEs) are being developed and tested. Understanding how students experience and interact with a simulation-based assessment of EBM competence would enable us to improve the modality.

Methods: We recruited 13 graduating medical students from one medical school who had recently completed an immersive multi station readiness-for-residency OSCE (Night onCall) which included a case-based EBM assessment. We conducted individual interviews to explore their perceptions of participating in this OSCE as a method of EBM assessment. The interviews were transcribed, coded, and analyzed using Dedoose by three health science librarians.

Results: Students discussed their experience and perceptions in six main areas: connection to clinical practice, curricular timing and content coverage, feedback, station instructions, awareness of their own limitations, and an OSCE as a format for assessing EBM.

Conclusion: Medical students appreciated the EBM OSCE because it enhanced their learning about how to integrate EBM into clinical practice. They proposed implementing multiple such opportunities throughout medical school because it would improve their competence and provide highly impactful opportunities to build toward EBM mastery. They endorsed that this would be well-accepted by medical students.

Keywords: Evidence Based Practice; Competency-Based Assessment; Medical Students; Evidence-Based Librarianship

See end of article for supplemental content.

INTRODUCTION

Evidence-based medicine (EBM) is an essential competency for practicing physicians [1, 2]. To engage in EBM, medical students must formulate focused, structured questions, search for related evidence, critically appraise and integrate this evidence with their own clinical experience and patient values [3, 4]. However, medical student training and assessment in EBM is often inconsistent and focused primarily on written assessments of knowledge [5-10]. The three primary validated assessments are the Berlin Questionnaire (multiple choice), the Fresno Test (essay), and the ACE Tool (true/false) [7, 9, 10]. While they each have their own strengths and weaknesses, a common weakness is that these validated assessments do not include any observation of applied behaviors. In their 2011 paper from the Sicily Conference, Tilson et al provide the CREATE Framework for classifying different EBM assessment tools [11].The CREATE Framework identifies what type of testing is better for what level the assessment is aimed at: knowledge, skill, or behavior. Cognitive testing like the Berlin Questionnaire or the ACE Tool are best at assessing knowledge. Performance assessment, like the Fresno Test are best at assessing skill. Activity monitoring, on the other hand, is best at assessing competency in performing a behavior.

Strategies to build authentic, contextualized EBM competency assessments that utilize activity monitoring are emerging [11, 12]. EBM Objective Structured Clinical Evaluations (OSCEs) are one method being used to both assess competence and provide students feedback to enable development of EBM skill mastery [5, 13-15]. In

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1999, the first two EBM OSCEs reported in the literature each focused only on one specific step within EBM: one on MEDLINE search creation and the other on critical appraisal of abstracts [16, 17]. While these demonstrated that the individual behaviors could be assessed in this format, they did not approximate real-world EBM practice. The following EBM OSCE efforts in the early 2000s moved the needle more, with one OSCE including multiple steps of EBM and the other focusing on critical appraisal [18-20]. Still both presented test environments that did not simulate the real world and did not have students ask questions, search for, identify, appraise, and apply the evidence they found in their own search. EBM OSCEs from 2009 and forward continued to move the needle with inclusion of all of the steps of EBM [15, 21, 22]. These three efforts used different approaches, but all found success in utilizing this format to effectively assess EBM competence.

However robust these efforts have been so far, none of them included the views of the learners in their efforts to assess effectiveness of the station – only if enough reliable metrics were generated. Also of note, only Burrows and Tylman's 1999 EBM OSCE explicitly included librarians, often the primary teachers of EBM content [17, 23]. Despite this progress, we still have a limited understanding of how medical students experience EBM OSCE stations. Understanding students' feedback and preferences and incorporating these perceptions into improving EBM competency assessments will improve the stations, allowing us to make them more practical and actionable to enhance student lifelong learning and not just be an assessment of one point in time. This study aims to explore the views and preferences of medical students taking an EBM OSCE in order to describe factors that lead to a successful experience that motivates students to further refine their competence and informs future development and refinement of EBM OSCEs as an assessment strategy.

METHODS

Data Collection

In April 2022, all 107 graduating medical students in the NYU Grossman School of Medicine Class of 2022 were recruited via email to participate in semi-structured interviews about their experiences participating in an EBM OSCE, Night onCall. We offered each participants a $25.00 incentive, from the 2022 Medical Library Association (MLA) Research, Development, and Demonstration Project Grant. To be eligible, graduating students must have already completed the Night onCall OSCE. Recruitment continued until new data points no longer appeared in the interview responses to the semi-structured questions. Responses began to be primarily repetitive starting around the 6th interview. The authors continued interviewing until no new data points were revealed in 4 consecutive interviews, indicating to the authors that saturation had been reached [24]. Out of the 107 graduating medical students recruited, 13 were interviewed. Following interviews, all data was anonymized and no further data was collected about the interview participants.

The Night onCall EBM station was part of an immersive multi-station readiness-for-residency OSCE [13]. The station followed a patient case and had students sit at a computer to begin the station. Initially they were prompted to enter their most pressing clinical question(s) from the patient they had just seen, then on the next screen they were given an important clinical question about their patient and asked to find evidence to answer the question and describe how they would care for the patient given the evidence they found. They were not specifically told to use any particular sources and were able to freely use the Internet in whatever way they wanted. A full description of the Night onCall OSCE can be found in the previously published paper [13].

All NYU Grossman School of Medicine medical students were required to participate in this OSCE to receive formative feedback that might help guide their self-development as incoming residents. While these students had participated in many OSCEs throughout medical school, this was the first time in an EBM OSCE for all students. This group of medical students all received the same training on EBM throughout medical school. Their training consisted of a scaffolded six-month long curriculum in their first year, focusing on the first three steps of EBM: Ask, Acquire, and Appraise. This curriculum was followed by journal clubs and self-guided learning in clerkships where they practiced these steps and learned more about the final two steps: Applying evidence to patient care and Assessing their own performance.

We chose to conduct semi-structured medical student interviews about their experiences participating in this OSCE because this method enabled us to explore individual perceptions about the experience in detail, and generate extensive guidance to improve the impact of this activity. NYU Grossman School of Medicine IRB review led to the determination that this activity was educational quality improvement and thus exempt from full IRB review and approval. However, we obtained informed consent from participants and anonymized data prior to analysis to ensure participant confidentiality.

An iterative process was used to develop the semi-structured interview guide. Questions and prompts were initially developed based on a literature review and refined in discussion with co-authors to focus on the following key topics: student performance, feedback preferences, station logistics, connection to curriculum, connection to real-life behaviors, and other perceptions

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about assessment of EBM competency. See appendix 1 for the semi-structured interview guide.

One study author (JN) conducted these semi-structured 30-minute interviews using the question guide via Zoom and audio recorded and transcribed using the automatic transcription feature. Three authors (JN, JM, and CP) verified and corrected transcripts using the audio recordings. The interviewer (JN) also kept field notes during the interviews to aid in editing and verifying transcripts. Following verification, the transcripts were anonymized.

Data Analysis

Analysis of the interview transcripts followed the stages in reflexive thematic analysis as defined and revised by Braun and Clarke [25-27]. This approach was used because of its flexibility and interpretive approach to understanding and describing patterns and meaning. A realist approach was used in this analysis, which attempts to identify themes that portray truths about the data. In a realist view, the data is assumed to reflect the true experiences and perceptions of the participant. The goal of the authors in utilizing a realist approach was to observe the data as participants' reported it, without trying to interpret the underlying social or cultural influences. Ultimately with a goal of presenting an authentic analysis of how participants experienced and felt about the OSCE.

Initially, three study authors (JN, JM, and CP) independently read all transcripts and developed an initial round of codes. Following this familiarization, they met to compare and discuss codes and insights so far. The same authors then progressed to independent deductive coding using an agreed upon set of 21 codes they developed jointly during the familiarization process. See Table 1 for code structure and frequency of use. In addition to the base codes, authors progressed into coding with an openness to changing, adding, or not using codes as they continued to understand the material. Each transcript was blind double-coded using the agreed upon codes and sections could be given multiple codes as appropriate. Because each author was coding independently, memoing was used to ensure a richer discussion of codes and themes later. Memoing, in this instance, refers to making notes on why you coded something a certain way or thoughts you had about potential meanings or clarifications. Table 1 displays the frequency of use of each code and the total number of codes applied across all interview transcripts.

After the processes of familiarization, generation of codes, and deductive coding, the authors then moved into constructing themes. To achieve this, the authors extracted data on frequencies of code use and code overlap, using the code overlap as the primary clusters of meaning. This data was used by JN, JM, and CP independently to reflect on the meanings found in the data. Finally, through rounds of discussion, they defined and revised themes. In moving from codes to clusters of meaning to themes, JN, JM, and CP sought to describe what was important to the students' in their interview responses. As an example of this process, authors could take a comment that was coded as connection to curriculum, challenges in completion, and future recommendations and interpret it under the theme of recommending integration of EBM OSCEs earlier. In one comment a student might reflect on all three and draw a conclusion, while another student may only make one of those comments at a time during the interview.

Despite the interview guide being structured around three primary topics, the authors found six primary themes that frequently occurred in the students' answers. The realist approach continued to be utilized in this stage of thematic

Table 1 Code Frequency Distributions

Primary Codes and Subcodes	Frequency of Use	Primary Code Category Totals
Challenges in Completion	16	119
Time Constraints	32	
PICO Questions	28	
Station Instructions	43	
Perceived Performance	4	106
Overall Performance	26	
Asking a Question Performance	25	
Searching Database Performance	21	
Named a Resource	28	
Named a Mobile Device	2	
Station Expectations	14	75
Self-Performance Expectations	14	
Assessment Expectations	47	
Future Recommendations	62	62
Feedback to Students	24	56
Individualized Written Feedback	13	
Best Practice Video Feedback	19	
Timing/Frequency of EBM OSCE	52	52
Connection to Curriculum	46	46
EBM Behavior in Clinic vs OSCE	43	43
Impact of Participating	28	28
All Codes		587

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analysis, attempting to reflect the true observations and reality of the participants. The frequency of these clusters of meaning, both across students and within each student, helped solidify for the authors that these were the primary themes to highlight as findings. These six themes were then reviewed by all authors, bringing their expertise in medical education and assessment into the conversation. The Dedoose Desktop App, version 9.0.54 (SocioCultural Research Consultants, LLC, Los Angeles, CA, USA) was used to store and code the transcripts and generate data for thematic analysis. For a reflexivity statement on our qualitative thematic analysis, see Appendix 2.

RESULTS

A total of 13 medical students participated in individual interviews following their experience participating in Night onCall. All participants had the same medical school curriculum and completed this OSCE 2-3 months prior to graduation.

Thematic Analysis

Six primary themes emerged that highlight medical student experiences and preferences in participating in an EBM OSCE station.

Theme 1: EBM has a clear connection to clinical practice.

Students appreciated that they were being tested and receiving feedback on a competence they knew was important to clinical practice. They explained that their performance in this OSCE was not always reflective of how they would do the same thing in an actual clinical setting. In practice, they report being able to use the apps and bookmarked websites on their phones that they know and trust, as opposed to always having to open new tabs and begin searches from scratch. At the same time, they reported that participating in this OSCE helped make it clear to them when and how to use EBM in a more clinically effective way.

"I think when we learn these things we're like, "oh yeah, that's definitely gonna be important" but you don't realize how important until you really have both been in situations where you need to answer a question and are imminently faced - like it feels more real now that I'm going to be alone at times, and not have access to people to just ask questions to." (S4)

"I've seen people do this even in clinical practice in my rotations, if there is a clinical question that comes up, it's important to be able to identify the question in a timely manner, and use the right terminology to find the answers that you need, and also be able to find the resources to answer your questions." (S11)

Theme 2: Integration of EBM OSCEs should occur earlier in the curriculum to allow for practice and mastery.

Students stressed that there was too big of a gap between when they were taught this content and the timing of this station. Three specific recommendations surfaced multiple times. First, they suggested we introduce an EBM OSCE station near the beginning of clerkships to help set clear standards for performance and time to practice during clerkships. Second, students specifically requested that we introduce an EBM OSCE station during Sub-Internships when they are most actively practicing this skill set. And third, they asked that we expand the clinical areas covered in the EBM OSCE to reflect specialties beyond primary care adult medicine.

"I feel like this would be almost something that would be useful, like before your clerkship year or during your clerkship year. I thought a lot of this stuff that we did would actually be really useful to have during your sub-I because you do have some of these responsibilities. This is when you're learning all of these responsibilities, learning more to be like an intern which I guess is the point of all these stations." (S6)

"if the purpose is for us to be able to implement something new or to grow. I think that having multiple chances to take a shot at it is always helpful. So I think it would have been helpful. I actually think it probably could have been helpful to have that before clerkship year. And just maybe have like gotten feedback on: Okay, this is what you did and here's another thing that you can do for next time. And then had the chance to get reassessed after clerkships to see if we've been able to incorporate some of the feedback." (S7)

Theme 3: Feedback is important to build and solidify competence.

Students all indicated that timely feedback was essential to the success of learning from their OSCE experience but they differed on the type of feedback they preferred. Students who reported feeling they did well in the Night onCall EBM OSCE station expressed a desire to see a video of a best-practice model answer to the station. Those who felt like they had room to improve wanted actionable individual feedback tailored to their own performance.

"if it's individualized feedback I think I'm more likely to remember at least one of those pointers and incorporate it next time versus in the more generalized feedback. I think, as a student as someone with a busy schedule there's always the chance that I don't even watch the 2 min video." (S7)

"I think a model is great - I don't think it needs to be individualized. I think that would be a lot of work on all of your ends and then we're all intelligent individuals and can look at what our search was like if you provide us what we searched in retrospect, and then what a model search would be like, we can all tailor our searches from there. " (S8)

Theme 4: Low self-confidence in ability and perceived skill to effectively and efficiently perform searches.

Students noted two main concerns regarding how well the EBM competency OSCE reflected their EBM proficiency-time on task and technical proficiency. Some students

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believed that the time limit prevented them from demonstrating their full ability. In particular, students who reported having a background in conducting research noted that they were used to having more time to do searches and interpret and apply results. Other students reported a lack of confidence in their technical ability to perform searches using standard tools such as PubMed and attributed this low self-confidence to having had little coaching on these skills during the clinical years.

"I'm just not that adept at like…I can figure it out in PubMed, but not that quick. So I was like, there's no time, I must find the answer from a quick search." (S6)

"when I do a literature search I try to take my time with it, and given the time constraints, I had to arbitrarily pick data or pick searches that I wouldn't normally do" (S2)

Theme 5: OSCE stations on novel tasks are cognitively challenging.

While all the medical students reported they were able to adequately complete the station, they did express surprise at encountering a novel task in simulation so close to graduation. Students provided detailed recommendations for improving station instructions and they expressed a desire to have this type of station introduced earlier in their medical school experience. They believed this would help students focus their attention on completing the tasks rather than understanding instructions.

"I remember for me feeling like: Well, I spent the whole first three minutes figuring out what I was supposed to do and then I have like six minutes to do it." (S5)

"I never read instructions well when I'm in the OSCE situation. I've always found that oral instructions at the beginning, and then reminders at the station work best for me." (S4)

"a lot of that OSCE was just very different than the OSCEs that we've had in the past. And so I think, at least for me, a lot of it was spent just trying to understand the system." (S5)

Theme 6: A simulated clinical context, like an OSCE, is an impactful way to practice and gain feedback on EBM skills.

Students reported feeling that an EBM OSCE aligned well with simulations of other clinical competencies. This helped them realize that EBM skills are clinical skills they will be responsible for practicing. They also pointed out the disconnect between what they are taught in classes, such as PICO, and real-world practice. All of the students requested more chances to practice and get feedback on this important set of skills.

"I think the main takeaway – I feel like there's always this divide between formulating a PICO question and then maybe doing a literature search or something like that, what we might do research-wise, and then what we actually do in the hospital. And I feel like in the hospital we're usually just going by protocol or going by what we see other people doing rather than actually sitting down ourselves and doing a literature search. And so I feel like this sort of provided a scenario when we could practice creating this link between a clinical situation and then that sitting down and literature-searching type of situation." (S1)

"My takeaway was that I still have not mastered that skill! I could definitely get better at quickly finding those answers still, or I guess finding them at all, because I didn't really find a great answer. So I guess I probably need both more practice and more instruction in the PubMed part." (S4)

DISCUSSION

Medical students that participated in these interviews expressed sincere enthusiasm about the opportunity to practice and receive feedback on their EBM skills, especially because it was integrated into a comprehensive clinically authentic simulation. Within many medical schools' curricula, this content is often taught exclusively in the pre-clinical years. This can create a disconnect where students learn a theoretical framework, like PICO, but never learn to apply that framework in practice or learn in practice novel ways of approaching EBM that do not reflect what is taught. Situating this assessment integrated with other clinical skills helps emphasize and deepen the connection to clinical practice [28, 29].

Having recognized the clinical importance of practicing EBM, near-graduating students expressed a desire to have had more frequent and earlier EBM OSCE stations. They recommended having opportunities for this assessment throughout their clinical years, at least: one at the beginning of clerkships, and one during their sub-internships. Students would be better able to practice EBM clinically and master this set of skills prior to graduation if they were given multiple opportunities to be assessed and receive feedback. Introducing this type of assessment earlier would also serve to familiarize students with this type of competency assessment, reducing the extraneous cognitive load associated with figuring out the tasks under time restraint, enabling them to more accurately demonstrate their ability to do the components of the task germane to competency in authentic clinical settings [30, 31].

Students also commented that they would prefer the EBM OSCE station to feature subject matter related to their chosen specialty. By aligning and developing new EBM OSCE stations in partnership with clerkship directors, we could meet the goal of more frequent opportunities for practice, broaden the subjects covered, and tailor these assessments so that, when appropriate they are relevant to the student's chosen career path.

Feedback was seen as a key component of learning from this station. However, students differ about what kind of feedback they preferred. Students who self-identified as more experienced in research wanted to be able to walk away with a video model of best practice that they could keep as a reference. Students who self-identified as weaker at this skill set were hoping for individually

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tailored actionable feedback based on their specific performance. This is further supported by research on the expertise reversal effect in cognitive load theory [32]. The expertise reversal effect is seen when overly detailed feedback actually reverses the expertise of more advanced learners, making them question what they already know. For novice learners, worked examples with step-by-step instructions and individual guidance are helpful for learning. For more advanced learners, fully worked examples with individual guidance become redundant and can lead to expertise reversal and worse performance [33-35]. Taking this into account, using a fading guidance strategy in providing feedback will be more effective for the learners [36]. These recommendations align with introducing multiple EBM OSCEs throughout medical schools. The OSCEs taking place earlier in the curriculum could have tailored feedback, and as students become more experienced and skilled they could receive less guidance.

Students did point out some frustrations and problems with this station. Their difficulties hinged on their self-reported kind of experience. Students with a heavy research background were more used to having a lot of time to search for and synthesize evidence. These students struggled with the time limit. Students with limited research experience struggled with the best ways to search for evidence. These students felt that they could not excel in this station because of their limited technical skills. Both time limitation and technical skill are expected and desirable difficulties that force students to critically examine their habits and assumptions. Despite students reporting these as frustrations, they also reflected on them as learning opportunities. This self-reflection is a critical part of facilitating transformative learning [37]. Knowing this, we can provide feedback and advice tailored to student experience and focused on raising student awareness of their proficiency or lack thereof.

Operationally, students understood the instructions and were able to complete the station. However, when pressed for suggestions, they suggested a variety of improvements ranging from announcing the instructions aloud to reviewing the instructions for each station before the OSCE begins, to allowing a preview of the instructions the week before. The common theme in their suggestions was that they were surprised to be experiencing a station that was new to them so close to graduation. Cognitive load theory is important to consider here. Cognitive load theory explains how, in performing tasks like EBM with many elements and a high degree of interactivity, the intrinsic load is high. This becomes problematic if the extraneous load of processing new instructions is also high, leading to weaker performance due to the additive cognitive load [30, 32]. Instead of changing the instruction delivery, this discomfort could be addressed by having a station in this format occur throughout the curriculum, thus decreasing the extraneous load and allowing students more time to focus on the task at hand [38].

LIMITATIONS

There are several possible limitations for our study. Our volunteer sample of medical students is a snapshot of graduating medical students from one medical school. The experiences, needs, and preferences of students could differ depending on their unique backgrounds and medical school curricula. Qualitative data can be interpreted in many ways. The three study authors who coded and analyzed the data are practicing medical librarians who teach and assess EBM. We approached this study with a desire to maximize the trustworthiness of the findings through reflexivity and by incorporating memoing, field notes, independent descriptive coding, iterative discussions, and adjudication of disagreements in order to come to shared, constructed interpretations. Our process did not include activities such as member checking to enhance validity. Instead, we felt that our expertise and prolonged exposure in the field when combined with thematic saturation of the data were sufficient.

CONCLUSIONS

Medical students appreciated having the opportunity to take an EBM OSCE. Students liked this OSCE and saw a great value in it as a learning experience. They recognized that the OSCE also helped them solidify how EBM integrates into clinical practice. Their experience could be improved by having multiple opportunities throughout medical school to participate and receive feedback on their performance in this OSCE.

While this study involved a limited sample of 13 participants, using qualitative research methods allowed us to go deeper into experiences and perceptions and find more nuanced perspectives. That our findings align with established research on competency-based assessment, such as the importance of formative feedback and multiple assessments over time, strengthens our confidence in the findings [39]. However, further research with larger and more diverse cohorts of students from other types and sizes of medical schools would help generalize these results and allow for exploration of themes across institutions.

From this study, we are confident that implementing a series of EBM OSCEs would be well-accepted by medical students and a powerful opportunity to both assess competence and build mastery. Future research on a longitudinal series of EBM OSCEs could investigate the effectiveness of different types of feedback and explore the impact of the interprofessional nature of librarian-led EBM OSCEs impact on both medical education processes and learning outcomes. Overall, our findings indicate that librarian-led OSCEs are an acceptable and useful method for advancing competency-based assessment of EBM.

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OTHER DISCLOSURES

None reported.

ETHICAL APPROVAL

This study was reviewed and deemed to meet exempt status by the NYU Grossman School of Medicine Institutional Review Board.

DISCLAIMERS

None reported.

DATA AVAILABILITY STATEMENT

Data associated with this article are available in Zenodo at: https://doi.org/10.5281/zenodo.11390561.

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Supplemental Files

- **Appendix A**
- **Appendix B**

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CASE REPORT
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Insights from search summary tables for evidence and gap maps: a case study on peer support interventions

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Background: Evidence and Gap Maps (EGMs) are a visual representation of the available evidence relevant to a specific research question or topic area. They are produced using similar methods to systematic reviews, however, there is little guidance on which databases to search and how many. Information Specialists need to make decisions on which resources to search, often for a range of study designs within a broad topic area to ensure comprehensiveness.

Case Presentation: This case study presents two search summary tables (SSTs) from an evidence and gap map on peer support interventions. The first search summary table presents the findings of the search for systematic reviews and the second for randomised controlled trials. Different databases and different searches were undertaken for the two different study types.

Conclusion: The two SSTs indicated that MEDLINE and PsycINFO were key databases required for the identification of both systematic reviews and randomised controlled trials of peer support interventions, with the addition of CINAHL for systematic reviews, and CENTRAL for randomised controlled trials. For both study types, forward citation searching found additional included studies although it was more lucrative for identifying additional randomised controlled trials. Search summary tables are a simple way to share the effectiveness of the search methods chosen for a specific evidence synthesis project. The more SSTs we have, the more data we will have to inform evidence-based decisions on our search methods.

Keywords: Evidence synthesis; evidence and gap maps; information retrieval; search summary table

See end of article for supplemental content.

BACKGROUND

Evidence and Gap Maps (EGMs) are a visual representation of the available evidence relevant to a specific research question or topic area. They facilitate evidence-informed decision-making in many areas including health, social care, education, and environmental science, by creating an accessible overview of existing systematic reviews and/or primary research on a given topic [1]. While they provide an overview and categorise/group relevant studies within the same format, unlike other forms of systematic review they do not seek to synthesise the evidence across studies. EGMs can also highlight where there is a lack of evidence, indicating areas for investment in future primary research and evidence synthesis [2].

EGMs are produced using similar methods to systematic reviews, following guidance to ensure the conduct and reporting of each step is transparent, robust, and reproducible. Snilstveit et al. (2016) [1] outline the main steps of an EGM: determining the scope and framework for the EGM in consultation with key stakeholders, developing study eligibility criteria, systematically searching for relevant studies, screening studies against eligibility criteria, data extraction providing summaries and appraisals of included studies, and finally creating a visual display of studies. While sharing similar objectives to other "big picture" review types, EGMs are proposed to differ from scoping reviews in several ways. EGMs may take an even 'broader' perspective to a topic area than scoping reviews, typically including a greater number of studies, with higher level data extraction and employing visual, interactive outputs to represent findings. Through use of a structured, pre-specified framework to guide categorisation and mapping of studies, EGMs provide a

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systematic approach to the identification and presentation of gaps in the literature [3-5].

Existing guidance on methods for EGMs (Table 1) does not provide a clear indication of the number of sources, or requirements for key databases to be searched to identify studies. For example, The Campbell Collaboration guidance for the conduct of searches for EGMs [6] requires searches to be "systematic and cover a broad range of literature" and to "ensure that the search includes appropriate national, region, and subject specific bibliographic databases", while the Collaboration for Environmental Evidence [7] suggests starting the search by targeting sources likely to retrieve the largest number of relevant references. Furthermore, no specific guidance for the conduct of EGMs for clinical healthcare topics was identified.

Table 1 Guidance on search methods for Evidence and Gap Maps (EGMs)

Organisation	Guidance
Campbell EGM conduct standards [6]	Ensure that the search includes appropriate national, regional, and subject specific bibliographic databases. Searches should be systematic and cover a broad range of literature, keeping in mind that they cannot always be as comprehensive as a systematic review because of the broad scope. Ensure the search strategy is sufficiently broad to not miss any bodies of literature. There is no minimum set of databases to search, but authors should consider consulting with a research retrieval specialist to avoid unnecessary duplication of effort.
Collaboration for Environmental Evidence [7]	"…the review team should start the search using the source where the largest number of relevant papers are likely to be found, and subsequent searches can be constructed with the aim to complement these first results."
Snilstveit, 2016 [1]	"The search strategy should be systematic and comprehensive but also needs to be manageable. One of the benefits of EGMs is that they can be done relatively quickly, so there is a need to strike a balance between an exhaustive and feasible search." "Other techniques that can increase the efficiency of the search include focusing on key repositories of impact and systematic reviews. Authors should supplement searches with subject specific searches in academic databases and relevant web sites. Other techniques such as snowballing citation tracking, and use of listservs. Finally, text-mining….reducing the time and workload of identifying studies for inclusion."

For EGMs, information specialists are faced with the challenge of designing and conducting systematic searches, often for a variety of study designs in broad topic areas, while ensuring this is manageable within the time available. Due to the broad topic areas more databases may need to be searched, and the terminology required may lead to increased search results, therefore, information specialists need to carefully consider their approach, prioritizing searches of key sources and using search techniques that will ensure comprehensiveness, while avoiding duplication of effort in searching sources that are unlikely to yield additional relevant records.

Reporting standards for EGMs [6, 8] require description of all sources and full search strategies for each database to be reported. However, there is currently no requirement to report details of search effectiveness or provide an evaluation of database selection or different search approaches used. The reporting guidelines for searching, PRISMA-S [9], requires the information sources and methods used, search strategies, peer review and managing records to be reported but does not include any evaluation or effectiveness of the search. SearchRxiv (https://www.cabidigitallibrary.org/journal/searchrxiv) was set up in 2022 as a place for anyone to deposit their searches in any discipline, again, no evaluation is required. Search summary tables (SST) [10] offer a simple way to provide an overview of the results of the searches in all types of evidence syntheses, indicating which database searches found included references and which supplementary search methods found additional unique references, as well as sensitivity and precision calculations for each database. SSTs have been completed for systematic reviews [11] and provide useful insights for identifying optimal approaches in searches for guideline development [12] and programme theories [13].

Publishing SSTs [10] for an EGM, alongside their search methods and the PRISMA flow diagram [9], adds to the growing evidence base about the contribution of individual databases and supplementary search methods for study identification. They can also inform efficient use of sources and searches for any planned updates to the EGM. Furthermore, creating SSTs for EGMs that include multiple study designs may provide insights into the usefulness of different sources and approaches for identifying a variety of study designs (e.g., systematic reviews, randomised controlled trials and economic evaluations).

The aim of this study was to develop and explore the utility of SSTs for different types of included studies: systematic reviews (SR), randomised controlled trials (RCT) and economics evaluations (EE), using a case study of an EGM on peer support interventions.

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CASE PRESENTATION

The first two authors conducted database searches and supplementary searches for an EGM on peer support interventions [14].

All records retrieved from searches including duplicates, were downloaded into EndNote X9.2 (Clarivate) and coded to indicate the source (i.e., name of bibliographic database or supplementary search method). The number of records retrieved from each database, those screened at Title/Abstract stage (after deduplication), and those screened at Full-Text were also documented.

Search summary tables (SSTs) were created in Excel using a template and process developed by Bethel [10] involving two phases. The first phase of the SST creation involved adding details of included references to separate SSTs for each study design (systematic reviews, randomised controlled trials, and economic evaluations). The data in the SST for EEs were incomplete so it has not been included in this case study.

The second phase of the SST creation involved searching for each included reference in selected bibliographic databases (for SRs: CINAHL, MEDLINE, PsycINFO, Embase and Epistemonikos; for RCTs: MEDLINE, CENTRAL, CINAHL and PsycINFO; using article titles or accession numbers), and re-running searches to determine if an updated search using the original search strategy would retrieve included references not located by the original search. This information was also recorded in the SST.

Two SSTs were produced, one for systematic reviews (SRs) and one for randomised controlled trials (RCTs). Tables 2 and 3 provide a summary of the SST findings for both study designs. The full SSTs are available in the Supporting Information published with Price [13, 14].

The SR searches included eight bibliographic databases and three methods of supplementary searching (forward and backward citation searching of included references identified from database searches, plus Google Scholar searches). The SR SST indicates that of these searches, only three bibliographic databases and two supplementary search methods retrieved unique references. Unique references are those references retrieved by a database search that were not retrieved by any other database search. As indicated in Table 2, forward citation searching found the additional included article [15] which was identified by all three sources used (Web of Science, Scopus and CitationChaser). Backward citation searching found no further additional relevant SRs.

For the second phase of the SST, CINAHL, MEDLINE, PsycINFO and Epistemonikos were searched to determine which of the 32 included SRs were available in each database, and whether these references would be retrieved in update searches using the original search strategies. The original MEDLINE searches (completed October 2020) did not retrieve five of the 32 included references. However, when the searches were re-run for the SST analysis in January 2021, two articles [15, 16] identified through supplementary searches, were found to be in MEDLINE. An additional reference [17] was indexed within MEDLINE but was not retrieved by our original search strategy. Two further included references [18, 19] were not in MEDLINE at all.

Epistemonikos was found to include all 32 SRs; however, the SR SST indicated that our search strategy did not retrieve 20 of them. This prompted us to investigate issues with the search strategy and check our understanding of search functionality within Epistemonikos.

The RCT searches included four bibliographic databases (CENTRAL, CINAHL, MEDLINE and PsycINFO) and three supplementary search methods (forward and backward citation searching of the included references identified from the database searches, plus Google Scholar searches). Table 3 provides the summary findings and Appendix A provides further details of the outcomes of forward citation searching using different tools.

When the database searches were re-run for the second phase of the SST analysis in September 2021, five of the references not retrieved by the original bibliographic database searches (completed in March 2021) were found. Four were in MEDLINE and one in PsycINFO. As seen in Table 3, four references [20-23] were not found by the search strategies used in those databases but were available in MEDLINE. Three references used terms to describe peer support interventions (i.e., lay tutors, lay volunteers and navigators) that had not been included in search strategy, and one reference [20] did not include any terms from the RCT filter. Only one RCT [24] was not available in the any of the bibliographic databases searched for this review. This RCT [24] is a PhD thesis retrieved from Google Scholar searches.

DISCUSSION

The SSTs confirm that there is value in searching multiple bibliographic databases to identify SRs and RCTs relevant to peer support interventions due to differences between databases in subject coverage, available publication types and the application of controlled vocabulary terms. Furthermore, the SSTs for this EGM provide data on the key databases to prioritise for search updates for SRs and RCTs, with a limited selection potentially minimising the number of records needed to screen to identify included studies.

Analysis of SSTs indicated that MEDLINE and PsycINFO were key databases required for the identification of both SRs and RCTs of peer support interventions, with the addition of CINAHL for SRs, and CENTRAL for RCTs. Our findings are consistent with research and guidance on

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Table 2 Summary findings from an SST for Systematic Reviews included in EGM

Source	Refs retrieved	Included refs (%)	Unique included refs from original search (October 2020)	Additional refs in search re-run (January 2021)	Refs in database not retrieved by search
Total included references	N/A	32 (100%)	N/A	N/A	N/A
Cochrane Database of Systematic Reviews	52	2 (6%)	0	N/A	N/A
CINAHL	877	23 (72%)	2	2	0
MEDLINE	1123	27 (84%)	2	2	1
PsycINFO	581	15 (47%)	1	3	1
Embase	1484	25 (78%)	0	2	1
ProQuest Dissertations & Theses Global (PQDT)	807	0	0	N/A	N/A
Applied Social Science Index and Abstracts (ASSIA)	188	4 (12%)	0	N/A	N/A
Epistemonikos	332	7 (22%)	0	5	20
Forwards Citation Searching (FCS)		1 (3%)	1		
Backwards Citation Searching (BCS)		0	0		
Google Scholar		1 (3%)	1		

Table 3 Summary findings for an SST for Randomised Controlled Trials included in EGM

Source	Refs retrieved	Included refs (%)	Unique included refs from original search (March 2021)	Additional refs in search re-run (September 2021)	Refs in database not retrieved by search
Total included references	N/A	61 (100%)	N/A	N/A	N/A
MEDLINE	3190	50 (82%)	1	4	4
CENTRAL	4836	46 (75%)	1	7	4
CINAHL	2026	37 (61%)	0	8	1
PsycINFO	224	25 (41%)	2	2	1
FCS (all sources)		7 (11%)	4		
BCS		0	0		
Google Scholar		5 (8%)	1		

database selection for evidence syntheses within health and social care topic areas that points to MEDLINE as a key source [25-27], but also that searches of multiple bibliographic databases are essential for comprehensive retrieval of relevant studies [28-30]. This case study also indicates that SST-informed database selection could minimise the number needed to screen for search updates. For example, a search approach for SRs prioritising three databases (MEDLINE, PsycINFO and CINAHL) would retrieve 2,581 records, compared with 5,444 records for a search of eight databases.

The SST also provided the data for us to further investigate the search terms and controlled vocabulary terms used in the bibliographic database searches. It provided evidence for what we might do in the future for both the subject specific terms and study filter terms.

Epistemonikos (epistemonikos.org) has been highlighted as a potentially useful resource for identifying systematic reviews on health-related topics, with Goosen [25] suggesting a combination of MEDLINE and Epistemonikos searches alongside reference list checks as the optimal approach. However, this was determined by

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checking source coverage (by searching to see if the SR was contained in the database), rather than through application of search strategies to retrieve a set of known SRs. Reviewing the SST for SRs in this case study indicated a potential issue with our search strategy for Epistemonikos. We noted that while all 32 (100%) of the included references were available in Epistemonikos, our original search strategy only retrieved 7 (22%) of these. We were able to pinpoint an issue with searching for hyphenated phrases (e.g., peer-support) in Epistemonikos. For updates for this EGM, and in future searches, we intend to search Epistemonikos with a simplified strategy. We also recommend that Epistemonikos provide further guidance on advanced search functionality to support effective searching for evidence syntheses.

Guidance for searching for EGMs recommends use of supplementary methods such as searches of relevant websites and citation searching [1]. Research has demonstrated the value of citation searching for the identification of additional studies for evidence syntheses, particularly in topic areas where there is vague or inconsistent terminology [31]. The TARCiS statement [32] recommends that further research is needed in this area, and this case study highlights how SSTs can support this research priority, with the SST clearly indicating the methods of citation searching undertaken, and whether these added any value. For this EGM, forward citation searching added unique results for the RCTs, but not for the SRs, when compared with updating the searches prior to project completion. Backward citation searching did not yield any unique included SRs or RCTs. However, the eligibility criteria for this EGM excluded studies published prior to 2015. It is possible that backward citation searching may have yielded relevant studies if eligibility criteria included older publications.

This study also adds to existing research investigating the comparative usefulness of different tools for citation searching [33-35], thus supporting the third research priority in the TARCiS statement "*Further research is needed to assess the best way to perform citation searching,*" and second statement "*optimal use of indexes and tools and their combination to conduct citation searching*". The SSTs showed duplication in the references retrieved in forward citation searching by Scopus, Web of Science and CitationChaser [41]; however, Scopus identified the most references overall for both RCTs and SRs. This could be topic dependent, although Rogers [35] also found forward citation searching with Scopus yielded a greater number of included studies than Web of Science in a review of implementation studies on dementia care. For EGMs, there is a need to strike a balance between comprehensiveness and an effective use of time and resources. Through reporting which tools were used and their effectiveness, information specialists could make evidence-informed decisions on the most appropriate tool, and whether citation searching of multiple indexes can be justified in the time available. Forward and backward citation searching on Scopus and Web of Science currently involves searching reference by reference to retrieve and download cited and citing references. Workarounds using EndNote have been proposed for Scopus and Web of Science [36], however, free specific tools such as CitationChaser provide functionality for the bulk upload of digital object identifiers (DOIs) or other unique identifiers (e.g., PMIDs, PMCIDs) allowing for concurrent citation searching on multiple references. Furthermore, CitationChaser [37] is a freely available tool, whereas both Web of Science and Scopus are subscription services.

The Campbell Collaboration standards for the conduct of EGMs include grey literature searches as a mandatory requirement [6]. While searching for grey literature can help minimise publication bias [33], the Collaboration for Environmental Evidence [7] notes the time-consuming nature of these searches. In this EGM, we conducted searches of Google Scholar to identify additional SRs and RCTs, however, we searched ProQuest Dissertations & Theses for SRs only. Google Scholar searches yielded one included RCT, a PhD thesis, so this has prompted us to reconsider searching ProQuest Dissertations & Theses for RCTs, either as an alternative to Google Scholar or as an additional source.

Publication of SSTs alongside detailed search methods for EGMs and other evidence syntheses would ensure processes for the identification of studies are fully transparent. Currently, the main drawback would be the cost associated with the time taken to do this; however, tools are in development that may facilitate SST creation. Sharing SSTs would enable information specialists and other researchers to make evidence-based decisions regarding appropriate database selection and search techniques when working on a similar topic or research question. This may be particularly important for EGMs where exhaustive searching is not feasible or appropriate. SSTs could help researchers and information specialists target key databases to search as a minimum, or to prioritise the most fruitful supplementary search methods. This may, in turn, minimise the number of records needed to screen. They could help prioritise which databases to begin the search in, as recommended by some of the current guidance [7]. Use of SSTs could also help streamline processes to identify new studies for inclusion in 'living' EGMs.

The SSTs for this EGM on peer support interventions demonstrated that for SRs, a search of multiple bibliographic databases, plus either supplementary searching, or a search update of MEDLINE were required to comprehensively identify all included references. A combination of database and supplementary searches were necessary to identify all included RCTs. This was a single case study of one EGM for one topic area (peer support interventions) for two study designs (systematic reviews and randomized controlled trials), and it may be difficult to make generalisations from these SSTs to other

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research questions or topic areas. The EGM also included economic evaluations; however, we do not have the detailed data for this to provide sufficient information for discussion.

This case study demonstrates that new insights can be gained from completing SSTs at the end of an evidence synthesis project. Reporting a search summary table (SST) alongside full search strategies would be a useful addition to any evidence synthesis publication, either in supplementary materials, or accessible through institutional repositories or collections of search strategies (e.g. SearchRxiv). Over time, SSTs could be considered for inclusion in future iterations of the PRISMA-S guidance. This would allow full transparency of search processes, support reflective practice, add to our existing literature on evidence-based searching, and provide opportunities for future research to improve the efficiency of search methods for EGMs and other types of evidence synthesis. Ideally, a technical solution could be developed to for populating a SST. The more SSTs we have, the more data we will have to inform evidence-based decisions on our search methods.

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SUPPLEMENTAL FILES

- **Appendix A**

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COMMENTARY
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Integrating PICO principles into generative artificial intelligence prompt engineering to enhance information retrieval for medical librarians

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Prompt engineering, an emergent discipline at the intersection of Generative Artificial Intelligence (GAI), library science, and user experience design, presents an opportunity to enhance the quality and precision of information retrieval. An innovative approach applies the widely understood PICO framework, traditionally used in evidence-based medicine, to the art of prompt engineering. This approach is illustrated using the "Task, Context, Example, Persona, Format, Tone" (TCEPFT) prompt framework as an example. TCEPFT lends itself to a systematic methodology by incorporating elements of task specificity, contextual relevance, pertinent examples, personalization, formatting, and tonal appropriateness in a prompt design tailored to the desired outcome. Frameworks like TCEPFT offer substantial opportunities for librarians and information professionals to streamline prompt engineering and refine iterative processes. This practice can help information professionals produce consistent and high-quality outputs. Library professionals must embrace a renewed curiosity and develop expertise in prompt engineering to stay ahead in the digital information landscape and maintain their position at the forefront of the sector.

Keywords: PICO; Generative Artificial Intelligence; Prompt Engineering; Information Retrieval

CURRENT CHALLENGES

The digital information landscape is undergoing rapid transformation, posing both opportunities and challenges for medical librarians. With the exponential growth of digital content and the increasing complexity of information needs, librarians are constantly seeking ways to enhance the precision and efficiency of information retrieval. The current challenges include:

1. **Information Overload:** The sheer volume of information available online can be overwhelming for users. Librarians must navigate this vast sea of data to find accurate, relevant, and timely information for their patrons [1].
2. **Evolving User Expectations:** Today's users demand instant access to information that is not only accurate but tailored to their specific needs. This shift in expectations requires librarians to adopt more sophisticated search techniques and tools [2].
3. **Integration of Advanced Technologies:** The integration of technologies such as artificial intelligence (AI), machine learning, and natural language processing into library systems presents both opportunities and hurdles. While these technologies can enhance information retrieval, they also require librarians to develop new skills and adapt to rapidly changing tools [3].
4. **Quality and Reliability:** Ensuring the quality and reliability of information remains a critical concern. Librarians must be adept at evaluating sources and filtering out misinformation, particularly in an era where digital content can be easily manipulated [4].

These challenges underscore the need for innovative approaches to information retrieval. By adopting and mastering new techniques such as prompt engineering, librarians can continue to meet the evolving needs of their patrons effectively.

BACKGROUND

Generative Artificial Intelligence (GAI) is rapidly transforming the landscape of information retrieval. GAI refers to a class of artificial intelligence systems capable of generating new content, such as text, images, or music, by learning patterns from existing data. These systems use deep learning models to create outputs that can mimic human-made content [5]. With the advent of sophisticated GAI technologies, the ability to generate high-quality, contextually relevant responses has become increasingly critical. From the first known bibliographic work, the

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Pinakes, created in the Library of Alexandria in the 3rd century BCE [6], to the development of machine-readable cataloging (MARC) standards in the 1960s [7], and through modern challenges like open access, data management, and digital preservation, librarians have consistently been at the forefront of informational revolutions throughout history [8]. The current transformation driven by GAI, though in its infancy, is unprecedented in its rapid expansion and impact. Once again, librarians and information professionals are tasked with leveraging advancements created by a technological evolution to meet the evolving needs of their patrons.

Prompt engineering is an emerging practice within the GAI field that focuses on designing effective prompts to guide artificial intelligence (AI) systems in generating useful and accurate responses. At its core, prompt engineering involves the careful construction of inputs or instructions that an AI system uses to produce relevant and high-quality information outputs. The process is akin to asking a detailed question or setting a clear task for the AI, which, in turn, generates an answer or a piece of content that meets the specified requirements [9].

The practice of prompt engineering can be compared to formulating precise search queries or research questions, but it goes beyond keyword matching. Instead, it involves a nuanced approach that considers the context, desired output, and the user's specific needs. This makes it a powerful tool for guiding AI systems to deliver more accurate, contextually appropriate, and relevant information [10].

Effective prompt engineering requires a deep understanding of both the subject matter and the capabilities of the AI system. It encompasses various elements, such as the needed task, the context in which the information will be used, and the audience for which the output is intended. For instance, a well-crafted prompt for a GAI system might specify not only the topic of interest but also the type of information required, an example to help guide the output, the format in which it should be presented, and the tone that is appropriate for the intended audience.

The significance of prompt engineering lies in its ability to enhance the precision and quality of information retrieval. In an era of information overload, where the volume of available data can be overwhelming, effective prompt engineering enables users to obtain more focused and relevant outputs from AI systems. This not only improves the efficiency of information retrieval but also ensures that the information generated is aligned with the user's specific needs and context.

TECHNOLOGICAL ADVANCES

The evolving role of prompt engineering is a critical component of modern information retrieval. It facilitates the creation of accurate and contextually relevant prompts that address specific user needs, thereby improving the quality and precision of AI-generated responses. This parallels traditional practices such as the use of controlled vocabularies and tailored search strategies, emphasizing the necessity for librarians to adapt these skills to the capabilities of GAI technologies [11]. By mastering prompt engineering, librarians can effectively navigate the complexities of information overload and enhance the retrieval processes of GAI platforms.

The current era is marked by innovative technological advances that are reshaping the information retrieval field. Among these, GAI stands out as a transformative force. GAI technologies leverage deep learning algorithms to generate human-like text and have the potential to revolutionize how librarians interact with and retrieve information [12]. However, GAI is just one part of a broader technological landscape that is influencing library and information science. Other notable advancements, many of which paved the way for GAI, include:

1. **Natural Language Processing (NLP):** NLP technologies enable computers to understand and process human language, improving the accuracy and relevance of search results. These tools allow for more intuitive interactions with information systems, making it easier for users to find what they need [13].
2. **Machine Learning:** Machine learning algorithms analyze patterns in data to improve search results over time. By learning from user interactions, these systems can provide increasingly personalized and relevant information [13].
3. **Semantic Search:** Unlike the traditional keyword-based search, semantic search aims to understand the intent behind a query. This approach leads to more accurate and contextually appropriate results, enhancing the user experience [14].
4. **Voice-Activated Search:** The rise of voice-activated assistants like Siri, Alexa, and Google Assistant has provided new ways for users to interact with information systems. This technology relies on sophisticated AI and NLP to understand and respond to voice queries accurately [15].
5. **Blockchain for Information Integrity:** Blockchain technology offers a promising solution for ensuring the integrity and authenticity of digital information. By creating immutable records, blockchain can help combat misinformation and provide verifiable sources [16].

These technological advances are, arguably, driving a paradigm shift in information retrieval. As librarians

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embrace these new tools, they must also develop new competencies and evolve foundational skill sets to leverage their full potential [11]. The integration of traditional frameworks such as PICO into prompt engineering represents one such pathway, enabling librarians to harness the power of GAI and other technologies effectively but in a way that builds upon current experience. By staying at the forefront of these developments and using familiar tools, librarians can continue to play a critical role in guiding users through the complexities of the digital information landscape.

APPLICATION OF PICO PRINCIPLES

The PICO framework (Population, Intervention, Comparison, Outcome) has been a cornerstone in medical research for structuring research questions and guiding systematic reviews. By breaking down complex questions into clear, manageable components, PICO can facilitate targeted and effective information retrieval. This systematic approach has proven invaluable in medical research, providing a structured methodology for acquiring and synthesizing information [17].

Integrating these standardized principles into prompt engineering may enhance the precision and relevance of responses while also providing a standardized approach that can be adapted across various prompt frameworks depending on the desired outcome. This standardization is essential for ensuring consistency and quality in information retrieval, enabling librarians and information professionals to deliver high-quality outputs consistently and efficiently. The application of the PICO framework's systematic approach to prompt engineering represents an important advancement in information science. By leveraging frameworks like TCEPFT, librarians and information professionals can develop more effective and precise prompts, thereby improving the overall quality of information retrieval and enhancing their role as key players in the information landscape.

Possible Benefits of PICO-Driven Prompt Engineering

1. Enhanced Precision: Applying PICO principles helps define clear, specific tasks that are contextually relevant and personalized.
2. Consistency: Standardized frameworks ensure that prompts produce high quality results across different use cases and contexts.
3. Flexibility: The modular nature of PICO allows for easy adjustments and refinements to prompts, ensuring they remain relevant to changing needs.

Practical Application

Consider this scenario:

A physician needs information about complications specific to type 2 diabetes in elderly patients.

Combining the TCEPFT framework with PICO principles, the prompt could be structured as follows:

Task	Identify common complications.
Context	Specific to type 2 diabetes in elderly patients.
Example	Such as complications that impact mobility or daily activities.
Persona	For a primary care physician preparing for patient consultations.
Format	Detailed paragraph with clear subheadings for each complication.
Tone	Professional and thorough.

Once the framework is established and the components defined, the prompt is easily constructed similarly to how a research question is formulated from a PICO instance. The arrangement should follow a logical flow, resulting in a prompt such as:

Prompt: "Identify the most common complications of type 2 diabetes in elderly patients that affect mobility or daily activities, presented in a detailed paragraph with subheadings for each complication. This information is for a primary care physician to prepare for patient consultations, so please maintain a professional and thorough tone."

This structured approach ensures that the generated output is precise, relevant, and tailored to the physician's needs.

To reinforce this idea, consider another scenario:

A medical librarian gets a request from a medical school faculty member preparing a lecture on the impact of sleep disorders on mental health in adolescents. The faculty member needs comprehensive and up-to-date information to ensure the lecture is evidence-based and informative.

Using the TCEPFT framework, the librarian can structure the prompt as follows:

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Task	Gather information on the impact of sleep disorders on mental health in adolescents.
Context	Specific to sleep disorders such as insomnia and sleep apnea and their psychological effects like anxiety and depression.
Example	Focus on studies that explore the correlation between sleep disorders and mental health outcomes in adolescent populations.
Persona	For a medical faculty member preparing an evidence-based lecture for medical students.
Format	A detailed summary with key findings from recent research studies, organized by type of sleep disorder.
Tone	Academic and informative.

Prompt: "Identify and summarize the latest research on the impact of sleep disorders, such as insomnia and sleep apnea, on mental health outcomes in adolescents, specifically focusing on anxiety and depression. Present the findings in a detailed summary, organized by type of sleep disorder. This information is intended for a medical faculty member preparing an evidence-based lecture for medical students, so the tone should be academic and informative."

Flexibility in Prompt Engineering

Another benefit of using a structured approach is the ability to switch out components without the need to recreate a prompt entirely. While the output will never be the same, it will be similar in structure and presentation. This flexibility allows medical librarians to adapt prompts to meet varying information needs efficiently.

For example, consider the first scenario where the prompt is focused on complications specific to type 2 diabetes. By changing "type 2 diabetes" to "chronic kidney disease," the content of the output will certainly differ, but the overall structure, audience, and tone will remain consistent. This ensures that the librarian can quickly modify the prompt to address a new yet related information request without starting from scratch.

In another scenario, switching out "sleep disorder" for "drug abuse" would again alter the content but maintain the same structure and presentation style. This adaptability is imperative for medical librarians who frequently receive requests with similar needs but slightly different variables. For instance, a request for information on the impact of sleep disorders on mental health in adolescents can be easily adjusted to focus on the impact of drug abuse on mental health by simply changing the specific condition in the prompt.

Here is an example of how this flexibility works:

- **Original Prompt for Sleep Disorders:** "Identify and summarize the latest research on the impact of sleep disorders, such as insomnia and sleep apnea, on mental health outcomes in adolescents, specifically focusing on anxiety and depression. Present the findings in a detailed summary, organized by type of sleep disorder. This information is intended for a medical faculty member preparing an evidence-based lecture for medical students, so the tone should be academic and informative."
- **Modified Prompt for Drug Abuse:** "Identify and summarize the latest research on the impact of drug abuse, such as the use of opioids and cannabis, on mental health outcomes in adolescents, specifically focusing on anxiety and depression. Present the findings in a detailed summary, organized by type of substance. This information is intended for a medical faculty member preparing an evidence-based lecture for medical students, so the tone should be academic and informative."

By altering the specific condition (sleep disorders to drug abuse), the librarian can generate a relevant and tailored output without the need to reconstruct the entire prompt.

CONCLUSION

The integration of the PICO framework into prompt engineering methodologies presents an important advancement for medical librarians and information professionals. By adopting a structured approach like the TCEPFT framework, librarians can enhance the precision, consistency, and flexibility of information retrieval processes. This systematic method not only improves the quality of the outputs but also ensures that librarians can efficiently adapt to various information needs, thereby meeting the evolving demands of their patrons. Consistency is more easily attainable if the process used is already a familiar staple in day-to-day work, as is the case with PICO and medical librarians.

It is important to acknowledge that the TCEPFT framework is not the only way to approach prompt engineering. There are numerous other variations and frameworks that can be equally effective, depending on the context and specific requirements of the task at hand. Additionally, not every situation may necessitate a full structure like TCEPFT. In some cases, a simpler or more intuitive approach might be more appropriate. However, maintaining consistency in the application of whichever framework is chosen is essential for producing high-quality and reliable results. In essence, while the

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framework of the initial prompt may be fluid based on the desired outcome, the process and step logic to get to a quality prompt can be invoked by calling upon an already established and typically honed skill that medial librarians possess.

As the field of librarianship continues to intersect with advanced technologies like GAI, it is imperative for librarians to explore and master these new tools. By doing so, they can remain at the forefront of the digital information landscape, providing valuable services and support to their patrons. As has been the case throughout history, library professionals have a unique opportunity to cultivate a renewed curiosity and actively engage with burgeoning information technology, which currently is focused on GAI technologies and prompt engineering techniques. Embracing these innovations will enhance their skill sets and ensure that they continue to play a pivotal role in the future of information retrieval.

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Cynthera McNeill, Umeika Stephens, and Tara Walker. **Urban Health: A Practical Application for Clinical-Based Learning.** First Edition, Wayne State University Digital Publishing House. 2022 187.p. Open-access (Free). (ISBN: 979-8-9857754-1-9)

Cynthera McNeill, Umeika Stephens, and Tara Walker of Wayne State University, and authors of *Urban Health: Practical Applications for Clinical-Based Learning*. Published in 2022 by Wayne State University's Digital Publishing House, this book is freely accessible as an open-access textbook and is intended to educate medical professionals, especially those specializing in urban medical environments. This book aims to fill the gap in knowledge about the challenges of urban healthcare in medical education. The book deals with various interdisciplinary fields relevant to the target population, such as medical education, public health, medical humanities, and community nursing, which once again addresses the complexity of groups that are underestimated in urban healthcare disparities.

Healthcare in urban environments has a distinct set of challenges specific to socioeconomic, environmental, and systemic factors that disproportionately impact relatively underserved populations. Urbanization is a growing trend in the global population and requires a focused approach to health professional education that combines social determinants of health, care disparities, and medical practice in urban environments. With this in mind, they wrote a textbook on learning through clinical-based applications entitled Urban Health. Most health programs cover health disparities in theory, but few have a formal and direct approach to addressing them in a clinical setting. This book aims to meet that need by combining relevant case studies, real-world examples, and interactive learning exercises to help readers translate their knowledge into strategies that can be applied in urban healthcare practice. The book is written in a way that will educate doctors, nurses, and healthcare administrators about the historical, systemic, and policy-driven determinants that affect the health of urban populations.

Urban Health: Practical Applications for Clinical-Based Learning highlights the role of cultural competence, patient-provider trust, and interdisciplinary collaboration in relation to better urban health outcomes. The authors combine clinical experience with social science and insights from policy analysis to prepare future health professionals to provide equitable, compassionate, and effective care in urban settings. The book consists of seven chapters, each of which addresses an important component of urban health care.

Chapter 1 introduces the nature of urban health, highlights the differences between urban and rural health care settings and frames the urban health penalty. Terms directly related to urbanity indicate the greater burden of chronic disease, poorer access to medical services, and endemic health inequities observed in urban populations. Using Detroit as a case study, the authors highlight how long-term, community-driven efforts can advance solutions to these problems. Chapter 2 highlights training gaps in urban medical training, including a lack of attention to cultural competence, medical mistrust, and the social determinants of health in standard curricula. Medical mistrust receives significant attention in this chapter, and it is rooted in historical injustices in American society—such as the Tuskegee Syphilis Study—to contemporary realities, such as racial bias in medical care. Chapter 2 discusses federal efforts to address the shortage of health professionals in urban areas, including the National Health Service Corps and Area Health Education Centres. Chapter 3 explores the relatively new concept of the social determinants of health (SDOH), defined as the conditions in which people are born, grow, live, work, and age that can affect their health outcomes individually and in society. Such as education, economic stability, environmental conditions, access to health services, and social support systems. The authors underline how urban infrastructure, such as housing and transportation policies and access to food, affects health. The case of the food desert is persuasively made, showing how limited access to affordable nutritious food can lead to chronic diseases such as diabetes and heart disease. The fourth chapter discusses primary care in urban environments. This chapter discusses barriers to accessing health services, such as high caseloads, few health care providers, and insurance restrictions. It also discusses the relationship between patients and healthcare providers, including how bias and systematic oppression impact the quality of healthcare that urban patients receive. The authors argue for a more patient-centred, holistic approach in which healthcare providers recognise their patients' life experiences and engage in collaborative efforts to remove barriers to healthcare. Chapter 5 explores the mental health gap in cities, while defining the difference between mental illness and mental health stress triggers. This chapter underlines the impact of community trauma, economic instability, and racial discrimination on mental health outcomes.

The chapters on trauma-based care are quite interesting, emphasizing the need to uncover the root causes of mental distress - systemic problems and not just symptoms. In the sixth chapter, they review tertiary patient management and discuss access to primary services in urban areas and how urban communities overuse emergency

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rooms. The authors discuss the challenges of discharging patients from hospitals, idealism, transportation issues, financial barriers, and the lack of care resources that facilitate hospitalization and long-term outcomes. They argue for an interdisciplinary approach that aligns nurses, doctors, social workers, and public health workers to improve care coordination.

The final chapter discusses the urban health gap at the time of COVID-19. They use Detroit as a case study to show how COVID-19 exacerbates existing health inequalities and results in COVID-19-related deaths among communities of colour occurring disproportionately. They call for policies and investments in urban health infrastructure. Urban Health: Practical Applications for Clinical-Based Learning has the greatest strength in its comprehensive interdisciplinary scope. Through innovative and engaging narratives, the authors seamlessly connect theory and practice, allowing readers to understand how urban health systems work.

Each chapter includes integrated case studies, examples, and reflective exercises to engage active learning, making this book an exceptional resource for medical students, nurses, and administrators in the health field. The family is also over-involved, leading to mistrust - another key aspect of strength based on community work and cultural competence. While many health textbooks take a paragraph to acknowledge racial differences, this book discusses the historical and structural reasons why trust may not be easy. This is very timely given the ongoing conversation about systemic racial bias in medicine and the need to foster patient trust by providing culturally inclusive care for all.

Of course, this book has limitations. Although urban health in the United States is comprehensively explored, the global perspective is less rich. International case studies would provide some more detailed working models for addressing urban health challenges, which exist all over the world, as food for thought in terms of best practices across health systems. In the long term, although this book does a good job of outlining barriers to care, I think it could also provide clearer, step-by-step advice to doctors on how to overcome the barriers it outlines. A greater focus on policy advocacy and systemic response would make this book more action-oriented.

Urban health is not adequately covered or disseminated in medical education data. In response to this gap, this book provides a clear structure for understanding urban health. It highlights patient-centred care, the social determinants of health, and interdisciplinary collaboration - all of which are key aspects of modern clinical practice. This is particularly relevant for students studying public health, nursing, and medicine; students at this university level are encouraged to think critically and apply their understanding to real-world problems. The case studies are based on real-life clinical experiences that reflect practical contexts to easily connect theoretical learning with practice. In real clinical practice environments, doctors regularly see patients with challenging social and economic difficulties. This book gives them the tools to help overcome these challenges and become a more compassionate and solution-oriented version of themselves in patient care.

Urban Health: A Practice-Based Approach to Clinical Education is an essential requirement for all those involved in urban healthcare. This book provides a nuanced and evidence-based approach to closing this gap and improving outcomes, relationships and systems, which is directly in line with the purpose of this site: to share quality information and content from the most credible sources. Although their own institutions are not yet world-class enough, there is still much room for improvement, especially through the expansion of international education and the provision of a more prescriptive policy agenda. This book is, nevertheless, an important contribution to medical education. The book encourages healthcare professionals to reconsider urban health, making it a valuable resource for those committed to improving health equity.

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Pritpal Singh. **Biomedical Image Analysis Special Applications in MRIs and CT Scans**. Publisher: Springer Singapore Rowman & Littlefield, Medical Library Association; 2024. 166 p. €177,69. ISBN: 978-981-99-9939-2.

Biomedical Image Analysis Special Applications in MRIs and CT Scans is a part of the Brain Informatics of Health (BIH) Book series. This book covers the fundamental theory of these techniques and their practical applications through various examples, presented in a straightforward manner without complex mathematics. The authors delve into key aspects of biomedical image analysis, including model formulation, architecture, basic steps, empirical analysis, and performance evaluation using statistical parameters to assess the effectiveness of the proposed models.

The series is a leading resource in brain informatics and computational brain studies, offering a comprehensive review of brain informatics and health topics. It also covers advanced and recent topics, serving as a platform for emerging subjects that are not yet suitable for textbooks.

The book is targeted at researchers in biomedical image analysis, computer science, and research organizations. It is ideal for individuals interested in applying soft computing techniques to biomedical image analysis, specifically for MRI and CT scans. It is also suitable for those looking to grasp the techniques used in medical image data processing without delving into overly complex mathematics.

The editors introduce the first chapter, "Introduction," by highlighting the significance of medical image analysis, particularly MRI and CT scans, in diagnosing medical conditions. They discuss key image processing techniques like segmentation and clustering, and address the difficulties encountered in analyzing medical images. This chapter lays the foundation for the methodologies discussed in subsequent chapters.

Parkinson's disease is a progressive central nervous system disorder that affects motor and balance functions. While an MRI scan can help detect the disease early and predict symptom severity, it cannot definitively diagnose Parkinson's. Chapters 2, 3, and 4 explore different MRI analysis methods for Parkinson's disease. Chapter 2 introduces the Fuzzy Clustering Method, which aims to identify brain changes associated with Parkinson's by addressing uncertainty in MRI images. Experimental results demonstrate its effectiveness. Chapter 3 presents the Neutrosophic-Entropy Segmentation method, designed to detect subtle brain structure changes in Parkinson's patients using an entropy-based segmentation algorithm. The method's performance is evaluated and compared with other techniques. In Chapter 4, the Neutrosophic-Entropy Clustering Method is discussed, focusing on clustering MRI images to identify patterns related to Parkinson's disease. This approach groups pixels based on uncertainty levels, enhancing pattern detection. Chapter 5 introduces a segmentation method for brain tumor detection in MRI images using type-2 neutrosophic theory-based thresholding, improving accuracy in tumor identification. Lastly, a quantum clustering approach for CT image segmentation of COVID-19 patients is discussed in the final chapter, combining K-means clustering with a quantum optimization algorithm for efficient large-scale medical data processing, particularly in lung analysis for COVID-19 cases.

This book is outstanding and offers a wide range of benefits. Its clear structure facilitates easy navigation through the chapters, ensuring a smooth flow of discussion. The practical applications, such as MRI and CT scan analysis, help readers connect theory with real-world scenarios, enhancing comprehension. The book covers diverse approaches, including various algorithms like K-means, neutrosophic sets, and fuzzy information gain, providing a comprehensive overview of medical image processing techniques. The focus on health issues underscores the significance of science in advancing disease diagnosis and treatment. The introduction of new algorithms reflects ongoing efforts to enhance efficiency and effectiveness in medical image clustering and segmentation. Researchers and practitioners seeking to deepen their understanding of these techniques will find this book to be a valuable reference. The systematic presentation of each chapter ensures that readers can easily grasp the information and apply it in relevant contexts.

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