Landscape Analysis of Affinity Groups, Mentoring and Pipeline Programs for Underrepresented Student Identities in Allied Healthcare Professions

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Despite numerous calls to increase representation in the healthcare in the United States, there is still a persistent lack of diversity across all health professions (Jackson & Gracia, 2014; Miller & Vaughn, 2023). Individuals that are underrepresented minorities (URMs) often encounter obstacles in both accessing quality education necessary to enter the healthcare field and navigating the workforce during their training and career. This underscores a significant public health issue as it hinders efforts to deliver equitable and culturally competent care, which perpetuates health disparities among minority populations. Examples of such identities are racial/ethnic minorities (REMs), sexual and gender minorities (SGMs), or low socioeconomic status (SES). There have been several diversity, equity, inclusion (DEI) strategies to help URMs enter careers in the health professions. Pipeline programs aim to enhance diversity by recruiting and supporting URMs at the educational level, while affinity groups foster a sense of belonging and support networks within professional settings (Miller & Vaughn, 2023; Patterson & Carline, 2006). Mentorship is another strategy to provide guidance, support, and professional development opportunities for URMs (Atwal et al., 2023). Although there has been widespread recognition of the importance of representation and diversity in healthcare, the existing literature lacks comprehensive evidence-based models to increase the number of URMs into healthcare professional programs and their retention in the workforce. To address this gap, we performed a critical landscape analysis of existing affinity groups, mentoring and pipeline programs. We identified studies using a

comprehensive search from the databases Medline, APA PsycInfo, CINAHL, Embase, and Web of Science (1992-2025). A total of sixteen articles were included. Our results provided a description of study aims/objectives, characteristics of mentoring and pipeline programs (training level of students, healthcare training program, population targeted, host program, source of funding and program length), program activities, the experiences of URM students after participation, and the program outcomes (study evaluation method and metrics). By identifying successful strategies and best practices, our research aims to inform current efforts aimed at increasing minority representation and promoting inclusivity in academic environments in the health professions.

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Preface

The motivation for undertaking this research project initially stemmed from my own personal identity as a racial and ethnic minority in the healthcare professions. Through my lived experiences, I was acutely aware of the disparities that exist within our healthcare system, particularly in access to quality care for marginalized patients and lack of representation among healthcare professionals. Hence, I wanted to investigate current practices that can bridge the gap and pave the way for a more diverse and inclusive healthcare landscape. By shedding light on these issues and advocating for systemic change, I hope to contribute to the creation of a more equitable and inclusive healthcare system for future generations.

Completing this thesis has been a valuable learning experience filled with moments of both profound personal growth and challenges. As I reflect on this milestone, I am reminded of the unwavering support and guidance that has kept me going throughout this process.

I would like to thank my thesis committee members Jodie Vento, Helena VonVille, Michelle Takemoto, and Dr. Jenna Carlson. In addition to my thesis committee, I would like to extend my heartfelt gratitude to my past mentors, Dr. Erika Barr, Dr. Susan Gottesman, Dr. Paule Joseph, and Dr. Colleen Campbell. Their mentorship and encouragement throughout the years were instrumental in my career development and entry into the genetic counseling profession. Lastly, I thank my friends and family for their love, support, and encouragement. Their belief in my abilities and skills has been an immense source of strength and inspiration.

1.0 Introduction

Diversity is broadly defined as the practice of including various attributes or characteristics in a group or organization. Within the medical community and as defined by Togioka et al., it specifically pertains to "the incorporation of healthcare professionals, trainees, educators, researchers, and patients of varied race, ethnicity, gender, disability, social class, socioeconomic status, sexual orientation, gender identity, primary spoken language, and geographic region" (Togioka et al., 2024). The Centers for Disease Control and Prevention refers to the healthcare workforce as those who serve in healthcare settings with direct or indirect exposure to patients or infectious materials. These may include, but are not limited to, emergency medical service personnel, nurses, nursing assistants, physicians, technicians, therapists, phlebotomists, pharmacists, students, and trainees (Centers for Disease Control and Prevention, 2023). The public health workforce is composed of "those who work for official public health agencies at all levels of government, community-based, and voluntary organizations with a health promotion focus, the public health-related staff of hospitals and healthcare systems, and a range of others in private industry, government, and the voluntary sector" (Bouye et al., 2016).

Despite major advances in public health and medicine in the last recent decades, many racial and ethnic minorities still experience health disparities, which leads to poorer health outcomes (Jackson & Gracia, 2014). As the United States population continues to increase in racial and ethnic diversity, it is imperative to cultivate a healthcare workforce that mirrors its patient population. Unfortunately, the diversification of healthcare practitioners is happening at a much slower rate than that of the general population (Togioka et al., 2024). The general US population will become a "majority-minority" and more racially and ethnically diverse by 2060 (U.S. Census

Bureau, n.d.). Black/African American and Hispanic/Latinx populations are among one of the fastest growing portions of the country's population but continue to be the most underrepresented racial and ethnic groups in health professions (Association of American Medical Colleges, n.d.; Smith et al., 2009). For these communities with marginalized identities, they often receive inadequate healthcare due to barriers such as language, income, and lack of diverse healthcare providers (Bouye et al., 2016). Other factors that contribute to poorer health outcomes and make certain populations more vulnerable to health disparities include, but are not limited to: age, geographic location, gender, sexual identity and orientation, disability status, and citizenship status (Jackson & Gracia, 2014). Numerous studies have reported that increasing diverse representation in our healthcare and public health workforce can help with providing more culturally competent care (Bouye et al., 2016; Nguyen et al., 2023; Togioka et al., 2024). Healthcare practitioners who are racial or ethnic minorities have reported challenges with their identity, such as racist behavior from patients or their colleagues (Chandrashekar & Jain, 2020). Challenges in the experiences of URM healthcare professionals have even emerged at the academic level, pertaining to matriculating and succeeding in college and graduate education. Several reasons could be due to a lack of mentorship and training, low sense of belonging and support, and training in non-inclusive environments (Carmichael et al., 2021; Estrada et al., 2018; Nguyen et al., 2022).

To increase the diversity of the healthcare workforce, barriers that impact URM students from entering and staying in the healthcare field should be addressed. One such approach is the creation of mentorship programs and pipeline initiatives to increase representation of students with minority identities in healthcare professions (Bouye et al., 2016; Patterson & Carline, 2006; Smith et al., 2009). Pipeline programs are initiatives designed to improve diversity and recruitment of underserved and minority groups in health professions (Bouye et al., 2016; Smith et al., 2009).

Similarly, affinity groups are organizations formed around a shared identity to develop supportive relationships and communities within a profession (Miller & Vaughn, 2023). These organizations can help foster an environment that enhance retention of employees with minority identities (Githens & Aragon, 2009). Mentoring programs are intended to provide guidance, support, and professional development opportunities for URMs. Ultimately, regardless of what type of program is implemented, they all have a shared goal to provide resources and educational opportunities to URM students. In recent years, many health professions organizations and training programs have been focused on taking measures to promote diversity and outreach to URM individuals (Diaz et al., 2020; Pino-Jones et al., 2021). While previous studies have recognized the lack of diversity as a significant issue, there are very few reported successful or standard models aimed at addressing this problem in the literature.

To address this gap, the aim of this study is to perform a critical landscape analysis to examine what current affinity groups, mentoring and pipeline programs have been implemented to increase minority student representation and their retention within their profession. To accomplish this, we completed a scoping review using a comprehensive search in various databases (Ovid Medline, APA PsycInfo, Embase, CINAHL, Web of Science) using pre-defined search and exclusion criteria. From the 814 studies initially screened by title and abstract, 103 studies were moved to full-text review. We then only included papers that looked at affinity groups, pipeline, or mentoring programs for URM students pertaining to allied health professions, leaving the final number of papers to be 16.

1.1 Specific Aims

1. Conduct a critical landscape analysis to investigate if there is a model for affinity groups, mentoring and pipeline programs in healthcare professions.
2. Identify characteristics of these programs that are developed and implemented to support and facilitate the training of URM students.
3. Identify the experiences of URM students who have participated in affinity groups, mentoring and pipeline programs after these interventions.
4. Describe the outcomes and goals of affinity groups, pipeline, and mentorship programs.

2.0 Manuscript

2.1 Background

Health inequities continue to persist across the nation, especially in underserved areas and among marginalized populations (Jackson & Gracia, 2014). In addition to the need of eliminating health disparities, it is essential to enhance diversity among healthcare professionals to reflect the diversity of the US population. It has been reported that patients have a greater satisfaction when a racially concordant healthcare provider is available, and providing opportunities for minority populations to have a practitioner that shares a common culture with them can lead to improved health outcomes (Cooper et al., 2003). One way to achieve patient-provider concordance is by increasing the number of URM students in healthcare professional training programs.

Multiple explanations can be considered as to why there are demographic disparities and a lack of diverse identities in training programs and the healthcare workforce. For instance, there is an inequality of educational opportunities and resources that begins as early as in K-12 education (Estrada et al., 2018; Patterson & Carline, 2006). Students who are URMs have commonly reported barriers to matriculating and succeeding in both college and graduate education. This can be attributed to a lack of mentorship and training, low sense of belonging and support, and training in non-inclusive environments (Estrada et al., 2018; Nguyen et al., 2023).

Partnerships between health profession training programs, higher education and K-12 institutions should be considered to help increase representation of underrepresented minorities in the healthcare workforce. These partnerships can include approaches to improve minority student achievement, such as methods to improve academic enhancement, instructional enrichment, career

awareness and outreach, mentoring, research internships, and financial support (Patterson & Carline, 2006; Smith et al., 2009). A pipeline program is a term that is also often used interchangeably with enrichment/pathway programs or pre-professional programs. Broadly, these programs intend to provide the previously mentioned strategies to help with diversification.

One characteristic of a pipeline program, for example, is to provide academic support, which includes enrichment or remediation to bolster academic skills in science, communications, study skills and test-taking (Patterson & Carline, 2006). Another feature of successful pipeline programs is outreach, which provides career awareness and information about various health professions to encourage interest at a young age. Research internships are also occasionally included in pipeline programs to help students develop research skills and knowledge in academic or laboratory settings for career development. URM students can also commonly be from low SES or educationally under-resourced backgrounds, so another aspect that these programs can provide is financial support through scholarships, grants, or funding opportunities as these trainees pursue healthcare careers (Patterson & Carline, 2006).

To help URM students have a better sense of belonging and social support, affinity groups can be implemented in chapters of healthcare professional societies and networking groups, universities, or clinical training sites. Affinity groups are professional development groups or organizations that are formed around a shared identity (Miller & Vaughn, 2023). They are aimed to cultivate inclusion and reduce feelings of isolation in students and practitioners with URM identities, as well as foster professional growth, leadership development, networking, and collaboration opportunities in the healthcare professions (Alicea & Johnson, 2021; Miller & Vaughn, 2023). There are many affinity groups for various identities, including those who are Black/African American, Hispanic/Latinx, LGTBQIA+, etc. A strength of affinity groups is that

they have been promoted as safe spaces for members to participate in unrestricted dialogue pertaining to their identity and lived experiences (Ali, 2017). Members can discuss shared experiences and identities which creates a culture where individuals can express feelings without a fear of oppression from non-members, which can help engagement between in-group members and promote an inclusive environment (Ali, 2017).

A common theme in both pipeline programs and affinity groups involves the mentorship of minority students to recruit and retain diverse identities in healthcare and public health professions. Mentors who share similar identities and backgrounds as their mentees help contribute to URM students' academic success and feelings of belonging (Nguyen et al., 2023). These mentors can be faculty members, healthcare practitioners, and clinical supervisors in the students' respective healthcare profession or other related career fields (Nguyen et al., 2023). Mentoring can also exist separately from pipeline and affinity groups, as its own standalone program.

There have been several types of mentoring relationship structures observed in the science, technology, engineering, mathematics, and medicine (STEMM) fields. Formal mentorship is defined as a relationship where a mentor and mentee are assigned to each other as part of an organizationally supported program, whereas an informal mentorship naturally evolves when individuals share common interests and feel comfortable with each other on a personal level (National Academies of Sciences et al., 2019). Typically, mentoring relationships have been studied as a dyadic structure, where there is one mentor and one mentee working as a pair. However, non-dyadic mentorship, that involves more than one mentor and mentee is a type of mentorship structure. Examples of other mentorship structures in STEMM can include triads, collective or group mentorship, and mentorship networks. A sole mentor may not possess all the necessary knowledge, skills, capabilities, or connections required by their mentee, highlighting the

potential significance of mentorship structures beyond just one-on-one relationships for the success of mentees (National Academies of Sciences et al., 2019). Positive outcomes attributed to mentoring or participating in mentorship programs include better engagement with an organization and commitment to their own role (Atwal et al., 2023). Mentoring can function as a tool to provide coaching, role modelling, and promoting exposure and visibility (Atwal et al., 2023).

Therefore affinity, pipeline, and mentorship programs can be considered as an approach to aid in URM students matriculating into healthcare professional programs. With barriers beginning as early as elementary school for underrepresented identities, little exposure or preparation in science can cause these students to lose interest very early on in their academic careers (Thiem & Dasgupta, 2022). Pipeline programs aim to engage with URM students, and enhancing resources that can provide preparation necessary to be admitted into a healthcare professional training program. Affinity groups and mentorship programs aid in creating safe spaces and communities for URM individuals to thrive in their institutional training programs and careers, which leads to higher retention of these identities in the workforce with an ultimate goal of reducing health disparities (Atwal et al., 2023; Miller & Vaughn, 2023).

To address challenges in recruiting, mentoring, and ensuring the success of underrepresented students and professionals, diversity must be considered as an actionable value and priority. While previous studies have highlighted the importance of increasing diversity to reduce health disparities, there has been little research to our knowledge that evaluates existing affinity groups, mentoring or pipeline programs aimed towards increasing diverse representation within professional healthcare training programs. The goal of this study is to explore if there are established models for affinity groups, pipeline, and mentorship programs in increasing URM

students in the healthcare professions. Our study also investigated the goals, characteristics, and the experiences of URM students before and after participation of these programs.

2.2 Methods

I adopted several of the steps outlined in the methodological framework used by Pollock et al. for a scoping review, which allowed us to explore current practices of already established affinity groups, pipeline, or mentorship programs in increasing URM students in the healthcare professions by summarizing a range of evidence (Pollock et al., 2023).

First, we created aims or objectives for this study and then defined eligibility criteria for relevant articles. Next, we tracked all search-related data. I then performed study selection based on exclusion criteria, and then finally developed a study characteristics table. This allows for the inclusion of a broad range of published peer-reviewed literature and does not require the assessment of the quality of included studies. Since the aims of our study includes an exploratory question, this methodology enabled us to analyze any knowledge gaps in the literature. We used the Joanna Briggs Institute (JBI) general guidance for a scoping review and reported using several elements with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for scoping reviews (PRISMA-ScR) (Tricco et al., 2018).

2.2.1 Search Strategy

The search strategy was designed with the assistance of a health sciences librarian (HV). Our search strategy retrieved and reviewed studies published from 1992-2025 from the databases Medline, APA PsycInfo, Embase, CINAHL, and Web of Science (Table 1). Reviewers LT and HV searched the databases using our search strategy and terms, which are included in Appendix A. We conducted our searches from 19 December 2023 to 25 January 2024. All citations were then imported into EndNote 21 and grouped by the database searched.

Table 1 Summary of Literature Databases Searched

Table	Vendor/ Interface	Database	Data searched	Database update	Searcher(s)
1a	Ovid	Medline® ALL	December 19, 2023; Revised January 24, 2024	1946 to December 18, 2023; Revised search 1946 to January 23, 2024	Helena M. VonVille; Leann To
1b	Ovid	APA PsycInfo	December 19, 2023; Revised January 25, 2024	1806 to December Week 1 2023; Revised 1806 to January Week 3 2024	Helena M. VonVille; Leann To
1c	Elsevier	Embase®	December 19, 2023	December 19, 2023	Helena M. VonVille; Leann To
1d	Ebsco	CINAHL	December 19, 2023; Revised January 25, 2024	December 19, 2023; Revised search January 25, 2024	Helena M. VonVille; Leann To
1e	Clarivate	Web of Science	December 19, 2023; Revised January 25, 2024	December 19, 2023; Revised search January 25, 2024	Helena M. VonVille

2.2.2 Eligibility Criteria

Studies with the article topic of either affinity groups, pipeline, or mentorship programs aimed to increase URMs in the healthcare professions were included. We included programs from public health and allied healthcare professions, including audiology, dentistry, emergency medical technicians, nursing, occupational therapy, pharmacy, physical therapy, and medical physicians. Appendix A provides a table with all the health professions we used in our search strategy. Studies were required to be from the United States and published in English. We created exclusion criteria for the screening process, which is listed below:

1. Study was not an original research article (review, commentary, etc.)
2. Study did not evaluate the effect of an affinity group, pipeline, or mentoring program (i.e., did not report post-intervention data)
3. Chemical-focused study (i.e., papers looking at affinity binding)
4. Study recommended affinity groups, pipeline, or mentoring programs as a future DEI strategy, but not pertaining to the article topic
5. Target population was practicing professionals (i.e., medical residents or fellows)
6. Target population were not health profession trainees (i.e., the focus of the study was not related to a health profession discipline or healthcare training program)
    a. High school and undergraduate participants were eligible if they were in a program aimed to increase or engage interest in the health professions
7. Non-DEI use of affinity group (i.e., cohort studies)

Table 2 provides a glossary with definitions and terms to help guide study selection and provide consistency in data entry for the scoping review.

Table 2 Glossary of Terms

Definitions
Mentorship: As described by Beech et al, "a developmental partnership in which knowledge, experience, skills and information are shared […] to foster the mentee's professional development and […] also to enhance the mentor's perspectives and knowledge".
Formal Mentorship: "A mentoring relationship in which a designated mentor and mentee are assigned to one another as part of an organizationally supported program" (National Academies of Sciences et al., 2019).
Informal Mentorship: "A mentoring relationship that occurs naturally based on mutual interest and interpersonal comfort" (National Academies of Sciences et al., 2019).
Mentorship Dyad: "A single mentor-mentee pairs in which the mentor and mentee interact in ways that are mutually responsive" (National Academies of Sciences et al., 2019).
Mentorship Triad: "A mentorship relationship that can include one mentee and two mentors, two mentees and one mentor, or a combination of the two, where the most experienced individual in the triad mentors a somewhat less experienced individual who in turn mentors an individual who is new to the field, forming a sort of mentorship cascade." (National Academies of Sciences et al., 2019)
Group Mentorship: "A group of mentees work together with one or more mentors as a small network, providing distinctive resources and information to one another" (National Academies of Sciences et al., 2019).
Network Mentorship: "A situation in which a mentee utilizes a variety of resources and people for mentorship" (National Academies of Sciences et al., 2019).
Pipeline Program: As per Patterson et al, "initiatives designed to improve diversity and recruitment of underserved and minority groups in health professions". This can also be referred as enrichment/pathway programs or pre-professional programs.
Local Institution: As per Byrd et al, "a pipeline program that serves only those at the host school or organization".
National Institution: As per Byrd et al, "a pipeline program that serves multiple site nationally, which are commonly associated with government-funded initiatives".
Affinity Group: As per Miller et al, "a professional development groups or organizations that are formed around a shared identity". This can also be referred as an employee resource group.
Racial and Ethnic Minorities: As per the Association of American Medical College, "those racial and ethnic populations that are underrepresented in the medical profession relative to their numbers in the general population".

2.2.3 Screening, Selection, and Data Extraction

Study selection was conducted with the use of an Excel workbook (VonVille, 2023). All unique citations were added into the Excel workbook after the searches were completed. The articles were screened and reviewed by LT. We used a two-step screening process as defined by our set of exclusion criteria (Figure 1). The first step involved initial screening by title and abstract if it should be excluded or go to full-text review. The second step was then full-text review of items, where non-excluded articles from the first step were retrieved and an exclude/include decision was recorded in the Excel workbook.

We then developed a data extraction table for the full-text articles included in our study to identify any affinity groups, pipeline or mentorship models aimed to increasing URM identities into healthcare professional educational programs.

2.2.4 Data Items

The extracted data elements included: author; year published; aims/objectives; training level (middle school/high school/undergraduate/post-baccalaureate/graduate); program type (affinity group/mentoring program/pipeline program); health program/discipline; population targeted (race and ethnicity minorities/socioeconomically disadvantaged/low-socioeconomic status/educationally under-resourced); program host; program funding; program description; program length; program evaluation methods; program evaluation metrics; and findings.

2.3 Results

Our search resulted in a total of 1116 citations identified from database searches. After duplicate citations (n=302) were excluded, 814 titles and abstracts were screened. Afterwards, 220 full-text records were reviewed for the second level screen, of which 117 full-text records were excluded. This left a total 103 studies included for the scoping review. Due to the large number of articles included after the literature search and selection process, items were then only included for data extraction if they were published from 2020 or after, and if the article looked at allied health profession fields (removing articles in which the topic was focused solely towards increasing URM students in either the medical, nursing, or dental fields). The final number was 16 studies for the data extraction.

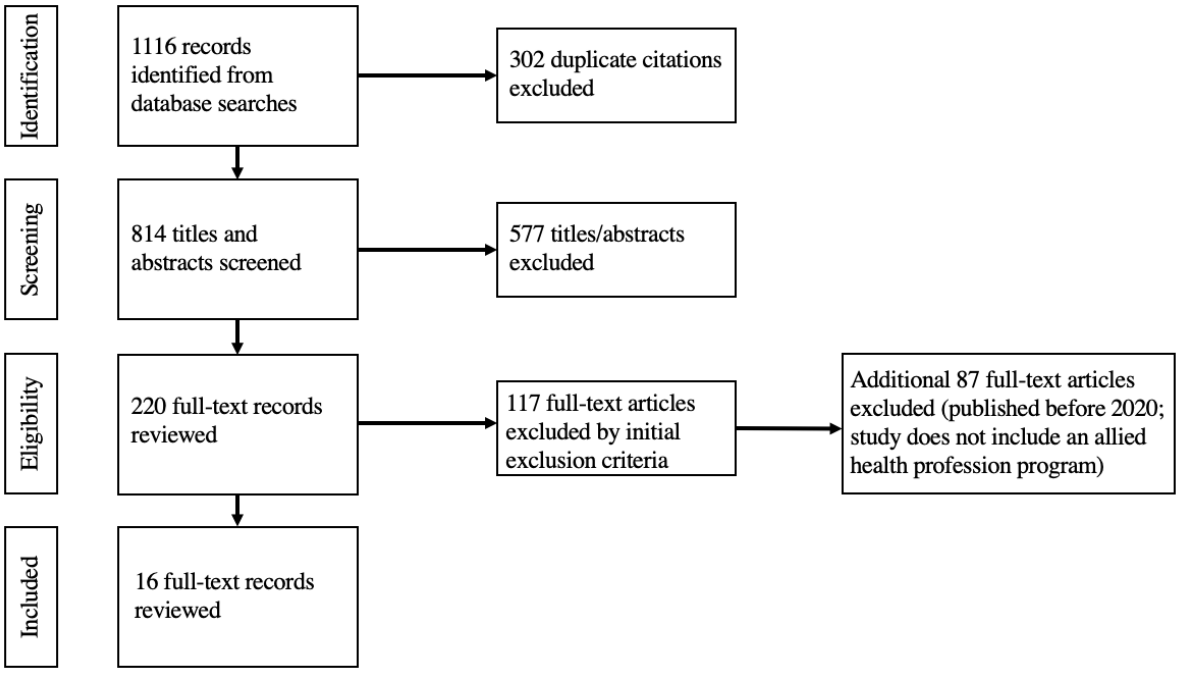

Figure 1 PRISMA-ScR Flowchart of Literature Search and Selection Process

2.3.1 Data Extraction Table

We examined sixteen articles for this scoping review. Out of these sixteen studies, four were identified to be mentoring programs (Grilo et al., 2023; Javier et al., 2021; Mahendra & Kashinath, 2022; Naidoo et al., 2021) and the remaining twelve were pipeline programs (Armstrong et al., 2022; Bliss et al., 2020; Butler & Ampadu, 2022; Crews et al., 2020; Daniels-Osaze et al., 2021; Fernandes et al., 2022; Kana et al., 2020; Kohut et al., 2023; Portee, 2023; Robles et al., 2021; Stewart et al., 2020; VanInwegen et al., 2022). The full data extraction table and characteristics of the included studies can be found below in Table 3. None of the full-text studies were identified to be about affinity groups. The articles were then assigned an article ID (Table 4).

Table 3 Full-Text Articles and Assigned ID Numbers

Article ID	Author (Year) Title
Study 1	Javier, D., Stinson, K., Zavala, M., Ahmed, T., & Vishwanatha, J. K. (2021) NRMNet: Building a National Resource for Mentorship, Networking and Professional Development to Enhance Diversity.
Study 2	Naidoo, K., Yuhaniak, H., Borkoski, C., Levangie, P., & Abel, Y. (2021) Networked mentoring to promote social belonging among minority physical therapist students and develop faculty cross-cultural psychological capital.
Study 3	Mahendra, N., & Kashinath, S. (2022) Mentoring Underrepresented Students in Speech-Language Pathology: Effects of Didactic Training, Leadership Development, and Research Engagement.
Study 4	Grilo, S., Bryant, M., Garbers, S., Wiggin, M., & Samari, G. (2023) Effects of a Mentoring Program for Black, Indigenous, and People of Color and First-Generation Public Health Students.
Study 5	Bliss, C., Wood, N., Martineau, M., Hawes, K. B., López, A. M., & Rodríguez, J. E. (2020) Exceeding Expectations: Students Underrepresented in Medicine at University of Utah Health.
Study 6	Crews, D. C., Wilson, K. L., Sohn, J., Kabacoff, C. M., Poynton, S. L., Murphy, L. R., Bolz, J., Wolfe, A., White, P. T., Will, C., Collins, C., Gauda, E., & Robinson, D. N. (2020) Helping Scholars Overcome Socioeconomic Barriers to Medical and Biomedical Careers: Creating a Pipeline Initiative.
Study 7	Kana, L. A., Noronha, C., Diamond, S., Pun, M., Broderick, M. T., Finks, J., & Sandhu, G. (2020) Experiential-Learning Opportunities Enhance Engagement in Pipeline Program: A Qualitative Study of the Doctors of Tomorrow Summer Internship Program.
Study 8	Stewart, K.-A., Brown, S. L., Wrensford, G., & Hurley, M. M. (2020) Creating a Comprehensive Approach to Exposing Underrepresented Pre-health Professions Students to Clinical Medicine and Health Research.
Study 9	Daniels-Osaze, A., Valmont, M., & Gonzalez, H. (2021) Diversifying Healthcare Fields by Enhancing Pipeline Initiatives.
Study 10	Robles, J., Qadeer, R., Reyes Adames, T., & Naqvi, Z. (2021) Impact of the Bronx Community Health Leaders Program for Socioeconomically Disadvantaged Prehealth Students.
Study 11	Armstrong, A. T., Noble, C. A., Azeredo, J., Daley, E., Wilson, R. E., & Vamos, C. (2022) An Overview of an Undergraduate Diversity MCH Pipeline Training Program: USF's Train-A-Bull.
Study 12	Butler, L. M., & Ampadu, J. V. (2022) Impact of summer healthcare diversity camp on students' interest and pursuit of healthcare careers.
Study 13	Fernandes, P., Wang, K., Timmerman, J., Reyes, A., Holmes, F., Olaleye, O. A., Salihu, H. M., Moerchen, V. A., Belcher, H. M. E., Copeland-Linder, N., Noble, C. A., Vamos, C. A., Armstrong, A., Waters, C. R., Long-White, D., Brown, C., Reddy, M. M., & Kuo, A. (2022) Success of Maternal and Child Health Pipeline Training Programs: Alumni Survey Results.
Study 14	VanInwegen, A., Caldas, L. M., Ballentine, R., Pamulapati, L. G., Patterson, J., Hayes, T., Ogbonna, K. C., & Donohoe, K. L. (2022) An intensive summer pipeline program for pre-pharmacy students to increase underrepresented minority matriculation to pharmacy school.
Study 15	Kohut, O. B., Wang, Z., Sanchez, R. R., Rausch, J. C., Nieto, A., & Minguez, M. M. (2023) Assessing the impact of a 6-year health sciences enrichment program for underrepresented minority youth on healthcare workforce diversity, career path, and public health.
Study 16	Portee, C. (2023) A Qualitative Study on Trainees' Perspective on the Benefits of Maternal and Child Health Pipeline Training Programs.

Table 4 Data Extraction of Full-Text Articles

Author Year	**Aims/Objectives**	**Training Level Health program Population targeted Demographics**	**Program Host Funding Program Description Program Length**	**Program Evaluation Method Program Evaluation Metrics Findings**
Mentoring Programs				
Javier et al. 2021	To provide a broad-based network of mentors who are accessible to diverse mentees across the country, allow networking and professional development resources that support mentee transitions from one career stage to the next, and diversify the biomedical workforce	Undergraduate, Post-baccalaureate, Graduate level Health Professions and Biomedical Research Racial/Ethnic minorities Total (n=6,526) Asian (n=862) Black (n=1958) Hawaiian/Pacific Islander (n=57) Mixed Race (n=306) Native American (n=149) White (n=1978) Prefer not to report (n=460) Blank (n=258)	National Institutes of Health; National program; Federally funded An online portal where users can access one-on-one mentorship and networking, engage in the scientific community and professional development, use career-design resources and webinars No length specified	Quantitative study Survey Demographic data was obtained making a user account through the portal. After a mentoring relationship, 77 mentees and 114 mentors completed a survey about their experience 54.5% of mentees responded that the mentoring they received was "Excellent." 59.7% of mentees and 43.9% of mentors responded that their relationship was "Excellent." 55.6% of mentees and 48.2% of mentors responded that the match between mentor and mentee was "Excellent." 50.7% of mentees responded that they improved in aligning expectations, 46.6% in setting goals, 47.9% in managing demands, 41.0% in managing stress, 39.7% in managing their work/life balance, 30.1% in their sense of belonging, 32.9% in their science identity, 50.7% in building/expanding their professional networks, and 45.2% in feeling prepared for the next steps in their career
Naidoo et al. 2021	To examine if a networked mentoring program aligned with the racial/cultural identity development model could mitigate social isolation and promote a sense	Graduate level Physical Therapy Racial/Ethnic minorities Total (n= 70) Black/African American (n=3) Asian/Pacific Islander (n=15) Hispanic (n=9) Native-American/Alaskan Native (n=1)	Unspecified graduate school for health sciences; Local program; Unspecified funding A mentoring program attempted to match mentors and mentees with concordant racial/ethnic identities when possible. Mentoring teams included a faculty mentor, peer mentor,	Mixed Methods Study Survey 21-item questionnaire to assess graduate students' sense of belonging and connectedness Focus Group Interviews Interview transcripts from first-year REM DPT mentee explored social belonging through thematic analysis

	of belonging among first-year racial and ethnic minority Doctor of Physical Therapy (DPT) students	White (n=33) Mixed Race (n=5) Unknown (n=4)	and first-year mentee. Faculty and mentees, and peer mentors and mentees were asked to meet ten times over the five-month study period. 1-year program	First-year mentees had an average of 6.63 faculty mentoring sessions, 5.88 peer mentoring sessions, and all participants attended at least one of the networking events. Faculty and peer mentors met twice over the intervention period Open-ended survey responses showed that first-year REM DPT mentees felt more connected to the institution through interactions with peer and faculty mentors and expressed the importance of having REM mentors. Four themes emerged from first-year mentee focus groups: foreign culture, someone like me, connection, and future oriented
Mahendra & Kashinath 2022	To implement and track the outcomes of a year-long, structured mentoring program aimed at enhancing the retention and success of underrepresented graduate and undergraduate students in speech-language pathology	Undergraduate and Graduate level Speech-Language Pathology Racial/Ethnic minorities Total (n=46) Graduate students (n=33) Asian (n=16) Latino (n=8) Black (n=1) White-identified (n=8) Undergraduates (n=13) Asian (n=6) Black (n=3) Latino (n=3) White-identified (n=1) White-identified persons who reported Arab or Middle Eastern ethnicity (n=3)	Unspecified California State University (CSU); Local program; 5-year external federal grant A mentoring program with 3 components: 1) Provide didactic training in leadership development, cultural competence, and clinical research methods. 2) One-on-one and cohort-based mentoring of participants by the authors, small-group mentoring with professional mentors, and small-group mentoring by peers (typically graduate students 1–2 years ahead) 3) Participation of a supervised, team-based, culminating experience that involved completing a clinical research project or a community outreach and education project 1-year program	Quantitative study Long-term Data Collection The study tracked longitudinal outcomes of participants after completion of the mentoring program. Undergraduate student outcomes included completion of bachelor's degree, application, and acceptance to graduate studies Graduate students' outcomes included completion of master's degree, performance on the Praxis national exam and on the California Basic Educational Skills Test (CBEST) All 33 graduate students passed their departmental master's comprehensive examination, completed coursework and practicum requirements for their master's degree, and completed their Clinical Fellowship Year experience to become licensed SLPs 12 out of 13 undergraduate participants graduated in 4 years. 10 of 13 applied to multiple speech-language pathology graduate programs for one or more years. 3 were admitted to SLP programs

Grilo et al. 2023	To evaluate the effects of an antiracist mentorship program on the sense of belonging and overall experience among BIPOC and first-generation students at Columbia University Mailman School of Public Health in New York City	Graduate level Public Health Racial/Ethnic minorities 2021 MOSAIC Student Survey Participants (n = 39) Asian (n=15) Black (n=13) Hispanic (n=5) Middle Eastern (n=3) ≥2 Races (n=3) 2016-2020 Graduate Exit Surveys Participants with Exposure to MOSAIC (n=116) Asian (n=40) Black: (n=11) Hispanic (n=19) American Indian or Alaska Native (n=1) ≥2 Races (n=7)	Columbia University Mailman School of Public Health; Local program; Funding from host program A mentoring program that offers comprehensive faculty-to-student peer mentorship across 5 domains: professional development, faculty mentorship, navigating institutions, incident management, and guest speakers, including connections to faculty, alumni, and community leaders 1-year program	Mixed Methods study Survey 2 data sources were used to retrospectively evaluate experiences of BIPOC and first-generation graduate students The 2021 MOSAIC Student Survey (n = 39) collected data on experiences of students who participated in the MOSAIC program The 2016-2020 Graduate Exit Surveys (n = 1222) collected data on graduating students' experiences, satisfaction, and perspectives on diversity, equity, and inclusion	Significantly increased satisfaction, experiences in graduate school, and overall quality of life among graduate students in MOSAIC versus graduate students who did not participate Results indicated that most participants of MOSAIC joined for opportunities to connect to BIPOC and first-generation students, faculty mentorship, community building, and professional development, which had a positive effect on student well-being Open-ended responses were put into 4 main themes: increased sense of belonging and community, navigating the university and increased access to resources, MOSAIC during virtual learning, and identification of additional needs
Pipeline Programs					
Bliss et al. 2020	To increase the number of URM healthcare professionals through the Health Sciences Learning, Engagement, Achievement and Progress (HS-LEAP) program	Undergraduate level Health Professions Racial/ethnic minorities Total (n=408) Asian (Southeast or refugee) (n=114) Black/African American (n=30) White (non-Latinx) (n=50) International (n=7)	University of Utah; Local program; Funding by host program A program with didactic, clinical, research experiences and community opportunities of the health professions The program includes a community engagement project and other	Quantitative study Long-term data collection "Students were followed for 6 years after the program to evaluate successful engagement in their profession of choice" Graduation and postgraduation outcomes compared to non-HS-LEAP	Participation in HS-LEAP was associated with higher mean first semester GPA, higher first-year fall-to-fall retention, and higher 6-year graduation rates when compared to students who were not in the program

		Latinx (n=167) Multiple race/ethnicity (n=17) American Indian/Alaska Native (n=10) Pacific Islander (n=3) Unknown (n=2)	professional development activities 4-year program, 14-credit hours	students at the University of Utah from 2005-2016	

Crews et al. 2020	To create a broad and innovative biomedical research-focused pipeline program targeting students with under-resourced backgrounds and produce successful professionals in medicine, biomedical research, allied healthcare, or other STEMM fields, ultimately increasing diversity of the healthcare workforce	High School, Undergraduate, Post-baccalaureate/Pre doctoral level Low-income; educationally under-resourced Health Professions High school programs: Summer Academic Research Experience (SARE) (n=63) (2009-2018) Biophysics Research for Teens (BRBT) (n=66) Undergraduate: Summer Internship Program (SIP) (n= 47) (2015- Post-baccalaureate: Doctoral Diversity Program (DDP) (n=23) Participant requirements: Came from under-resourced backgrounds 1. Households with annual incomes <200% of U.S. federal poverty level 2. Educational challenges (1st generation college student, raised in a single-parent household, and/or attending a high school where most students come from low-income families)	Johns Hopkins University; Local program; Federal and foundational grants, host program contributions, private donations A pipeline initiative that serves ~60 students via four programs yearly: ~30 high school students through SARE and BRBT each (8-week program) ~16 undergraduates through CSM-SIP (10-week summer program) ~5–8 post-baccalaureate scholars through DDP (2-year program) Participants received stipends through the program. All four programs aim to develop participants' core academic, social, professional competencies, creativity, technical expertise, and passion for advanced careers	Quantitative Study Survey All four programs have self-assessments and surveys, and collected data on program completion, matriculation to college, graduate, or medical programs if applicable. High school participants had GPAs measured pre- and post-intervention	SARE and BRBT: improved academic performance. For the lower GPA students, about half have experienced approximately 1 point improvement in the subsequent school year. Of the 66 scholars from 2012-2018, 37 matriculate to a college program and 34 confirmed to pursue a pre-med, STEM or health major SIP: Of 47 participants from 2015-2018, 5 matriculated to medical or graduate programs, with 35 still in undergraduate, 3 joined the DDP program DDP: Out of 23 participants from 2015-2018, 11 matriculated into a medical or graduate program and 3 currently work in biomedical/healthcare field. Participants reported more focused, better informed medical and graduate school application essays. Clearer view of what direction they want to take their careers All programs showed increased confidence and independence, and development of pride in one's work. Many participants, especially at the high school level, begin to see research as a career DDP Scholars frequently author/coauthor papers; CSM SIPs and SAREs have also published

Kana et al. 2020	To examine the experiences of students participating in the Doctors of Tomorrow (DoT) summer internship program, which aims to increase interest in healthcare careers from high schoolers that are underrepresented in medicine	High School level Racial/Ethnic minorities Health Professions Total (n=36) African American/Black (n=25) Asian (n=10) White (n=1)	University of Michigan Medical School and Cass Technical High School; Local program; Private and federal funding A paid internship participants that happens between 9th and 10th grade. Each student is paired with a community-based service organization or research group in Detroit that is most aligned with their career interests 8-week summer program	Qualitative study Survey Participants engaged in weekly goal setting through SMART framework along with self-reflective writing through questions. Responses were compiled for qualitative thematic analysis	Four overarching themes: (1) Engagement in authentic experiential-learning opportunities (2) Development of professional skills (3) Self-reflection and actualization (4) Real world barriers in experiential-learning Data showed experiential learning through internships can provide opportunities for students to reflect on their experiences for personal and professional growth
Stewart et al. 2020	To increase diversity representation among healthcare professionals through the Health Disparities Clinical Summer Research Fellowship Program (HDCSRFP), a comprehensive pipeline designed to increase the preparation of underrepresented students for health careers	Undergraduate, Post- baccalaureate level Racial/Ethnic minorities; Socioeconomically disadvantaged backgrounds Health Professions Total (n=121) Participants must be enrolled US college/university students or recent graduates and be from groups traditionally underrepresented in the US health professions or from socioeconomically or educationally disadvantaged backgrounds	University of Connecticut School of Medicine; Local program; Private, federal, and host program funding A research intensive, residential program. Participant shadow community healthcare providers at local health centers or clinics, conduct research at their community site, and present their research projects during a poster symposium at the end of the program 7-week summer program	Quantitative study Survey Participants from 2008-2018 were surveyed to identify who completed undergraduate studies before the end of the 2018 fall semester pursued a career or further studies within a health profession	109 participants responded to the survey. 79 have completed undergraduate studies, while 30 were continuing in undergraduate or post-baccalaureate programs 73 college graduates matriculated to health profession schools or graduate health programs or are engaged in healthcare Of these 73 participants, 36 were accepted to medical school, 12 were accepted to dental school, and 25 are engaged in other health professions or enrolled in graduate health programs

Daniels-Osaze et al. 2021	To address the chronic shortage of underrepresented populations in the healthcare workforce by creating a pipeline program that engages disadvantaged middle and high school students in STEM activities	High School level Racial/Ethnic minorities Health Professions Total (n=181) Black (n=147) White (n=12) Asian (n=16) Other (n=6) Ethnicity: Hispanic/Latinx (n=15) Non-Hispanic/Latinx (n=166)	SUNY Downstate Health Sciences University; Local program; Private and federal funding A pipeline program that provides academic enrichment and exposure to 10^{th} -12^{th} grade students. A bi-weekly professional development workshop series prepares participants for the college application process along with internships, research, and financial aid opportunities 3-year program	Quantitative Study Survey At the end of each workshop, participants completed surveys assessing their overall satisfaction with the session; helpfulness of content for college preparation; readiness to transition to college; willingness to attend future workshops; and willingness to recommend the program to others. Participants were asked 5 questions, with a Likert scale survey that either used a 4 or 5-point scale	Of the 108 respondents, a total of 122 responses were recorded 98.36% agreed the content was helpful in preparing for college "9.34% stated they felt more prepared more prepared to transition to college 94.26% expressed satisfaction overall 87.71% expressed willingness to attend future workshops 100% said they would recommend these workshops to others
Robles et al. 2021	To describe and report on outcomes of a longitudinal service-driven pre-health pathway program in a low-income community intended to address this disparity and increase health equity	Undergraduate, Post- baccalaureate level Racial/Ethnic minorities; Socioeconomically disadvantaged backgrounds Health Professions Total (n=64) Black (n=18) Latinx (n=26) Asian (n=11) White (n=4) Mixed race/ethnicity (n=4) 44 out of 64 participants were reported to have come from a low-income family	Montefiore Family Health Clinic; Local program; Federally funded grants A longitudinal service-driven and near-peer mentorship program where pre-health students volunteer at a community health center. Participants volunteer 2 hours per week, attend 2 out of 4 weekly meetings per month, and make one scholarly presentation per year in addition to attending presentations about social determinants of health, talks from invited speakers about health care professions, career advising and support,	Quantitative Study Survey A Qualtrics survey was sent to ask student demographics and metrics that tracked career advancement	194 students attended from 2014 to 2020. 168 participants were in the program for at least 3 months, and the survey response rate was 64 out of 168 Out of the 194 students who have participated in the program, 76 students advanced into professional health career programs, with 39 direct acceptances and 15 conditional acceptances to medical school programs, 9 nursing, 4 physician assistant, 9 health-related master's level programs, 1 respiratory therapy, and 1 optometry

		38 were first-generation college students	and weekly near-peer mentorship and networking A minimum 6-month commitment but students can remain in the program until they enter their professional health career or can no longer regularly attend		
Armstrong et al. 2022	To describe an undergraduate pipeline training program (PTP) designed to guide underrepresented minorities (URM) trainees into Maternal Child Health (MCH)-related health professions	Undergraduate level Racial/Ethnic minorities; Socioeconomically disadvantaged backgrounds Maternal and Child Health Professions Total (n=35) Hispanic/Latino (n=13) Black/African American (n=35) Asian (n=7) White (n=11) American Indian/Alaskan Native (n=2) Other (n=2) First-generation student (n=18) Economic hardship (n=26)	University of South Florida (USF) MCH PTP; Local institution belonging to a national pipeline program; Federally funded grant A program that involved faculty and peer mentors, public health courses, experiential opportunities, research opportunities, internships, professional development and networking, trainee portfolios 2-year program	Quantitative Study Survey Participants completed pre- and post-self-efficacy surveys at the start and end of the program. The survey had 15 questions (five point-Likert scale, Strongly Agree-Strongly Disagree) focused on long-term career goals, MCH employment/research/funding opportunities, and graduate school application process Long-term Collection Data Ongoing follow-up is conducted via email every 6 months to update trainee information and relevant long-term outcomes such as graduate school application, admission, or work in MCH	35 trainees completed the program. 14 out of 35 went into graduate or medical programs 18 out of 35 reported areas of employment in nursing, public health, research, social work. Findings from the pre- and post-self-efficacy surveys suggest the MCH Pipeline Training Program may have impacted trainee self-efficacy in applying to health-related graduate studies and positions in the MCH workforce. Significant differences in self-efficacy ($p < 0.05$) were observed across all cohorts

Butler & Ampadu 2022	To evaluate the impact of the Southern Illinois University Edwardsville (SIUE) Healthcare Diversity Summer Camp on participants' interest and pursuit of a healthcare career	High School level Racial/Ethnic minorities Pharmacy; Nursing; Dental Total (n=77) African American (n=66) Hispanic (n=4) Asian (n=2) Mixed (n=5)	Southern Illinois University Edwardsville (SIUE) School of Pharmacy; Local program; Private funding A program where participants learn about career opportunities in pharmacy, nursing, and dental medicine and admission requirements for these programs. Students were led on campus tours and learned about the activities and SIUE resources such as financial aid resources, student life, extracurricular activities, campus recreation, and on-campus housing 5-day summer camp	Mixed Methods Study Survey Pre and post surveys after the intervention during camps offered in 2013, 2014, 2016, and 2017 to assess students' understanding about healthcare careers and confidence in pursuing a career in the featured healthcare fields before and after attending the summer camp. The survey had Likert-type questions (1 = strongly disagree to 5 = strongly agree) and qualitative questions An additional survey assessed academic progression of previous camp participants after the program assess impact of the camp on participants' interest in pharmacy, nursing, and dental medicine careers, in addition to program impact on their pursuit of these careers, current academic status, career goals and their choice of college or university	Seventy students out of 77 fully completed both pre- and post-surveys. All survey questions, except one, showed statistically significant improvement from the camp pre-survey compared to the post-survey. Participants showed statistically significant improvement in their understanding of admission requirements for the healthcare schools, their confidence in discussing and becoming a healthcare professional, and their interest in pursuing a career in pharmacy, nursing, and dental medicine Qualitative comments were assessed for common themes. Most participants found exposure during the camp to be beneficial. Most participants highly rated the faculty and student interactions, particularly for those who were undecided about pharmacy as a future career choice. 37 follow-up survey assessing academic progression were completed. 11 either currently attended or planned to attend SIUE for college, and the other 26 respondents provided the name of the college they attended or planned to attend. Only 2 participants were pursuing a degree that is not healthcare related

Fernandes et al. 2022	To evaluate the success of this Maternal and Child Health (MCH) Pipeline Training Program based on three domains: (1) demographic characteristics, (2) academic and career development, and (3) attitudes towards the field of MCH and the training programs among graduates	Undergraduate level Racial/ethnic minorities; socioeconomically disadvantaged backgrounds Maternal and Child Health Professions and Public Health Total (n=126) Race American Indian/Alaskan Native (n=1) Asian: (n=21) Black/African American (n=87) Caucasian (n=26) Multiple (n=6) Ethnicity Hispanic/Latinx (n=36) 54% of participants reported being disadvantaged one way or another (financially, educationally)	MCH Pipeline Training Program (Alabama State University, Baylor College of Medicine and Texas Southern University, Howard University, Kennedy Krieger Institute, University of California, Los Angeles, University of South Florida, University of Wisconsin-Milwaukee); National program; Federally funded grant The Maternal and Child Health Training Pipeline Program offer undergraduate students' various activities such as academic and career advising, faculty and peer mentoring, research opportunities, specialized curriculum, community-based learning, and leadership seminars 2-year program	Quantitative Study Survey A survey was designed to evaluate three domains: 1) demographic characteristics 2) academic and career development among graduates (3) attitudes towards the field of MCH and the training programs among graduates Within each domain there were multiple closed-ended questions asked including yes/no, multiple-choice (single and multiple answers), Likert-scale, and multiple open-ended questions	The survey was distributed to 550 participants who graduated from the MCH Pipeline Training Program at 7 sites. There were 162 survey responses (37% overall response rate) MCH Pipeline Training Program graduates reported applying to graduate or professional schools (80%) and 67% were accepted into these programs. Public health (21%), Medicine (14%) and Nursing (8%) were the most common health-related fields that survey respondents applied The MCH Pipeline Training Program helped 48% in applying to (98% of question respondents) and 48% be successful in (99% of question respondents) graduate/professional school 62% were employed either part-time or full-time. Most continued to be involved with MCH populations (70%), with more than a third working with school-aged (36%) and/or adolescents and young adults (34%). Program graduates reported working with vulnerable minority (69%) and low-income (64%) populations

VanInwegen et al. 2022	To describe the Summer Academic Enrichment Program (SAEP) for underrepresented minority (URM) matriculants at Virginia Commonwealth University (VCU) School of Pharmacy	Undergraduate, Post-baccalaureate level Racial/Ethnic minorities Pharmacy Total (n=80) Demographics were not reported for all the 80 participants in this study, only those that matriculated to VCU. 45 participants enrolled at VCU School of Pharmacy (SOP) Among those 45 that matriculated, 15 identified as one or more of the following URM populations: Black/African American 28.9% (n = 13) Hispanic/Latinx (n = 2) American Indian (n = 1)	Virginia Commonwealth University (VCU) School of Pharmacy; Local program; Unspecified funding A program that involved academic courses, learning skills lessons, journal club and book discussions, clinical experiences, mock interviews, social events, discipline immersion, test review, admissions advising 6-week summer program	Quantitative Study Retrospective Analysis Data analysis of VCU SOP matriculants from the pharmacy track of SAEP looking at program impact Follow-up collection data Demographic data from 2012 to 2019 participants were obtained, which looked at whether students matriculated at a pharmacy school or pursued alternative paths was obtained after program completion. School administration provided the demographic data of VCU's pharmacy classes for comparison	URM classifications for students enrolled at VCU SOP over nine years (Class of 2016 to Class of 2024, representing the classes of the corresponding SAEP participants' matriculation) ranged from 5% to 11% Black or African American, 0% to 5% Hispanic or Latinx, and 0% to 2% American Indian with a total URM representation range of 7% to 25%, varying between the classes The 45 students who matriculated from the SAEP pipeline program were a more racially diverse group of students than the total number of students who matriculated into VCU's pharmacy classes during those nine years
Kohut et al. 2023	To understand how a hospital-based youth mentoring and education program can influence the life trajectory of underrepresented minority students in pursuing career paths in the health sciences	Middle School, High School level Racial/Ethnic minorities Health Professions and Public Health Total (n=27) White (n=2) Black (n=5) Latinx (n=14) Asian Pacific/American Indian (n=3) Multiple (n=3)	New York-Presbyterian Hospital/Columbia University Irving Medical Campus (NYPH-CUIMC); Local program; Funding from host program A program with academic curriculum, health careers exploration, science enrichment, application assistance, mentorship, psychosocial support 6-year program	Qualitative Study Semi-structured individual interviews The study recruited program alumni who graduated from 2012 to 2021 Questions asked participant's age, gender, racial/ethnic identity, experiences, helpful program elements, professional and academic growth	Thematic analysis from alumni interviews reported activities and experiences offered by the program that foster key youth development constructs linked to healthier and more resilient communities

Portee 2023	To determine the benefits of the Maternal and Child Health Pipeline Training Program (MCHPTP) described by the program participants	Undergraduate level Racial/ethnic minorities; socioeconomically disadvantaged backgrounds Maternal and Child Health Professions and Public Health Total (n=15) Black/African American (n=9) Asian-American (n=5) Other (n=1)	MCH Pipeline Training Program (Alabama State University, Kennedy Krieger Institute, Texas Southern University, University of California-Los Angeles, University of South Florida, University of Wisconsin-Milwaukee); National program; Federally funded grant A pipeline program that aims to create a more diversified workforce that is reflective of and prepared to address the issues of health disparities in underserved communities, improve health care in diverse Maternal and Child Health populations, make a significant impact on the local, state, regional, and national levels 2-year program	Qualitative Study Interview A 15-item questionnaire to determine the perceived benefits of MCHPTP among program participants and graduates. Interviews were transcribed and findings were analyzed thematically with coding	Reported benefits include mentorships, research, networking, career and clinical exposure, knowledge of MCH, community involvement and volunteering, development of writing skills, public speaking, research skills, leadership skills, confidence, cultural competence/responsibility, and career development Reported shortcomings included program organization, the transition to online instruction due to the COVID-19 pandemic, limited mentoring, and program marketing

2.3.2 Characteristics of Mentoring and Pipeline Programs

Table 5 Characteristics of Mentoring and Pipeline Programs

Characteristics	Article ID
Training Level of Students	
• Middle school	S15
• High school	S6, S7, S9, S12
• Undergraduate	S1, S3, S5, S6, S8, S10, S11, S13, S14, S16
• Post-baccalaureate	S1, S6, S8, S10, S14
• Graduate	S1, S2, S3, S4
Healthcare Training Program	
• Health professions	S1, S5, S6, S7, S8, S9, S10, S15
• Biomedical research	S1
• Dentistry	S12
• Maternal and child health	S11, S13, S16
• Pharmacy	S12, S14
• Physical therapy	S2
• Public Health	S4, S13, S15, S16
• Speech-language pathology	S3
Population targeted	
• Racial and ethnic minorities	S1, S2, S3, S4, S5, S7, S8, S9, S10, S11, S12, S13, S14, S15, S16
• Socioeconomically disadvantaged; low-income	S6, S8, S10, S11, S13, S16
• Educationally under-resourced	S6, S8, S9, S11, S13
Host Program and Funding	
• Local program	S2, S3, S4, S5, S6, S7, S8, S9, S10, S11, S12, S14, S15
• National program	S1, S11, S13, S16
• Funding from host program	S4, S5, S6, S8, S15
• Federal funding	S1, S3, S6, S7, S8, S9, S10, S11, S13
• Private funding	S6, S7, S8, S9, S12, S16
• Unspecified funding	S2, S14
Program Length	
• 6-year	S15
• 4-year	S5
• 3-year	S9
• 2-year	S6, S11, S13, S16
• 1-year	S2, S3, S4
• Summer	-
○ 10 weeks	S6
○ 8 weeks	S6, S7
○ 7 weeks	S14
○ 6 weeks	S12
○ 5 days	S1, S10
• Unspecified	

2.3.3 Mentoring or Pipeline Programs Activities

Table 6 Mentoring and Pipeline Activities

	Research experience	Community project/ outreach	Faculty mentorship	Leadership/ professional development	Peer mentorship	Networking	Academic enrichment or didactic courses	Career awareness/ exploration	Clinical experience	Social support	Scholarly presentation/ dissemination of work	Application materials assistance	Financial aid
Mentoring Programs													
Study 1			X	X		X							
Study 2			X		X					X			
Study 3	X	X	X		X								
Study 4			X	X	X	X				X			
Pipeline Programs													
Study 5	X	X		X			X		X	X			
Study 6	X			X			X	X			X	X	X
Study 7	X	X											
Study 8	X	X									X		
Study 9	X		X	X			X			X	X	X	X
Study 10		X											
Study 11	X		X	X	X	X	X					X	
Study 12								X				X	X
Study 13	X	X	X	X	X		X	X					
Study 14							X		X	X		X	
Study 15			X	X			X					X	
Study 16	X	X	X	X	X	X		X					

2.3.4 Mentoring or Pipeline Programs Aims/Objectives

Table 7 Aims/Objectives from Mentoring and Pipeline Programs

	Mentoring relationship	Promoting community or sense of belonging	Professional development or networking	Increasing URM student interest or engagement in healthcare careers	Increasing URM student entry in healthcare training programs	Increasing URMs in workforce	Cultural identity development	Exploring URM student experiences in program	Addressing health disparities or health inequities
Mentoring Programs									
Study 1	X		X			X			
Study 2	X	X					X		
Study 3	X					X			
Study 4	X	X							
Pipeline Programs									
Study 5						X			
Study 6					X	X			
Study 7				X				X	
Study 8					X	X			
Study 9				X		X			
Study 10									X
Study 11					X				
Study 12				X					
Study 13								X	
Study 14					X			X	
Study 15				X					
Study 16									

2.3.5 URM Student Experiences of Mentoring or Pipeline Programs

Table 8 Reported URM Student Experiences Post-Mentoring or Pipeline Program

	Feeling more prepared for next career transition	Increased knowledge about career path	Increased sense of belonging or community	Personal and professional growth	Satisfaction in their healthcare training program
Mentoring Programs					
Study 1	X	X	X	X	
Study 2	X		X		X
Study 3					
Study 4	X		X		X
Pipeline Programs					
Study 5					
Study 6	X	X		X	
Study 7		X		X	
Study 8					
Study 9		X		X	
Study 10					
Study 11					
Study 12	X	X	X		
Study 13					
Study 14					
Study 15				X	
Study 16					

2.3.6 Mentoring and Pipeline Programs Outcomes

Table 9 Reported Outcomes for Mentoring and Pipeline Programs

	Completion of mentoring or pipeline program	Knowledge/skill attained – measured directly	Knowledge/skill attained – self-reported	Matriculation to college, graduate, or professional programs	Post-graduation career outcomes	Student interest in pursuing healthcare careers	Student satisfaction post-mentoring or pipeline program
Mentoring Programs							
Study 1	X		X			X	X
Study 2							X
Study 3	X	X		X	X		
Study 4							
Pipeline Programs							
Study 5	X			X	X		
Study 6	X	X		X	X	X	
Study 7			X			X	

Study 8				X	X		
Study 9						X	X
Study 10	X			X	X		
Study 11	X		X	X	X		
Study 12				X		X	
Study 13				X	X		
Study 14				X			
Study 15							
Study 16							

2.4 Discussion

Our findings provide a critical landscape analysis of affinity groups, mentorship, and pipeline programs employed to increase URM representation in healthcare training programs that have been published in the past five years. After limiting the article publication date to include only those published since 2020, we identified four mentoring programs and twelve pipeline programs relevant to our critical landscape analysis. However, we did not identify any relevant articles about affinity groups in our study. To our current understanding, there have been few studies conducted to identify the current approaches used to enhance DEI or URM representation in healthcare training programs, as well as to determine whether affinity groups, mentorship programs, and pipeline programs have been previously published with such aims.

These findings suggest that the four mentoring programs analyzed in the study had common aims and objectives, particularly in addressing the underrepresentation of minority students in healthcare training programs. All articles mentioned the goal of increasing the number of URM students in healthcare training programs. Additionally, half of the studies had an objective of providing a sense of community or belonging, recognizing the importance of social support networks in promoting student success. While affinity groups are recognized as distinct programs from mentoring programs, our findings highlight that they often share similar goals. One program

emphasized professional development and networking, underscoring the role of mentorship in facilitating career advancement and connections within the field. Another program aimed to provide cultural identity development, highlighting the significance of addressing cultural factors in supporting the academic and personal growth of minority students. Naidoo et al. reported a goal of their mentoring program was to increase URM identities into a training program with the intent to diversify the healthcare workforce.

The four mentorship programs had targeted URM students from undergraduate, post-baccalaureate, and graduate levels. These studies had included the following healthcare professional training programs or disciplines of interest: biomedical research, public health, physical therapy, and speech-language pathology. All the mentoring programs identified in our studied had faculty mentors, and three of those studies also included peer mentors for mentee participants. In terms of mentoring structure, two of the four of these studies had a triad or team mentoring, another was exclusive dyadic, and Grilo et al. did not explicitly specify the mentoring structure. Successful mentoring connections are dynamic, where the mentor adapts depending on what is needed for the interests, goals, and requirements of the mentee. This adaptability is crucial, especially during the dynamic phases of mentees' personal and professional growth, and since a single mentor may not have all the knowledge, skills and connections needed by their mentee, non-dyadic models can be important for URM student success (National Academies of Sciences et al., 2019). While Javier et al. used a traditional dyadic structure for their mentoring program, interestingly, the National Research Mentoring Network (NRMN) is an online, remote mentorship platform. This form of mentorship has been found to be attractive for URM individuals, and for individuals at institutions with a shortage of mentors in specific careers or disciplines (National Academies of Sciences et al., 2019). Prior studies have shown having a peer mentoring relationship

with both individuals around the same career level provides benefits including fostering the development of genuine connections and participation in meaningful experiences. (Haggins et al., 2018). Activities such leadership and/or professional development, and networking were also present in the mentorship programs. This aligns with the objectives of many mentorship programs, which focus on fostering community and creating a sense of belonging. This indicates that once students reach the graduate level of their training, a primary goal of mentorship programs is to offer support and aid in retaining these identities within the healthcare profession. Offering institutional support additionally fosters an inclusive environment, which in turn promotes the recruitment and retention of underrepresented minority (URM) students. A key theme found in a previous study reported that aligning mentorship programs with institutional goals and resources is essential to sustain efforts in promoting an environment of diversity and inclusion (Bonifacino et al., 2021).

Similar to the mentorship programs reviewed, a significant portion of the pipeline programs aimed to address the underrepresentation of URM individuals within the healthcare workforce or entry into a healthcare training program. This objective aligns with broader efforts to improve access and opportunities for URM students in healthcare, recognizing the barriers they may face in pursuing such paths. Furthermore, the emphasis on increasing URM students' interest or engagement in healthcare careers is significant. Pipeline programs recognize the importance of early exposure and engagement in fostering a pipeline of diverse healthcare professionals. Notably, this type of aim was more common with targeting students who are earlier in the pipeline, such as middle and high schoolers (Butler & Ampadu, 2022; Daniels-Osaze et al., 2021; Kana et al., 2020; Kohut et al., 2023). Past studies have shown long-term implications for engaging URM students at an early age in the pipeline. Participants in the High School Intern Program at the University of

California San Francisco had a higher graduation and matriculation rate into college than the national average (Witzel et al., 2020).

The pipeline programs discussed in this critical landscape analysis revealed a diverse range of experiences, opportunities, and forms of support for URM students. Several recurring themes emerged from the studies examined, aligning with previous literature. Mentorship, academic support, and aid with applications were consistently featured as components of these pipeline programs. Other components were financial aid, research opportunities, clinical experience, community outreach, career awareness or exploration. Many of the pipeline programs targeted undergraduate students, followed by those in middle or high school, and then post-baccalaureates. Many pipeline programs we reviewed explicitly mentioned recruiting racial/ethnic minorities, and roughly half of programs also included low SES or educationally under-resourced students.

The length of the pipeline programs included in this study varied greatly, the shortest one lasted for 5 days and the longest pipeline program was 6 years. Half of the pipeline programs were held during the summer for undergraduates or post-baccalaureate students. Summer internships have helped both high school and college students with academic preparation or transition into the next level of their career. The University of Alabama at Birmingham's (UAB) Center for Community Outreach Development (CORD) High School Summer Science Institute III Program assessed outcomes on former participants over an eight-year period. Nearly all of surveyed interns choose a STEM undergraduate major, in addition to pursuing a career in STEM. A majority of interns also stated the program experience as very positive and influenced their career decision (Patel et al., 2021). Initiating students in high school has the benefit of exposing URM students to the various career options within healthcare professions and giving them the time and support to explore their interests in a way that they may otherwise not have an opportunity to do (Thiem &

Dasgupta, 2022). Starting at the undergraduate level may be preferred as it targets students who are nearing the juncture of making critical decisions about their future education and career paths.

As for experiences and outcomes captured for both mentoring and pipeline programs, the program evaluations were primarily subjective and reported student satisfaction after participating, although some reported objective outcomes including completion of the mentorship/pipeline program, matriculation to the next education level, and post-graduation career outcomes. Although many programs reported benefits for URM students that participate in either mentorship or pipeline programs, these studies did not use a theoretical framework or evidence-based model when discussing the development of their program. Interestingly, Robles et al. adapted their service-driven and near-peer mentorship model from Mains and colleagues, which stated four pillars of longitudinal mentoring: (1) Ignite the Fire, (2) Illuminate the Path, (3) Create the Toolkit, and (4) Sustain the Desire (Mains et al., 2016). Since the program is hosted by a federally qualified health center and is run by student volunteers, its organizational structure can sustain the program's activities year-round, and does not rely on administrative support. The program benefits from existing resources housed at the family health center and is overseen by a physician “program champion”. This pipeline program created a replication guide and toolkit, which has been successfully reproduced at another health center (Robles et al., 2021). This innovative service-driven model has been able to advance pre-health professions students in low-income communities to into health care training programs and workforce, and could be further replicated for various healthcare disciplines or made accessible to students in other low-income communities,

2.4.1 Study Limitations and Future Directions

Our review has several limitations. Due to the lack of consistency in the naming of the key terms we were searching for, the search terms used may have resulted in missing or exclusion of relevant articles. Pipeline programs are often also called pathways or pre-professional programs, and affinity groups can be interchangeably used with the term employee resource group. Our search strategy also limited us to English-language articles published in the US. As a result, we may have not included relevant international and non-English-language articles.

This review was also conducted by only 1 person, which increases the potential for the risk of bias to be introduced. In addition, the methodological approaches we adapted from a scoping review cannot provide information about the risk of bias in articles and cannot capture the nuance and degree of impact affinity groups, pipeline and mentorship programs have in increasing URM representation since it is not a meta-analysis. The existing literature does not allow us to be able to clearly discern which practices or models are comparatively more effective than others. However, our review found that the studies included demonstrate that mentorship and pipeline programs had a positive impact on participants. The information provided by this scoping review may be used at institutions that would like to develop or improve mentorship or pipeline programs for URM students. In addition, the full-text articles included in our study looked at REMs or low SES individuals. Future studies could include look at other unrepresented groups in the healthcare professions such as SGMs or individuals with disabilities.

2.5 Conclusions

This critical landscape analysis highlights the pivotal role of mentoring and pipeline programs in addressing the underrepresentation of minority students in allied health professions. Through a thorough examination of various mentoring programs and pipeline initiatives, our review reveals several approaches and outcomes aimed at promoting diversity, equity, and inclusion within the healthcare workforce. The mentoring programs utilized a range of mentoring structures including traditional dyadic model of mentorship, triads, and group mentoring which included a faculty and peer mentor. If mentoring was included as an aspect of a program, the majority of time it was locally held by host organization. The one notable exception was from Javier et al., whose mentoring program was an online platform used by mentors and mentees nationwide. Although the majority of pipeline programs did not cite any specific models, common features included academic enrichment, professional development, career exploration, college and graduate school application assistance, or a research project. URM students who participated in mentoring or pipeline programs showed an increased interest in pursuing healthcare careers, a better sense of belonging and community, and improved knowledge and skill. Several studies assessed the effectiveness of their programs by examining outcomes such as college matriculation, enrollment in graduate or professional programs, and post-career outcomes. It was commonly reported that the majority of participants successfully progressed to the next stage of their career pipeline. These results show the need for further development and implementation of mentorship and pipeline programs nationally, to enhance the number and success of URM identities more effectively across the allied health professions. Future research directions include investigating effective components of mentorship and pipeline program design and its contribution to increasing URMs entry and retention into healthcare training programs and the workforce. By understanding

the effectiveness and impact of these programs, stakeholders can strategically invest in initiatives that effectively support underrepresented minority students, ultimately contributing to a more representative and equitable healthcare system.

3.0 Research Significance to Genetic Counseling and Public Health

From a public health perspective, it has been studied that minority populations are susceptible to significant health disparities, along with a disproportionate burden of preventable, chronic, and communicable diseases (Kelly-Blake et al., 2018). Racial and ethnic diversity in healthcare professions is essential for providing quality services, access to care for URM patient populations, and to meet the needs of an increasingly diverse healthcare system in the United States. Diversity in health professions training programs and healthcare workforce is associated with improved patient satisfaction, better patient and provider communication, and more positive experiences in the educational training for all students (Smith et al., 2009). Research suggests that racially and ethnically concordant patient-provider relationships can contribute to reducing health disparities by promoting trust, adherence to treatment, and patient satisfaction (Cooper et al., 2003; Saha et al., 1999). One study reported that Black/African American patients who had a physician of the same race rated their medical appointment as more participatory and positive than those who see physicians of different races (Cooper et al., 2003).

Increasing the diversity of the healthcare workforce can also help bridge cultural and linguistic gaps between patients and providers, leading to improved communication and understanding. This is particularly crucial in communities with language barriers and cultural differences that may deter individuals from seeking healthcare. When patients feel understood and

respected by their healthcare providers, they are more likely to engage in preventive care and follow treatment plans, ultimately leading to better health outcomes (Kennedy et al., 2017).

The goal of pipeline programs is to help better societies by increasing diversity and inclusiveness in healthcare and public health professions by recruitment, retention, and training of minority identities (Bouye et al., 2016; Patterson & Carline, 2006). Students who join affinity groups during their professional training benefit by being able to engage in safe spaces and environments that provide a feeling of belonging and community, which results in increased career satisfaction (Githens & Aragon, 2009). Participation of mentoring programs can aid in recruitment, career development, and professional advancement for URM identities (Atwal et al., 2023). Our study has identified previously established pipeline and mentoring programs that have helped diverse identities enter and persist in various healthcare professions. Implementing a diverse public health and healthcare workforce is one promising strategy that can increase access to and the quality of healthcare for marginalized groups and promote health equity.

The 2023 Professional Status Survey by the National Society of Genetic Counselors reported that 89% of genetic counselors (GCs) in the United States identify as white individuals (National Society of Genetic Counselors, 2023). There is a chronic shortage of genetic counselors with URM identities, with the percentages of GCs who identify as a racial/ethnic minority not being proportionally representative to the US population. REMs also face difficulties in receiving genetic counseling services due to a general lack of awareness of these professionals (Saulsberry & Terry, 2013). Other barriers for genetic counseling include limited access to services, socioeconomic issues, and medical trust (Saulsberry & Terry, 2013). From a genetic counseling perspective, this study highlights models and characteristics of mentorship and pipeline programs from other health professions that can be applied into creating pipeline and mentoring programs for the profession

such as using non-dyadic mentorship structures, peer and near-peer mentorship, service-driven pipeline program, specialized curricula to gain interest and knowledge in genetic counseling topics. By helping URM students enter the genetic counseling field, these individuals can become healthcare providers who understand the culture, speak the language, and are trusted by traditionally underserved communities can increase awareness and uptake in genetic counseling services.

Appendix A Search Strategies

A summary of all searches related to the study discovery phase of the scoping review, which was performed by HV and LT is provided below.

Appendix A.1 Medline Search Strategy

Provider/Interface	Ovid
Database	Medline® ALL
Date searched	December 19, 2023; Revised January 24, 2024
Database update	1946 to December 18, 2023; Revised search 1946 to January 23, 2024
Search developer(s)	Helena M. VonVille; Leann To
Limit to English	Yes
Date Range	1992-2005
Publication Types	No limit by publication type
Search filter source	No search filter used

Appendix Table 1

1	(affinity adj group*).ti,ab,kf.
2	limit 1 to (english language and yr="1992 - 2025")
3	2 not (peptide* or protein* or proton*).ti,ab,kf.
	Revised and updated 24 January 2024
1	allied health personnel/ or allied health personnel/ or anesthesiologists/ or anesthetists/ or audiologists/ or community health workers/ or dental assistants/ or dental auxiliaries/ or dental hygienists/ or dental staff/ or dental technicians/ or dentists, women/ or dentists/ or doulas/ or emergency medical technicians/ or endodontists/ or epidemiologists/ or faculty, dental/ or faculty, medical/ or faculty, nursing/ or health educators/ or health personnel/ or hospitalists/ or infection control practitioners/ or licensed practical nurses/ or nurse anesthetists/ or nurse clinicians/ or nurse midwives/ or nurse practitioners/ or nurse specialists/ or nurses, community health/ or nurses, pediatric/ or nurses, public health/ or nurses/ or Occupational Therapy/ or ophthalmic assistants/ or optometrists/ or "oral and maxillofacial surgeons"/ or orthodontists/ or pediatric assistants/ or pharmacists/ or pharmacy technicians/ or physical therapist assistants/ or physical therapists/ or physician assistants/ or physicians/ or psychotherapists/ or schools, dental/ or schools, health

	occupations/ or schools, medical/ or schools, nursing/ or schools, pharmacy/ or schools, public health/ or schools, veterinary/ or students, dental/ or students, health occupations/ or students, medical/ or students, nursing/ or students, pharmacy/ or students, premedical/ or students, public health/
2	(((allied or community or educators or occupation* or personnel or public) adj1 (health or healthcare)) or anesthesiologist* or anesthetist* or audiolog* or dental or dentist or dentistry or dentists or doulas or (emergency adj1 medical) or emt or emts or endodontists or epidemiologists or hospitalists or infection control practitioners or midwives or nurse or nurses or (Occupational adj1 Therap*) or optometrist* or surgeon or surgeons or orthodontists or pharmacist* or pharmacies or pharmacy or (physical adj1 therapist*) or physician or physicians or physiotherap* or premedical or psychotherapists or (medical adj1 school*) or (nursing adj1 school*) or (medical adj1 student*) or (nursing adj1 student*)).ti,ab,kf.
3	1 or 2
4	((affinity or mentor* or pipeline) adj2 (group or groups or program or programs or organization)).ti,ab,kf.
5	3 and 4
6	limit 5 to english language
7	6 not ((exp africa/ or exp asia/ or exp australia/ or exp canada/ or exp central america/ or exp europe/ or exp south america/) not (north america/ or exp united states/))
8	"Hispanic or Latino"/ or "Mexican Americans"/ or (((Cuban or Mexican) adj1 (American or Americans)) or Hispanic or Hispanics or Latina or Latinas or Latino or Latinos or Latinx or (Puerto adj1 (Rican or Ricans or Rico)) or (Spanish adj1 (origin or origins))).ti,ab,kf.
9	"Alaskan Natives"/ or (AIAN or ((Alaska or Alaskan) adj1 (Native or Natives)) or ((Apache or Cherokee or Choctaw or Hopi or Navajo or Pueblo or Sioux or Zuni) and (nation or reservation or tribe or tribal or tribes)) or Eskimo or ((indigenous or native) adj1 (American or Americans or Hawaiian or Hawaiians))).ti,ab,kf. or ("American Indian or Alaska Native"/ or "Indians, North American"/ or "Indigenous Peoples"/ or (First Nation or indigenous).ti,ab,kf.)
10	"Black or African American"/ or ((African adj1 (American or Americans or ancestry)) or (Black adj1 (American or Americans)) or Blacks or minorities or minority or race or racial).ti,ab,kf.
11	"Ethnicity"/ or Minority Groups/ or "Race Factors"/ or "Racial Groups"/ or ethnology.fs. or (ethnic* or minorities or minority or (people adj2 color) or race or races or racial or racially).ti,ab,kf.
12	bisexuality/ or gender identity/ or "Health Services for Transgender Persons"/ or homosexuality/ or homosexuality, female/ or homosexuality, male/ or "Intersex Persons"/ or "Sexual and Gender Minorities"/ or "Transgender Persons"/ or transsexualism/ or (bigender or bisexual or bisexuality or bisexuals or gay or gays or (gender adj2 (diverse or diversities or diversity or identity or minorities or minority or ("non" adj1 conforming) or nonconforming or orientation)) or genderqueer or GLBT* or homophile or homophilia or homosexual or homosexuals or intersex or lesbian or lesbianism or lesbians or LGBBTQ or LGBT* or ("non" adj1 (binary or heterosexual*)) or nonheterosexual* or pansexual or polysexual or queer or (same adj1 sex) or (sexual adj1 (diversity or minorities or minority or orientation)) or transgender* or transman or (trans adj1 (man or men or woman or

	women)) or transmen or transsexual or transsexualism or transsexuals or transwoman or transwomen or (two adj1 spirit) or "women who have sex with women" or "women who have sex with other women").ti,ab,kf.
13	(DEI or underrepresented).ti,ab,kf.
14	8 or 9 or 10 or 11 or 12 or 13
15	7 and 14
16	limit 15 to (english language and yr="1992 - 2025")
17	15 not ("1515683" or "1594721" or "7801729" or "8055859" or "8599280" or "8993054" or "9003472" or "9430411" or "9463480" or "9667650" or "9680250" or "9793495" or "11093776" or "11362789" or "11454628" or "11911846" or "12470714" or "12571854" or "12623118" or "15204055" or "15275822" or "15352015" or "16276499" or "16828487" or "16853725" or "17177377" or "18236323" or "18517244" or "19826930" or "19925279" or "20014845" or "20824730" or "21093593" or "22466034" or "22822702" or "22967519" or "22975010" or "23909624" or "24789482" or "24832999" or "25134083" or "25558125" or "26666293" or "26749453" or "28062406" or "28178856" or "28530948" or "28542034" or "30149321" or "30407135" or "31425398" or "31425399" or "32003219" or "32072477" or "32172670" or "32184952" or "32220050" or "32235748" or "32846237" or "32903524" or "33058547" or "33386221" or "33500675" or "33821244" or "33883397" or "33894958" or "33906479" or "34004421" or "34091372" or "34115579" or "34172296" or "34464536" or "35491890" or "35511883" or "35518195" or "35528583" or "35546236" or "35752717" or "35999827" or "36140107" or "36753279" or "36857127" or "36859187" or "37019175" or "37092776" or "37149605" or "37193919" or "37288679" or "37302704" or "37712467" or "37742412" or "38040657").ui.

Appendix A.2 PsycInfo Search Strategy

Provider/Interface	Ovid
Database	APA PsycInfo
Date searched	December 19, 2023; Revised January 25, 2024
Database update	1806 to December Week 1 2023; Revised search 1806 to January Week 3 2024
Search developer(s)	Helena M. VonVille; Leann To
Limit to English	Yes
Date Range	1992-2024
Publication Types	No limit by publication type
Search filter source	No search filter used

Appendix Table 2

1	(affinity adj group*).ti,ab,id.
2	limit 1 to yr="1992 - 2024"
3	2 not ("1515683" or "1594721" or "7801729" or "8055859" or "8599280" or "8993054" or "9003472" or "9430411" or "9463480" or "9667650" or "9680250" or "9793495" or "11093776" or "11362789" or "11454628" or "11911846" or "12470714" or "12571854" or "12623118" or "15204055" or "15275822" or "15352015" or "16276499" or "16828487" or "16853725" or "17177377" or "18236323" or "18517244" or "19826930" or "19925279" or "20014845" or "20824730" or "21093593" or "22466034" or "22822702" or "22967519" or "22975010" or "23909624" or "24789482" or "24832999" or "25134083" or "25558125" or "26666293" or "26749453" or "28062406" or "28178856" or "28530948" or "28542034" or "30149321" or "30407135" or "31425398" or "31425399" or "32003219" or "32072477" or "32172670" or "32184952" or "32220050" or "32235748" or "32846237" or "32903524" or "33058547" or "33386221" or "33500675" or "33821244" or "33883397" or "33894958" or "33906479" or "34004421" or "34091372" or "34115579" or "34172296" or "34464536" or "35491890" or "35511883" or "35518195" or "35528583" or "35546236" or "35752717" or "35999827" or "36140107" or "36753279" or "36857127" or "36859187" or "37019175" or "37092776" or "37149605" or "37193919" or "37288679" or "37302704" or "37712467" or "37742412" or "38040657").pm.
	Revised and updated 25 January 2024
1	((affinity or mentor* or pipeline) adj2 (group or groups or program or programs or organization)).ti,ab,id.
2	minority groups/ or sexual minority groups/ or alaska natives/ or american indians/ or blacks/ or hawaii natives/
3	"Racial and Ethnic Groups"/
4	asians/ or chinese cultural groups/ or japanese cultural groups/ or korean cultural groups/ or south asian cultural groups/ or southeast asian cultural groups/ or vietnamese cultural groups/
5	"latinos/latinas"/ or mexican americans/
6	(((Cuban or Mexican) adj1 (American or Americans)) or Hispanic or Hispanics or Latina or Latinas or Latino or Latinos or Latinx or (Puerto adj1 (Rican or Ricans or Rico)) or (Spanish adj1 (origin or origins))).ti,ab,id.
7	(AIAN or ((Alaska or Alaskan) adj1 (Native or Natives)) or ((Apache or Cherokee or Choctaw or Hopi or Navajo or Pueblo or Sioux or Zuni) and (nation or reservation or tribe or tribal or tribes)) or Eskimo or ((indian or indigenous or native) adj1 (American or Americans or Hawaiian or Hawaiians))).ti,ab,id.
8	((African adj1 (American or Americans or ancestry)) or (Black adj1 (American or Americans)) or Blacks or minorities or minority or race or racial).ti,ab,id.
9	(ethnic* or minorities or minority or (people adj2 color) or race or races or racial or racially).ti,ab,id.
10	(bigender or bisexual or bisexuality or bisexuals or gay or gays or (gender adj2 (diverse or diversities or diversity or identity or minorities or minority or ("non" adj1 conforming) or nonconforming or orientation)) or genderqueer or GLBT* or homophile or homophilia or homosexual or homosexuals or intersex or lesbian or lesbianism or lesbians or LGBBTQ

	or LGBT* or ("non" adj1 (binary or heterosexual*)) or nonheterosexual* or pansexual or polysexual or queer or (same adj1 sex) or (sexual adj1 (diversity or minorities or minority or orientation)) or transgender* or transman or (trans adj1 (man or men or woman or women)) or transmen or transsexual or transsexualism or transsexuals or transwoman or transwomen or (two adj1 spirit) or "women who have sex with women" or "women who have sex with other women").ti,ab,id.
11	(DEI or underrepresented).ti,ab,id.
12	2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11
13	1 and 12
14	health personnel/
15	medical personnel/ or dentists/ or military medical personnel/ or exp nurses/ or optometrists/ or pharmacists/ or physical therapists/ or exp physicians/ or exp psychiatric hospital staff/ or clinicians/
16	allied health personnel/ or occupational therapists/ or physical therapists/
17	(((allied or community or educators or occupation* or personnel or public) adj1 (health or healthcare)) or anesthesiologist* or anesthetist* or audiolog* or dental or dentist or dentistry or dentists or doulas or (emergency adj1 medical) or emt or emts or endodontists or epidemiologists or hospitalists or infection control practitioners or midwives or nurse or nurses or (Occupational adj1 Therap*) or optometrist* or surgeon or surgeons or orthodontists or pharmacist* or pharmacies or pharmacy or (physical adj1 therapist*) or physician or physicians or physiotherap* or premedical or psychotherapists or (medical adj1 school*) or (nursing adj1 school*) or (medical adj1 student*) or (nursing adj1 student*)).ti,ab,id.
18	14 or 15 or 16 or 17
19	13 and 18
20	19 not ("1515683" or "1594721" or "7801729" or "8055859" or "8599280" or "8993054" or "9003472" or "9430411" or "9463480" or "9667650" or "9680250" or "9793495" or "11093776" or "11362789" or "11454628" or "11911846" or "12470714" or "12571854" or "12623118" or "15204055" or "15275822" or "15352015" or "16276499" or "16828487" or "16853725" or "17177377" or "18236323" or "18517244" or "19826930" or "19925279" or "20014845" or "20824730" or "21093593" or "22466034" or "22822702" or "22967519" or "22975010" or "23909624" or "24789482" or "24832999" or "25134083" or "25558125" or "26666293" or "26749453" or "28062406" or "28178856" or "28530948" or "28542034" or "30149321" or "30407135" or "31425398" or "31425399" or "32003219" or "32072477" or "32172670" or "32184952" or "32220050" or "32235748" or "32846237" or "32903524" or "33058547" or "33386221" or "33500675" or "33821244" or "33883397" or "33894958" or "33906479" or "34004421" or "34091372" or "34115579" or "34172296" or "34464536" or "35491890" or "35511883" or "35518195" or "35528583" or "35546236" or "35752717" or "35999827" or "36140107" or "36753279" or "36857127" or "36859187" or "37019175" or "37092776" or "37149605" or "37193919" or "37288679" or "37302704" or "37712467" or "37742412" or "38040657").pm.

Appendix A.3 Embase Search Strategy

Provider/Interface	Elsevier
Database	Embase®
Date searched	December 19, 2023
Database update	December 19, 2023
Search developer(s)	Helena M. VonVille; Leann To
Limit to English	Yes
Date Range	No limit by date
Publication Types	No limit by publication type
Search filter source	No search filter used

Appendix Table 3

#1	('affinity group':ti,ab,kw OR 'affinity groups':ti,ab,kw) NOT (peptide:ti,ab,kw OR peptides:ti,ab,kw OR protein:ti,ab,kw OR proteins:ti,ab,kw OR proton:ti,ab,kw OR protons:ti,ab,kw) AND [english]/lim AND [1992-2024]/py
#2	#2 NOT (1515683:ui OR 1594721:ui OR 7801729:ui OR 8055859:ui OR 8599280:ui OR 8993054:ui OR 9003472:ui OR 9430411:ui OR 9463480:ui OR 9667650:ui OR 9680250:ui OR 9793495:ui OR 11093776:ui OR 11362789:ui OR 11454628:ui OR 11911846:ui OR 12470714:ui OR 12571854:ui OR 12623118:ui OR 15204055:ui OR 15275822:ui OR 15352015:ui OR 16276499:ui OR 16828487:ui OR 16853725:ui OR 17177377:ui OR 18236323:ui OR 18517244:ui OR 19826930:ui OR 19925279:ui OR 20014845:ui OR 20824730:ui OR 21093593:ui OR 22466034:ui OR 22822702:ui OR 22967519:ui OR 22975010:ui OR 23909624:ui OR 24789482:ui OR 24832999:ui OR 25134083:ui OR 25558125:ui OR 26666293:ui OR 26749453:ui OR 28062406:ui OR 28178856:ui OR 28530948:ui OR 28542034:ui OR 30149321:ui OR 30407135:ui OR 31425398:ui OR 31425399:ui OR 32003219:ui OR 32072477:ui OR 32172670:ui OR 32184952:ui OR 32220050:ui OR 32235748:ui OR 32846237:ui OR 32903524:ui OR 33058547:ui OR 33386221:ui OR 33500675:ui OR 33821244:ui OR 33883397:ui OR 33894958:ui OR 33906479:ui OR 34004421:ui OR 34091372:ui OR 34115579:ui OR 34172296:ui OR 34464536:ui OR 35491890:ui OR 35511883:ui OR 35518195:ui OR 35528583:ui OR 35546236:ui OR 35752717:ui OR 35999827:ui OR 36140107:ui OR 36753279:ui OR 36857127:ui OR 36859187:ui OR 37019175:ui OR 37092776:ui OR 37149605:ui OR 37193919:ui OR 37288679:ui OR 37302704:ui OR 37712467:ui OR 37742412:ui OR 38040657:ui)

Appendix A.4 CINAHL Search Strategy

Provider/Interface	Ebsco
Database	CINAHL
Date searched	December 19, 2023; Revised January 25, 2024
Database update	December 19, 2023; Revised search January 25, 2024
Search developer(s)	Helena M. VonVille; Leann To
Limit to English	Yes
Date Range	1992-2025
Publication Types	Academic journals
Search filter source	No search filter used

Appendix Table 4

S1	(TI (affinity N1 group*) OR AB (affinity N1 group*)) NOT (TI (peptide* OR protein* OR proton*) OR AB (peptide* OR protein* OR proton*))
S2	(TI (affinity N1 group*) OR AB (affinity N1 group*)) NOT (TI (peptide* OR protein* OR proton*) OR AB (peptide* OR protein* OR proton*)) Publication Date: 19920101-20251231; English Language
S1	Revised and updated 25 January 2024
S2	((TI ((affinity OR mentor* OR pipeline) N2 (group OR groups OR program OR programs OR organization))) OR (AB ((affinity OR mentor* OR pipeline) N2 (group OR groups OR program OR programs OR organization))) NOT ((TI (peptide* OR protein* OR proton*)) OR (AB (peptide* OR protein* OR proton*)))
S3	(MH "Mexican Americans") OR (MH "Hispanic Americans") OR (MH "Native Americans") OR (MH "Alaska Natives") OR (MH "Navajo Persons") OR (MH "Pima Persons") OR (MH "Minority Groups") OR (MH "African Americans") OR (MH "Pacific Islanders")
S4	(MH "Homosexuality") OR (MH "Bisexuality") OR (MH "Questioning Persons")
S5	(MH "LGBTQ+ Persons") OR (MH "Bisexuals") OR (MH "Gay Persons") OR (MH "Gay Men") OR (MH "Lesbians") OR (MH "Transgender Persons") OR (MH "Trans Women") OR (MH "Trans Men") OR (MH "Transsexuals")
S6	(TI (((Cuban OR Mexican) N1 (American OR Americans)) OR Hispanic OR Hispanics OR Latina OR Latinas OR Latino OR Latinos OR Latinx OR (Puerto N1 (Rican OR Ricans OR Rico)) OR (Spanish N1 (origin OR origins)))) OR (AB (((Cuban OR Mexican) N1 (American OR Americans)) OR Hispanic OR Hispanics OR Latina OR Latinas OR Latino OR Latinos OR Latinx OR (Puerto N1 (Rican OR Ricans OR Rico)) OR (Spanish N1 (origin OR origins))))
S7	(bisexual* OR gay OR homosexual* OR lesbian* OR transgender* OR transsexual*))
S8	(TI (DEI OR underrepresented)) OR (AB (DEI OR underrepresented))
S9	S2 OR S3 OR S4 OR S5 OR S6 OR S7
S10	S1 AND S8
S11	S1 AND S8 Limit to Academic journals; Narrow by language: English
S12	S10 NOT (ZK "NLM1515683" OR ZK "NLM1594721" OR ZK "NLM7801729" OR ZK "NLM8055859" OR ZK "NLM8599280" OR ZK "NLM8993054" OR ZK "NLM9003472" OR ZK "NLM9430411" OR ZK "NLM9463480" OR ZK "NLM9667650" OR ZK "NLM9680250"

	OR ZK "NLM9793495" OR ZK "NLM11093776" OR ZK "NLM11362789" OR ZK "NLM11454628" OR ZK "NLM11911846" OR ZK "NLM12470714" OR ZK "NLM12571854" OR ZK "NLM12623118" OR ZK "NLM15204055" OR ZK "NLM15275822" OR ZK "NLM15352015" OR ZK "NLM16276499" OR ZK "NLM16828487" OR ZK "NLM16853725" OR ZK "NLM17177377" OR ZK "NLM18236323" OR ZK "NLM18517244" OR ZK "NLM19826930" OR ZK "NLM19925279" OR ZK "NLM20014845" OR ZK "NLM20824730" OR ZK "NLM21093593" OR ZK "NLM22466034" OR ZK "NLM22822702" OR ZK "NLM22967519" OR ZK "NLM22975010" OR ZK "NLM23909624")
S13	S11 NOT (ZK "NLM24789482" OR ZK "NLM24832999" OR ZK "NLM25134083" OR ZK "NLM25558125" OR ZK "NLM26666293" OR ZK "NLM26749453" OR ZK "NLM28062406" OR ZK "NLM28178856" OR ZK "NLM28530948" OR ZK "NLM28542034" OR ZK "NLM30149321" OR ZK "NLM30407135" OR ZK "NLM31425398" OR ZK "NLM31425399" OR ZK "NLM32003219" OR ZK "NLM32072477" OR ZK "NLM32172670" OR ZK "NLM32184952" OR ZK "NLM32220050" OR ZK "NLM32235748" OR ZK "NLM32846237" OR ZK "NLM32903524" OR ZK "NLM33058547" OR ZK "NLM33386221" OR ZK "NLM33500675" OR ZK "NLM33821244" OR ZK "NLM33883397" OR ZK "NLM33894958" OR ZK "NLM33906479" OR ZK "NLM34004421" OR ZK "NLM34091372" OR ZK "NLM34115579" OR ZK "NLM34172296" OR ZK "NLM34464536" OR ZK "NLM35491890" OR ZK "NLM35511883" OR ZK "NLM35518195" OR ZK "NLM35528583" OR ZK "NLM35546236" OR ZK "NLM35752717" OR ZK "NLM35999827" OR ZK "NLM36140107" OR ZK "NLM36753279" OR ZK "NLM36857127" OR ZK "NLM36859187" OR ZK "NLM37019175" OR ZK "NLM37092776" OR ZK "NLM37149605" OR ZK "NLM37193919" OR ZK "NLM37288679" OR ZK "NLM37302704" OR ZK "NLM37712467" OR ZK "NLM37742412" OR ZK "NLM38040657")
S14	S12 NOT (ZK "NLM1497782" OR ZK "NLM7757393" OR ZK "NLM8169989" OR ZK "NLM8388944" OR ZK "NLM8431235" OR ZK "NLM8718210" OR ZK "NLM8909622" OR ZK "NLM9095717" OR ZK "NLM9095720" OR ZK "NLM9267185" OR ZK "NLM9582745" OR ZK "NLM10161048" OR ZK "NLM10219209" OR ZK "NLM10219215" OR ZK "NLM10624172" OR ZK "NLM11152087" OR ZK "NLM11285104" OR ZK "NLM11341720" OR ZK "NLM11567366" OR ZK "NLM12114154" OR ZK "NLM12152930" OR ZK "NLM12291947" OR ZK "NLM12450479" OR ZK "NLM12751620" OR ZK "NLM12836143" OR ZK "NLM14518844" OR ZK "NLM14526519" OR ZK "NLM15109347" OR ZK "NLM15689607" OR ZK "NLM15958785" OR ZK "NLM16451897" OR ZK "NLM16564481" OR ZK "NLM16723834" OR ZK "NLM16728767" OR ZK "NLM16799297" OR ZK "NLM16817673" OR ZK "NLM16985341" OR ZK "NLM17019912" OR ZK "NLM17023383" OR ZK "NLM17389568" OR ZK "NLM17595557" OR ZK "NLM17687082" OR ZK "NLM18092578" OR ZK "NLM18519595" OR ZK "NLM19042679" OR ZK "NLM19056626" OR ZK "NLM19237346" OR ZK "NLM19237347" OR ZK "NLM19237348" OR ZK "NLM19237349" OR ZK "NLM19237350" OR ZK "NLM19237351" OR ZK "NLM19237352" OR ZK "NLM19237353" OR ZK "NLM19237354" OR ZK "NLM19237355" OR ZK "NLM19237356" OR ZK "NLM19237357" OR ZK "NLM19237358" OR ZK "NLM19237359" OR ZK "NLM19237360" OR ZK "NLM19237361" OR ZK "NLM19237362" OR ZK "NLM19237363" OR ZK "NLM19237365" OR ZK "NLM19237366" OR ZK "NLM19237367" OR ZK "NLM19237368" OR ZK "NLM19237376" OR ZK "NLM19237377" OR ZK "NLM19237378" OR ZK "NLM19237379" OR ZK "NLM19237381" OR ZK "NLM19237382" OR ZK "NLM19246662" OR ZK "NLM19255181" OR ZK "NLM19413045" OR ZK "NLM19413046" OR ZK "NLM19447236" OR ZK "NLM19495948" OR ZK "NLM19638783" OR ZK "NLM19645372" OR ZK "NLM19690111" OR ZK "NLM19717366" OR ZK "NLM19806840" OR ZK "NLM19806841" OR ZK "NLM20113915" OR ZK "NLM20219162" OR ZK "NLM20458550" OR ZK "NLM20795583" OR ZK "NLM20930221" OR ZK "NLM20930227" OR ZK "NLM20930230" OR ZK "NLM20930231" OR ZK "NLM21179260"

	OR ZK "NLM21205728" OR ZK "NLM21222063" OR ZK "NLM21270550" OR ZK "NLM21314048" OR ZK "NLM21492341" OR ZK "NLM21795902" OR ZK "NLM21888040" OR ZK "NLM22135370" OR ZK "NLM22364050" OR ZK "NLM22643373" OR ZK "NLM22701183" OR ZK "NLM22775445" OR ZK "NLM23018331" OR ZK "NLM23224288" OR ZK "NLM23425989" OR ZK "NLM23493190" OR ZK "NLM23595029" OR ZK "NLM23615037" OR ZK "NLM23734472" OR ZK "NLM23787385" OR ZK "NLM23914460" OR ZK "NLM23969365" OR ZK "NLM24079217" OR ZK "NLM24223082" OR ZK "NLM24404314" OR ZK "NLM24573516" OR ZK "NLM24609343" OR ZK "NLM24609348" OR ZK "NLM24830914" OR ZK "NLM24880900" OR ZK "NLM24891113" OR ZK "NLM25122028" OR ZK "NLM25139607" OR ZK "NLM25502149" OR ZK "NLM25692562" OR ZK "NLM25727982" OR ZK "NLM26088033" OR ZK "NLM26222198" OR ZK "NLM26253024" OR ZK "NLM26304975" OR ZK "NLM26628654" OR ZK "NLM26650676" OR ZK "NLM26863468" OR ZK "NLM26996799" OR ZK "NLM27066986" OR ZK "NLM27271062" OR ZK "NLM27287279" OR ZK "NLM27379182" OR ZK "NLM27595369" OR ZK "NLM27649596" OR ZK "NLM27692354" OR ZK "NLM27783814" OR ZK "NLM27926807" OR ZK "NLM28040097" OR ZK "NLM28247207" OR ZK "NLM28302274" OR ZK "NLM28350307" OR ZK "NLM28364372" OR ZK "NLM28406112" OR ZK "NLM28441673" OR ZK "NLM28459471" OR ZK "NLM28632012" OR ZK "NLM28716310" OR ZK "NLM28791651" OR ZK "NLM28826318" OR ZK "NLM29292323" OR ZK "NLM29400084" OR ZK "NLM29644118" OR ZK "NLM29685787" OR ZK "NLM29755055" OR ZK "NLM30014170" OR ZK "NLM30014447" OR ZK "NLM30055674" OR ZK "NLM30117473" OR ZK "NLM30148514" OR ZK "NLM30272473" OR ZK "NLM30283847" OR ZK "NLM30413540" OR ZK "NLM30527696" OR ZK "NLM30692183" OR ZK "NLM30709461" OR ZK "NLM30881173" OR ZK "NLM30975303" OR ZK "NLM31037545" OR ZK "NLM31070424" OR ZK "NLM31084836" OR ZK "NLM31147096" OR ZK "NLM31210655" OR ZK "NLM31283733" OR ZK "NLM31343193" OR ZK "NLM31358352" OR ZK "NLM31441933" OR ZK "NLM31443732" OR ZK "NLM31470975" OR ZK "NLM31477584" OR ZK "NLM31636823" OR ZK "NLM31754560" OR ZK "NLM31930200" OR ZK "NLM31941519" OR ZK "NLM31980210" OR ZK "NLM32017731" OR ZK "NLM32037249" OR ZK "NLM32064062" OR ZK "NLM32069197" OR ZK "NLM32072106" OR ZK "NLM32096414" OR ZK "NLM32191187" OR ZK "NLM32256499" OR ZK "NLM32292197" OR ZK "NLM32352545" OR ZK "NLM32641352" OR ZK "NLM32732818" OR ZK "NLM32742201" OR ZK "NLM32764768" OR ZK "NLM32771220" OR ZK "NLM32851671" OR ZK "NLM32859397" OR ZK "NLM32914425" OR ZK "NLM32931005" OR ZK "NLM33031784" OR ZK "NLM33069350" OR ZK "NLM33155725" OR ZK "NLM33162065" OR ZK "NLM33196423" OR ZK "NLM33258266" OR ZK "NLM33298695" OR ZK "NLM33332594" OR ZK "NLM33349768" OR ZK "NLM33358007" OR ZK "NLM33400804" OR ZK "NLM33494948" OR ZK "NLM33532751" OR ZK "NLM33532959" OR ZK "NLM33570372" OR ZK "NLM33664009" OR ZK "NLM33680232" OR ZK "NLM33684971" OR ZK "NLM33780400" OR ZK "NLM33789548" OR ZK "NLM33797155" OR ZK "NLM33815015" OR ZK "NLM33825321" OR ZK "NLM33879396" OR ZK "NLM33893653" OR ZK "NLM33992432" OR ZK "NLM34011476" OR ZK "NLM34024270" OR ZK "NLM34027367" OR ZK "NLM34090687" OR ZK "NLM34097046" OR ZK "NLM34121070" OR ZK "NLM34192723" OR ZK "NLM34231995" OR ZK "NLM34296066" OR ZK "NLM34315681" OR ZK "NLM34337620" OR ZK "NLM34353571" OR ZK "NLM34372837" OR ZK "NLM34387678" OR ZK "NLM34408526" OR ZK "NLM34432703" OR ZK "NLM34482345" OR ZK "NLM34495038" OR ZK "NLM34506807" OR ZK "NLM34543724" OR ZK "NLM34550083" OR ZK "NLM34584930" OR ZK "NLM34666122" OR ZK "NLM34670240" OR ZK "NLM34673889" OR ZK "NLM34780383" OR ZK "NLM34808494" OR ZK "NLM34862919" OR ZK "NLM34878968" OR ZK "NLM34909539" OR ZK "NLM34909550" OR ZK "NLM34924042" OR ZK "NLM34935530" OR ZK

	"NLM34967821" OR ZK "NLM34975026" OR ZK "NLM34982334" OR ZK "NLM34995429" OR ZK "NLM35005239" OR ZK "NLM35017009" OR ZK "NLM35039422" OR ZK "NLM35064998" OR ZK "NLM35302532" OR ZK "NLM35307091" OR ZK "NLM35325352" OR ZK "NLM35337662" OR ZK "NLM35340444" OR ZK "NLM35414163" OR ZK "NLM35507452" OR ZK "NLM35568466" OR ZK "NLM35572842" OR ZK "NLM35581113" OR ZK "NLM35719651" OR ZK "NLM35723947" OR ZK "NLM35764430" OR ZK "NLM35766623" OR ZK "NLM35855255" OR ZK "NLM35862583" OR ZK "NLM35914851" OR ZK "NLM35934558" OR ZK "NLM36007107" OR ZK "NLM36030452" OR ZK "NLM36165245" OR ZK "NLM36165255" OR ZK "NLM36215162" OR ZK "NLM36269620" OR ZK "NLM36279531" OR ZK "NLM36280295" OR ZK "NLM36343190" OR ZK "NLM36373685" OR ZK "NLM36402521" OR ZK "NLM36473215" OR ZK "NLM36566646" OR ZK "NLM36570072" OR ZK "NLM36580271" OR ZK "NLM36787853" OR ZK "NLM36867425" OR ZK "NLM37076394" OR ZK "NLM37115939" OR ZK "NLM37179900" OR ZK "NLM37267045" OR ZK "NLM37282839" OR ZK "NLM37284183" OR ZK "NLM37295908" OR ZK "NLM37315043" OR ZK "NLM37319343" OR ZK "NLM37334065" OR ZK "NLM37394902" OR ZK "NLM37408339" OR ZK "NLM37460367" OR ZK "NLM37496711" OR ZK "NLM37535956" OR ZK "NLM37540531" OR ZK "NLM37574356" OR ZK "NLM37581204" OR ZK "NLM37594421" OR ZK "NLM37594421" OR ZK "NLM37595641" OR ZK "NLM37645405" OR ZK "NLM37654777" OR ZK "NLM37707845" OR ZK "NLM37712465" OR ZK "NLM37719407" OR ZK "NLM37866254" OR ZK "NLM37900043" OR ZK "NLM37938911" OR ZK "NLM37985264" OR ZK "NLM37994494" OR ZK "NLM38051167" OR ZK "NLM38051167" OR ZK "NLM38051839" OR ZK "NLM38055855" OR ZK "NLM38160117" OR ZK "NLM38163853")

Appendix A.5 Web of Science™ Search Strategy

Provider/Interface	Clarivate
Database	Web of ScienceTM
Date searched	January 24, 2024
Database update	January 24, 2024
Search developer(s)	Helena M. VonVille
Limit to English	Yes
Date Range	1992-2024
Publication Types	No limit by publication type
Search filter source	No search filter used

Appendix Table 5

1	"Affinity group*" (Title) or "Affinity group*" (Abstract) not peptide* OR protein* OR proton* (All Fields) and 2023 or 2022 or 2021 or 2020 or 2019 or 2018 or 2017 or 2016 or 2015 or 2014 or 2013 or 2012 or 2011 or 2010 or 2009 or 2008 or 2007 or 2006 or 2005 or 2004 or 2003 or 2001 or 2000 or 1999 or 1998 or 1997 or 1996 or 1995 or 1994 or 1993 or 1992 (Publication Years) and English (Languages)

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