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Original Article

Education Section

A Scoping Review on the Exigent Needs to Build Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, and Asexual Inclusive Competencies in the Medical Education Curriculum

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ABSTRACT

Introduction: Lesbian, Gay, Bisexual, Transgender, Queer, Intersex, and Asexual (LGBTQIA+) individuals are subjected to appreciable health inequalities, many of which are exacerbated by the absence of a standard framework for LGBTQIA+ proficient healthcare. The marginalised LGBTQIA+ population faces atrocious health outcomes and reveals deplorable medical care experiences. To provide relevant and sensitive care to LGBTQIA+ individuals and fulfill the healthcare needs of this marginalised population, healthcare service providers must acquire expertise in specific skills, guidelines, and recommendations.

Aim: To provide a brief summary of the evidence in the scientific literature regarding the necessity of incorporating LGBTQIA+ inclusive competency into medical education curricula.

Materials and Methods: An intricate literature search in scholarly databases like PubMed, Google Scholar, Embase, and CINAHL (Cumulative Index to Nursing and Allied Health Literature) yielded a wide range of publications focusing on training undergraduate medical students in LGBTQIA+ healthcare. The selected scientific articles were further screened in accordance with the inclusion and exclusion criteria devised for this scoping review, aligning with the study's objectives.

Results: The extensive search yielded a total of 578 articles for screening. Based on the inclusion and exclusion criteria, 14 manuscripts were analysed for this scoping review, advocating the importance of integrating competencies into the medical curriculum to provide improved, unbiased healthcare services to LGBTQIA+ communities.

Conclusion: There was notable diversity in studies in terms of the research objective, the LGBTQIA+ population(s) under focus, and the study results. Stigma and bias present potential barriers to establishing quality healthcare services for the LGBTQIA+ population. The current literature shows consensus in supporting academic efforts to shift towards pedagogical interventions that are vertically integrated and focused on clinical skills to address LGBTQIA+ health disparities.

Keywords: Health inequalities, Health professions education, Marginalised population

INTRODUCTION

The World Health Organisation (WHO) defines LGBTQIA+ health as the physical, emotional, and mental wellbeing of lesbian, gay, bisexual, transgender, queer, and intersex individuals [1]. Intersex refers to individuals born with sex characteristics that do not align with typical male or female classifications, possibly due to various genetic, hormonal, or other factors that result in atypical development of reproductive or sexual anatomy [2]. Sexual Orientation, Gender Identity, and Expression (SOGIE) are diverse and prevalent across cultures globally. Based on SOGIE, stigmatised communities face significant challenges in accessing quality healthcare services. Inadequate access to healthcare facilities and substandard services make them susceptible to adverse physical and mental health outcomes [3]. Additionally, sexual orientation exposes this population to numerous health risks. Urgent action is required in this critical situation to achieve sustainable development goals, including good health, gender equality, and sex equality [4].

The denial of healthcare services or discrimination, characterised by physical and verbal abuse in healthcare settings, often stems from a negative mindset and a paucity of knowledge about LGBTQIA+ health among medical professionals [5]. Reported responses from medical practitioners towards LGBTQIA+ individuals include hostile behaviour, direct refusals, unwarranted pity, and arrogance. These actions lead to emotional distress, inadequate care, and lack of medical attention. Furthermore, the use of heteronormative language by medical professionals causes confusion and discomfort among LGBTQIA+ individuals. As a result of unequal access to healthcare services and guidance, a higher prevalence of negative health behaviours is observed among the LGBTQIA+ population [6].

The limited or absent exposure to LGBTQIA+ healthcare among medical students serves as the root cause of health disparities and injustices faced by this marginalised population [7]. Training future clinicians to be well-versed in LGBTQIA+ health can help reduce the health inequities experienced by these individuals [8]. Despite the recognition of the necessity for medical practitioners to enhance their proficiency to provide adequate support and care for diverse patient groups, incorporating competencies on health equity for sexual and gender minorities into medical curricula has been challenging [9].

Cultural competencies play a crucial role in promoting equitable and inclusive healthcare. Cultural competency entails the ability to understand, appreciate, and effectively engage with individuals from various cultures and backgrounds. In medical education, cultural competency is becoming increasingly important as healthcare providers serve a more diverse patient population [10,11]. It is evident that inadequate preparation in LGBTQIA+ healthcare for medical students leads to poor quality healthcare delivery for individuals in the LGBTQIA+ community. Integrating LGBTQIA+ content into conventional medical curricula poses inherent complexities but has been proven to be valuable in enhancing the proficiency of medical practitioners. While experts in medical education worldwide acknowledge the importance of training and guiding students in LGBTQIA+ healthcare, the medical competencies related to the health of LGBTQIA+ individuals remain scarce and inconsistent

[12]. This scoping review aims to report on existing interventions on LGBTQIA+ competencies in medical education and emphasise the need to incorporate such competencies into medical education to promote inclusivity.

MATERIALS AND METHODS

This manuscript is based on an extensive synthesis of information from scientific articles highlighting the dire need to integrate LGBTQIA+ competencies into medical education from reputable sources like PubMed, Google Scholar, Embase, and CINAHL from August 7, 2022, to March 7, 2023. The various sections of this review article were structured in accordance with the standard guidelines of the PRISMA extension for scoping reviews [13].

Stage 1: Source of Information

A comprehensive search was conducted in databases including PubMed, Google Scholar, EMBASE, and CINAHL to identify scholarly publications relevant to the primary objective of this study. Articles published in peer-reviewed indexed journals in the English language were included in this research study.

Stage 2: Search Strategy

Articles selected for analysis in this review were obtained from prominent databases using key MeSH (Medical Subject Headings) terms such as 'LGBTQIA+ competencies', 'inclusivity', 'homosexuality', 'medical education', 'medical curriculum', 'sexual and minority groups', 'lesbian', 'gay', 'bisexual', 'transgender', 'queer', 'asexual', and 'intersex'.

Stage 3: Process of Selection

The selection process involved three distinct steps: Identification, screening, and inclusion of studies. The selection process is detailed and illustrated in [Table/Fig-1].

Eligibility Criteria

Articles included in this scoping review were selected based on specific eligibility criteria [Table/Fig-2]. During the selection process, articles that did not meet the inclusion criteria, duplicate records, and articles that met the inclusion criteria but lacked available data were excluded.

Data Charting

A detailed tabulation of all extracted variables was independently charted by the authors, followed by meticulous review and analysis.

Data Items

Following the data extraction process, the selected variables were segregated and charted under the following headings: Name of the author, year, country, aim of the study, study design, study population, intervention, and results.

RESULTS

Selection of Source of Evidence

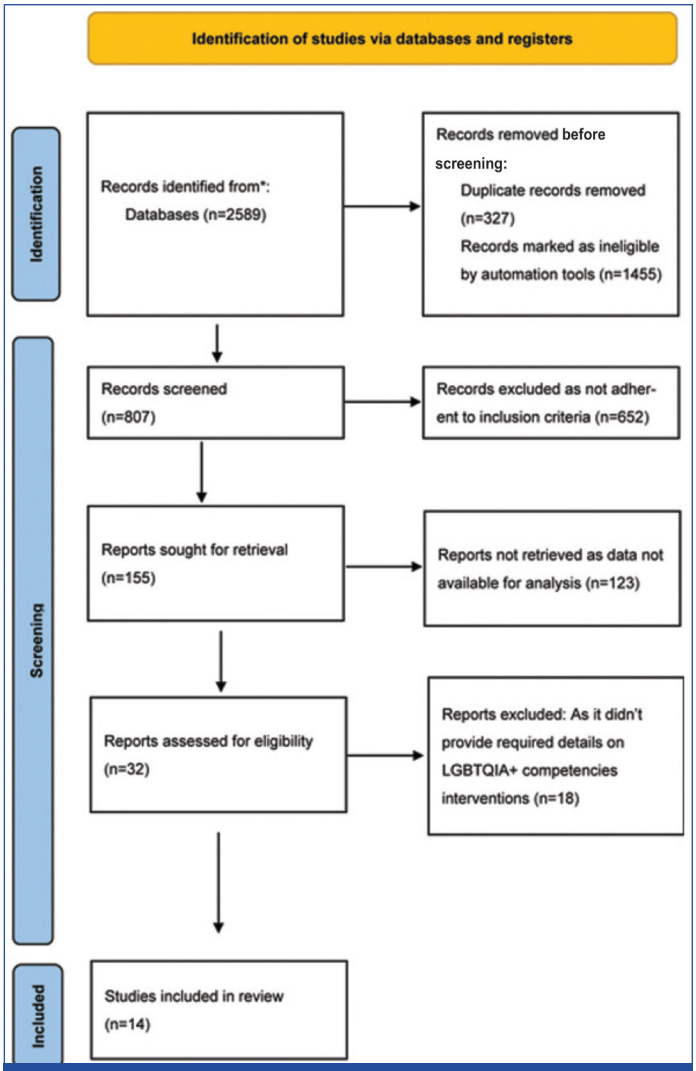
The publications obtained were filtered based on eligibility criteria. Ultimately, 14 manuscripts were selected for inclusion in this review.

Characteristics and Results of Source of Evidence

The data extracted and charted for this review are presented in [Table/Fig-3] [14-27].

Summary of Charted Data

The charted data reveals that numerous initiatives have been undertaken to improve LGBTQIA+ community health services. Incorporating these competencies into medical education will facilitate better communication between LGBTQIA+ patients and physicians, enhancing access to healthcare for these populations.



[Table/Fig-1]: The process of selection of articles. *PubMed, Google Scholar, EMBASE, and CINAHL.

Criteria	Inclusion	Exclusion
Language	English	All other languages
Year	2017	Before 2017
Type of study	Qualitative, observational studies RCT, mixed method studies, cross-sectional studies	Scoping reviews, systematic reviews, meta-analysis, editorials, commentaries, book chapters, unavailable full texts articles
Country	All countries	Nil
Publication status	Articles under peer-reviewed, indexed journals	Nil
Curriculum type	Medical curriculum	Other fields of education

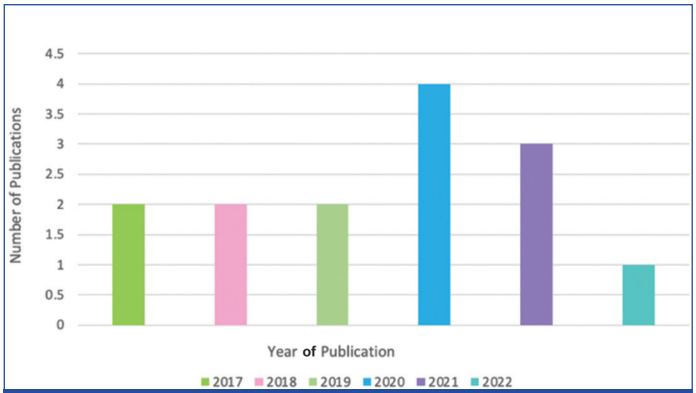
[Table/Fig-2]: Criteria for inclusion and exclusion of articles.
RCT: Randomised control trial

Many of the studies included in this review were conducted in 2020 (n=4) [Table/Fig-4]. It is noteworthy that the majority of the studies were conducted in the USA (n=10), followed by Asia (n=2), South America (n=1), and Australia (n=1) [Table/Fig-5]. The review encompassed various study designs, including: i) qualitative study (n=3); ii) mixed-method study (n=3); iii) cohort study (n=5); iv) cross-sectional study (n=3) [Table/Fig-6].

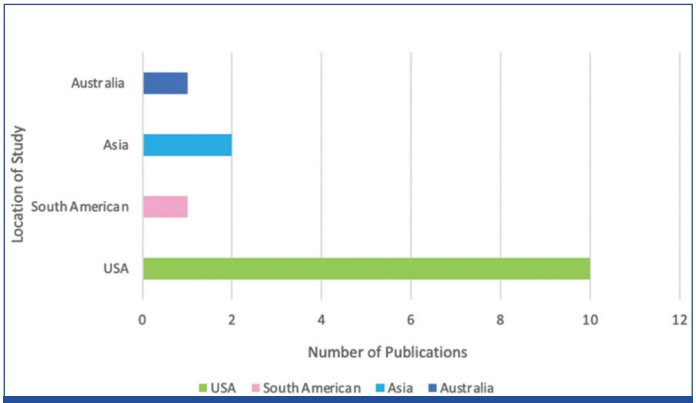
Considering the urgent need to address health disparities, integrating these competencies into undergraduate medical education is crucial [18,19]. A well-designed curriculum will help bridge the gap between physicians and LGBTQIA+ patients, facilitating effective communication and healthcare delivery [15,23]. A study revealed that the current knowledge and awareness of sexual and gender diversity education fall below optimal standards nationally, necessitating curriculum innovations to address this issue [26]. Researchers have identified the main barrier between medical practitioners

S. No.	Author, Ref. no	Year	Country	Aim of study	Study design	Study population	Intervention	Results
1	Schneider MM et al., [14]	2021	USA	To analyse the non verbal behaviour of medical students with cis gender women and transgender women	Qualitative study	Medical students	Not applicable	Among the students cis gender men had a trivialising behaviour towards the patients.
2	Frasca K et al., [15]	2019	USA	To frame a curriculum that fosters LGBTQIA+ healthcare and Human Immunodeficiency Virus (HIV) prevention	Mixed method study	34 internal medicine residents	Introduction of HIV care and pre- exposure prophylaxis module	A well framed LGBTQIA+ curriculum can enhanced patient outcomes in LGBTQIA+ population.
3	Roth LT et al., [16]	2020	Columbia	To analyse the best fit guidelines to promote health of LGBTQIA+ individuals	Mixed method study	146 students	Introduction of LGBTQIA+ health course	Students were highly involved in the curriculum and felt they learnt significant amount of information to provide quality healthcare to LGBTQIA+ individuals.
4	Gibson AW et al., [17]	2020	USA	To establish guidelines for the development of LGBTQIA+ competent curriculum	Cohort study	43 students	A 4-year LGBTQIA+ pathway was introduced and implemented	The program aids medical students to upgrade their training in LGBTQIA+ care.
5	Roth LT et al., [18]	2021	USA	To institute a longitudinal LGBTQIA+ curriculum	Cohort study	110 trainees	An year long curriculum was implemented and the changes were evaluated	It is strongly felt a need to include LGBTQIA+ training program in medical curriculum.
6	Nowaskie DZ and Sowinski JS [19]	2018	USA	To evaluate cultural competence in LGBTQIA+ health among primary care providers	Cohort study	127 primary care providers	Not applicable	There is a pressing need for LGBTQIA+ specific education in medical syllabus.
7	Barret DL et al., [20]	2021	USA	To conduct an interactive online session on the importance of LGBTQIA+ competencies into medical education	Cohort study	Dermatology trainees and residents, Three year medical students	90 minutes lecture and 30 minutes interactive role play sessions advocation the LGBTQIA+ health disparities	The post session observations improved clinical preparedness and knowledge evaluated by validated instrument.
8	Lu PY et al., [21]	2022	Taiwan	To analyse the clinical preparedness of medical students towards LGBTQIA+	Qualitative study	89 medical students	Focus groups and individual interviews towards acceptance and awareness about LGBTQIA+ medical service	Communication was the main obstacle in establishing a good relationship with LGBTQIA+ among healthcare providers due to stigmatism.
9	Nowaskie DZ and Patel AU [22]	2020	USA	To assess the level of knowledge about LGBTQIA+ care among medical students	Cross-sectional study	940 medical students	Not applicable	To improve the LGBTQIA+ cultural competency, allocation of at least 35hrs of LGBTQIA+ education is crucial in medical schools.
10	Noonan EJ et al., [23]	2017	USA	To evaluate the practices and knowledge about transgender healthcare among medical students	Cross-sectional study	176 medical students	Not applicable	A comprehensive curriculum needs to be implemented in order to improve the interactions and accessibility of quality healthcare services for the LGBTQIA+ communities.
11	Cooper MB et al., [24]	2018	USA	To impart knowledge about the social determinants of health which affect the care of LGBTQIA+ patients	Cohort study	180 third year medical students	1 hour didactic lecture by faculty trained in LGBTQIA+ health	Students reported higher knowledge exposure, clear demonstration on methods of effective communication with these patients.
12	Yang HC [25]	2020	Taiwan	To assess the success of implementing game based learning to improve the knowledge and preparedness of healthcare workers towards LGBTQIA+	Qualitative study	2 teachers and 19 medical students	Learning through games implemented in the curriculum that provide knowledge about the LGBTQIA+ and improving their health facilities	Games always engage students. This improves their interest towards learning and rapid results can be achieved. It serves as an effective method of imparting knowledge.
13	Lindberg BM et al., [26]	2019	USA	To explore the methods to enhance the undergraduate medical curriculum in sexual and gender diversity education	Mixed method study	Military medical students	Not applicable	The knowledge about sexual and gender diversity education is below average at national level and requires innovative curriculum developmental strategies to empower LGBTQIA+.
14	Sanchez AA et al., [27]	2017	Australia	To define the scope of LGBQIA+ health in the medical curriculum of Australia and New Zealand.	Cross-sectional study	Medical school administrators	Assessment of LGBTQIA+ competencies in different medical schools	Most of medical schools have dedicated 0-5 hours for imparting LGBTQIA+ knowledge either in clinical or preclinical phases with interspersed or dedicated modules. Some schools also had LGBTQIA+ patient care sessions.

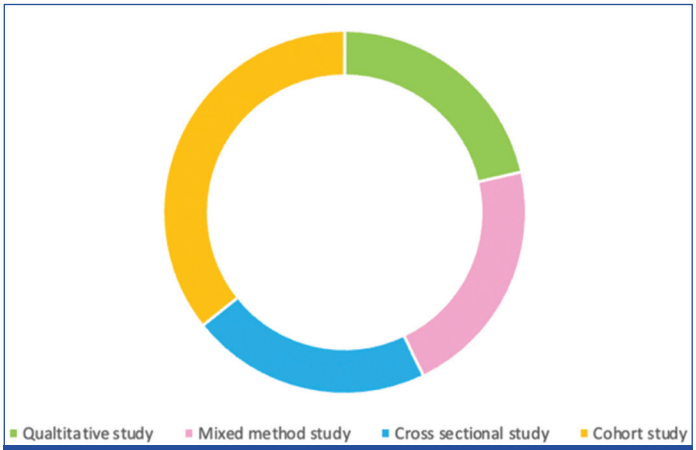
[Table/Fig-3]: Characteristics of extracted data [14-27].



[Table/Fig-4]: Year-wise overview of included articles.



[Table/Fig-5]: Number of publications pertaining to different geographical locations.



[Table/Fig-6]: Types of study design included in this review.

and LGBTQIA+ patients as a lack of effective communication [20]. Therefore, enhanced and innovative interventions will train medical students in providing improved LGBTQIA+ care [17]. The incorporation of these competencies into the medical curriculum received positive feedback from students, who were actively engaged and acknowledged the beneficial impact on their knowledge, communication skills, and practices concerning the LGBTQIA+ community [16,24]. A cohort study involving dermatology students also demonstrated that the inclusion of these competencies led to enhanced clinical preparedness [20].

To efficiently practice these competencies, allocating at least 35 hours of these sessions is crucial in medical school [22]. It is also important to note that teaching these competencies through games was found to be more engaging and enjoyable among students. This is an effective method to obtain quicker and better results [25].

DISCUSSION

LGBTQIA+ individuals face numerous obstacles in accessing healthcare equitably. Extensive research demonstrates that individuals in the LGBTQIA+ community experience substandard health outcomes and challenging healthcare experiences [28]. Social stigma, discrimination, bias, denial of access to quality healthcare services, and violations of healthcare rights make it difficult to find LGBTQIA+ inclusive, compassionate, and empathetic physicians [29].

Enhancing the LGBTQIA+ specific knowledge of medical students through academic interventions such as curricular reforms is considered a plausible solution to quell LGBTQIA+ health disparities [30]. Future curricular training in LGBTQIA+ health modules for undergraduate medical students involved didactic lectures, case-based learning, interactive sessions, and history-taking with self-identified LGBTQIA+ patients. These interventions largely focused on behaviour and awareness but were not found to be efficient in the final analysis [20,31]. The lack of cultural competencies in the medical curriculum leads to physicians endorsing negative attitudes, inconsistencies, discrimination, and biases in LGBTQIA+ health practices [32]. The importance of cultural humility education lies in focusing on individuals rather than cultural groups, self-reflection, and mindful listening. While there are challenges in implementing cultural humility training, it has been recognised that these interventions contribute to reducing LGBTQIA+ health disparities [33].

Much of the negative perspective of medical practitioners towards individuals of diverse genders, including intersex individuals, stems from societal transphobia. The lack of LGBTQIA+ health education allows these biases to persist, upholding cis-normative culture in healthcare settings [34]. Scholarly research studies support the idea that a feasible, actionable, and constructive curriculum centered on gender minority-related competencies will significantly enhance the knowledge, skills, and practices of medical graduates towards LGBTQIA+ individuals [35-37]. Interventions such as elective rotations, interactive webinars, student seminars, small group discussions, conferences, and workshops conducted regularly have been proven effective in providing comprehensive LGBTQIA+ health education [38].

Individuals from sexual minority groups experience enacted stigma from medical practitioners, including bias, neglect of sexual orientation issues, harsh language and behaviour, discrimination, refusal of healthcare services, and attempts to change sexual orientation [38].

A study conducted in Turkey revealed that most frontline staff in the healthcare industry, including physicians, nurses, laboratory technicians, hospital workers, and other administration members, did not show equal respect to LGBTQIA+ individuals. They often used unacceptable terminologies, causing significant mental stress in these patients [39]. Therefore, incorporating competencies that train medical students in these aspects and provide opportunities for face-to-face interactions with LGBTQIA+ patients will enhance the doctor-patient relationship and establish trust within the LGBTQIA+ community towards the medical system [40].

Due to societal stigmatisation and constant body shaming, LGBTQIA+ individuals experience adverse health outcomes, leading to higher rates of suicide, mental health issues, exposure to Human Immunodeficiency Virus (HIV), drug abuse, and alcohol consumption. Consequently, the health status of LGBTQIA+ individuals has become a critical global issue. However, individuals from diverse sexual and gender groups, including the intersex population, avoid healthcare facilities due to perceived discrimination and bias from healthcare providers [41,42]. One way to change LGBTQIA+ patients' mindset towards this discrimination is by offering affirmative care that respects their gender identities and enhances their ability to confidently engage with medical professionals, thereby promoting positive health outcomes [43]. Given the current state of LGBTQIA+ health worldwide, it is crucial for medical educators to develop and implement effective health curriculum and training, along with faculty development programmes, to equip medical students with LGBTQIA+ health competencies for delivering comprehensive care to this population and promoting health equity for diverse patient populations [44].

THE CONCEPTUAL FRAMEWORK

A conceptual framework plays a significant role in identifying educational issues and devising solutions. It helps illuminate and address the causes and concerns surrounding a specific problem [45]. The conceptual framework for an LGBTQIA+ inclusive curriculum design is based on Kern's six-step approach to curriculum development [46] and theories such as experiential learning theory, constructivism, and transformative learning. Physicians and healthcare providers should follow the steps outlined below to carefully design a curriculum incorporating LGBTQIA+-specific health modules.

Kern's Six-Step Model

1. Problem identification and general needs assessment
2. Targeted needs assessment
3. Goals and objectives
4. Educational strategies
5. Implementation
6. Feedback and evaluation

Problem identification: Identifying the root cause of the problem is imperative. Problem identification is a crucial step in the scientific process and serves as the starting point in the comprehensive procedure to identify and evaluate a problem and uncover potential solutions.

General and targeted needs assessment: A needs assessment is crucial for identifying the gaps in the existing condition and the requirements in the desired condition. It helps analyse available resources, identify preplanned strategies, and design approaches to achieve the learning goals.

Goals and objectives: Only through determined actions can the intended achievement be realised. Objectives provide directions for a goal. Hence, it is important to establish standard learning goals that can be achieved through measurable, relevant, and time-framed objectives.

Educational Strategies

Experiential learning theory: Experiential learning forms the basis of acquiring knowledge through practical experience, which reflects experiences and aids in remembering and retaining information [47]. According to John Dewey's experiential learning theory, learning by doing is based on the idea that learners grasp concepts best when actively involved in the learning process, and their motivation to learn is highest when they have the freedom to set their learning objectives within a defined framework [48]. An American education theorist introduced the concept of experiential learning through a cycle of four stages. The cycle begins with exposing the learner to the concrete experience of learning something new or enhancing existing knowledge. The crucial second stage is reflection, where learners review, evaluate, and contemplate their progress through the concrete experience. The subsequent stage involves taking action to enhance their learning experience and reflections by formulating abstract plans of action, engaging in literature discussions, and seeking expert opinions. The final stage of the cycle is the application of knowledge gained through experience and reflection, providing an opportunity to test learned concepts and foster new ideas through active experimentation [49].

Constructivism: Constructivism entails the idea of constructing or enhancing one's existing knowledge through new and unique personal experiences [50]. The elements of constructivism form a theoretical framework that underscores its significance in students' learning experiences. The theory posits that:

- Knowledge is constructed: Knowledge is always built upon existing knowledge. Students begin to construct their pre-existing knowledge with their distinctive qualities and experiences. Learning is a social activity; group discussions, teamwork, interaction with other learners, and reflection are essential for constructing knowledge.

Learning is an active process; students cannot learn solely by retaining information. Constructive knowledge can only be built through active participation in discussions and activities.

Learning is contextual; learning in isolation does not promote constructivism. Connecting one's beliefs and knowledge is crucial.

Learning to learn as you learn-learning is a journey through a maze of thoughts that becomes more meaningful by selecting and conceptualising information through better classification methods.

Learning exists in the mind; physical methods do not guarantee learning. Mental engagement is critical to the learning journey.

Knowledge is personal; constructive learning is entirely based on a person's talent, unique perspective, and experiences.

Motivation is key to learning. All the aforementioned aspects of constructivism cannot be achieved if the student is not willing to take the initiative to create the best learning experience. Motivation to participate is the basic element of constructivism [51].

Transformative learning: Transformative learning involves in-depth, constructive, and meaningful learning that goes beyond basic knowledge acquisition to foster critical learning. This type of learning leads to a fundamental shift in perspective, transforming from unquestioning acceptance of existing knowledge to reflective and purposeful learning experiences, resulting in true liberation of thoughts [52,53].

Implementation: Turning plans into action to achieve desired results relies on effectively, efficiently, and consistently executing and implementing strategies while adhering to time, budget, quality, and minimising adversity. Determining the roles and responsibilities of team members is crucial. Monitoring progress and processes and taking corrective actions at the right time will provide a valuable learning experience.

Feedback and evaluation: Feedback provides educators and learners with evidence of existing knowledge and skill improvement. It is the most influential step towards enhancing teaching and enriching the curriculum. Evaluation is key to measuring the effectiveness of curriculum implementation. The objective of curriculum evaluation is to improve the current programme and analyse its impact on student learning.

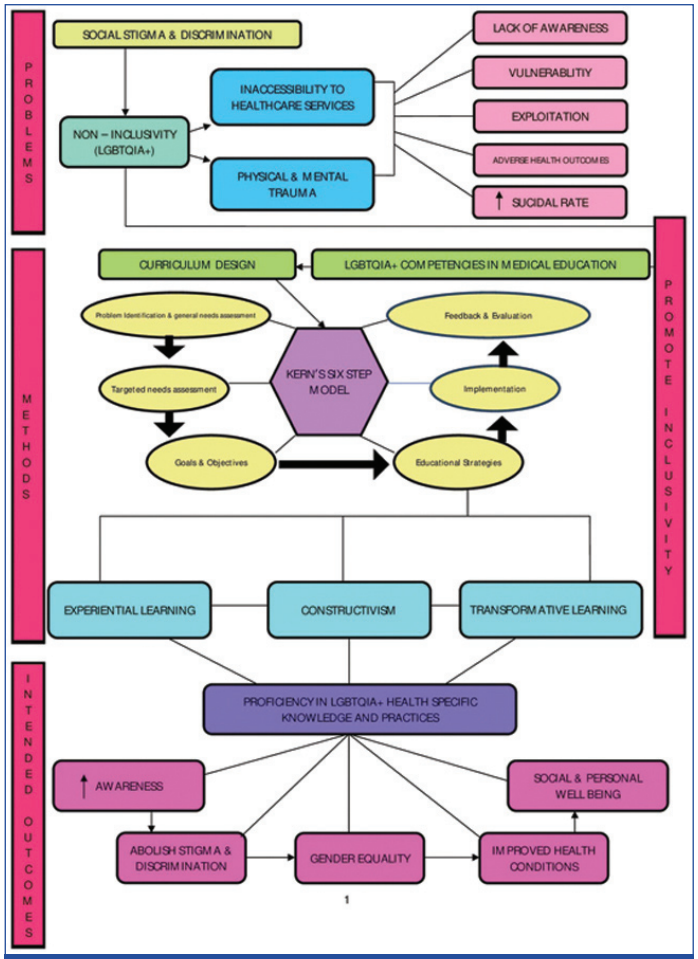
The proposed conceptual framework for the inclusion of LGBTQIA+ competencies in medical curricula has been demonstrated and depicted in [Table/Fig-7].

Directions For Future Research

To effectively implement curriculum innovations, more detailed research needs to be conducted in areas that lack proper attention. In-depth analysis should be conducted on effectively implementing the same to a wider extent, covering all medical colleges and universities in the nation. Evidential proof of the beneficial outcomes of these interventions on the LGBTQIA+ community should be validated through quantitative or qualitative studies. Analysing the barriers to successful implementation and focusing on methods to address them will help bridge the gap between LGBTQIA+ people and equal healthcare services.

Knowledge Gaps

A current review revealed the available information regarding the inclusion of LGBTQIA+ competencies in the medical education system. Yet, several issues are being left unaddressed due to a lack of information. Most studies are being conducted in the United States, but a more detailed analysis should be made of the conditions applicable in nations like India. Furthermore, many of the innovations in practice include imparting knowledge and awareness to medical students, but experiential learning is not practiced. The



[Table/Fig-7]: The conceptual framework for the inclusion of LGBTQIA+ competencies into medical curriculum.

impact of face-to-face conversations between medical students and the LGBTQIA+ community is not clearly explained.

Limitation(s)

This study has inherent limitations. Scholarly articles published in the English language only were included for the review. Moreover, the studies included for the scoping review focused only on encompassing LGBTQIA+ competencies in medical curriculum; nursing and other health professions were not included in this study.

CONCLUSION(S)

This scoping review focused on the inclusion of LGBTQIA+ competencies in undergraduate medical curricula to address LGBTQIA+ health inequities. A flourishing body of research asserts the necessity of imparting LGBTQIA+ health education to medical students and healthcare professionals to establish an LGBTQIA+ competent healthcare system. LGBTQIA+ health has yet to acquire extensive curricular significance, but efforts to incorporate LGBTQIA+ specific health topics into health education are burgeoning. There is no consensus on the precise academic intervention that should be employed to confront LGBTQIA+ health disparities. Currently, LGBTQIA+ medical education is primarily constituted by awareness-associated interventions that demonstrate short-term amelioration but fail methodologically. Education in LGBTQIA+ health can equip healthcare providers to recognise and serve the barriers to healthcare that engender LGBTQIA+ health inequalities, besides refining knowledge about LGBTQIA+-specific care. It is strongly believed that the incorporation of LGBTQIA+ specific health topics into the medical arena will allow us to devise a curriculum that addresses the LGBTQIA+ health inequities and eventually mitigate the health disparities faced by individuals of the LGBTQIA+ community.

Authors' contribution: Conceptualisation: KMS.; Methodology: SP, JNB, and KMS; Software: KMS; Validation: SP, JNB, and KMS; Formal Analysis: SP, JNB, and KMS; Investigation: SP, JNB, and KMS; Resources: KMS; Data Curation: KMS; Writing-Original Draft Preparation: SP, JNB, and KMS; Writing-Review and Editing: SP, JNB, and KMS; Visualisation: SP, JNB, and KMS; Supervision: KMS; Project Administration: KMS; and Funding Acquisition: KMS All authors have read and agreed to the published version of the manuscript.

Data availability statement: The data that support this study are available upon request from the corresponding author.

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