Implementation of Motivational Interviewing Training in Dentistry – A Scoping Review

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ABSTRACT

Background: Motivational Interviewing (MI) is an evidenced-based counseling approach to bring about behavior change where clinicians seek to strengthen a person's own motivation for change. Although MI has been effectively used for behavior change, the extent to which MI has been applied within the field of dental education has not been previously studied.

Objective: This review aims to assess the scope of implementation of MI training in dental education.

Methodology: We used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist and the Joanna Briggs Institute updated manual for evidence synthesis in this review. A search strategy was developed (May 2023) using Medical Subject Headings (MeSH terms), keywords, truncations, and proximity operators, and was applied to search the following databases: Medline (Ovid), Embase (Ovid), CINAHL, PsycINFO (Ovid), Web of Science and ProQuest. Screening of the retrieved articles was done according to the defined inclusion and exclusion criteria. Two researchers conducted the screening using the online screening tool Covidence to assess interrater agreement. Data extraction was carried out independently using a data extraction sheet consisting of variables informed by the DoCTRINE framework and determined by the research team.

Results: 17 papers were retained for review, 12 studies (70.58%) were conducted in the U.S., and the majority of papers (64.7%) published after 2010. MI training was primarily conducted with dental hygiene (47%) and dentistry (47%) students, using diverse instructional methods like lectures, role-play, e-learning, and workshops. Evaluation methods included pre-post questionnaires, audio-recorded patient interactions, and standardized instruments like MITI,

MISC, and OSCE. Training duration and frequency varied from single sessions (11.7%) to longitudinal programs (82.3%). While MI training improved students' confidence, communication skills, and readiness to address public health issues, skill retention required ongoing reinforcement. Key barriers included time constraints, resistance from patients, and limited faculty support. Eight papers (47%) showed high-quality reporting according to the DoCTRINE score.

Conclusion: Motivational Interviewing (MI) training could significantly enhance dental students' communication skills, empathy, and ability to deliver patient-centered care. However, effectiveness of MI and long-term skill retention requires ongoing reinforcement and practice. Incorporating MI into dental education through role-play, e-learning, and hybrid models ensures scalability and accessibility for those who don't have access to certain resources. Faculty competency and structured, consistent training is essential to ensure effective MI implementation. Addressing structural barriers, such as limited resources and time constraints, is critical. Future studies may focus on longitudinal MI training, emphasis on development and evaluation of Brief Motivational Interviewing (BMI) protocols for dentistry, and investigation of effectiveness of MI in clinical interactions with patients.

RÉSUMÉ

Contexte: Entretien Motivationnel (EM) est une approche de counseling fondée sur des preuves visant à provoquer un changement de comportement, où les cliniciens cherchent à renforcer la motivation personnelle du patient pour le changement. Bien que EM ait été utilisé efficacement pour le changement de comportement, son application dans l'éducation dentaire n'a pas été étudiée.

Objectif: Cette revue vise à évaluer la portée de la mise en œuvre de la formation EM dans l'éducation dentaire.

Méthodologie: Nous avons utilisé la checklist PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) et le manuel mis à jour de l'Institut Joanna Briggs pour la synthèse des preuves dans cette revue. Une stratégie de recherche a été développée (mai 2023) en utilisant les termes MeSH (Medical Subject Headings), des mots-clés, des troncatures et des opérateurs de proximité, et a été appliquée pour rechercher les bases de données suivantes : Medline (Ovid), Embase (Ovid), CINAHL, PsycINFO (Ovid), Web of Science et ProQuest. La sélection des articles récupérés a été effectué selon les critères d'inclusion et d'exclusion définis. Deux chercheurs ont effectué le dépistage en utilisant l'outil en ligne Covidence pour évaluer l'accord inter-juge. L'extraction des données a été réalisée indépendamment à l'aide d'une fiche d'extraction de données composée de variables déterminées par l'équipe de recherche.

Résultats: Dix-sept articles ont été retenus pour examen. Douze études (70,58 %) ont été menées aux États-Unis, et la majorité des articles (64,7 %) ont été publiés après 2010. La formation en EM a principalement été réalisée auprès des étudiants en hygiène dentaire (47 %) et en

odontologie (47 %), en utilisant des méthodes pédagogiques variées telles que des cours magistraux, des jeux de rôle, des formations en ligne et des ateliers. Les méthodes d'évaluation comprenaient des questionnaires avant et après la formation, des enregistrements audio d'interactions avec des patients et des instruments standardisés tels que le MITI, le MISC et l'OSCE. La durée et la fréquence de la formation variaient, allant de sessions uniques (11,7 %) à des programmes longitudinaux (82,3 %).

La formation en MI a permis d'améliorer la confiance des étudiants, leurs compétences en communication et leur préparation à aborder les questions de santé publique. Cependant, la rétention des compétences nécessitait un renforcement continu. Les principaux obstacles identifiés comprenaient le manque de temps, la résistance des patients et le soutien limité du corps enseignant. Huit articles (47 %) ont présenté un rapport de haute qualité selon le score DoCTRINE.

Conclusion: La formation en Entretien Motivationnel (EM) peut significativement améliorer les compétences en communication, l'empathie et la capacité des étudiants en odontologie à offrir des soins centrés sur le patient. Toutefois, l'efficacité de l'EM et la rétention des compétences à long terme nécessitent un renforcement et une pratique continue. L'intégration de l'EM dans la formation dentaire à travers des jeux de rôle, des formations en ligne et des modèles hybrides garantit son accessibilité et sa diffusion, y compris pour les personnes n'ayant pas accès à certaines ressources. La compétence du corps enseignant et une formation structurée et cohérente sont essentielles pour assurer une mise en œuvre efficace de l'EM. Il est crucial de surmonter les obstacles structurels, tels que les ressources limitées et les contraintes de temps. Les études futures pourraient se concentrer sur la formation longitudinale à l'EM, le développement et

l'évaluation des protocoles d'Entretien Motivationnel Bref (EMB) en odontologie, ainsi que sur l'étude de l'efficacité de l'EM lors des interactions cliniques avec les patients.

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PREFACE TO THESIS FORMAT

This thesis has been written in a traditional format.

CONTRIBUTION OF AUTHORS

Akash Ramprasad: Master's candidate: Faculty of Dental Medicine and Oral Health Sciences, McGill University, Montreal (QC), Canada: Conceived the study objective, prepared review protocol, performed data collection and interpretation, and wrote the thesis.

Ayushi Naik: Master's candidate: Faculty of Dental Medicine and Oral Health Sciences, McGill University, Montreal (QC), Canada: Participated as the second reviewer in screening, data extraction and bias assessment, data interpretation.

Dr. Nora Makansi: Assistant professor, Faculty of Dental Medicine and Oral Health Sciences, McGill University, Montreal (QC), Canada: Supervised the preparation of review protocol, reviewer in data extraction, data interpretation.

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LIST OF ABBREVIATIONS

MI	Motivational Interviewing
CCT	Client-Centered theory
TTM	Transtheoretical model
BMI	Brief Motivational Interviewing
PRISMA-ScR	Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews
JBI	Joanna Briggs Institute
DoCTRINE	Defined criteria To Report Innovations In Education
JB	Jill Boruff
MeSH	Medical Subject Headings
AR	Akash Ramprasad
AN	Ayushi Naik
IRR	Inter-rater reliability
NM	Nora Makansi
US	United States

UMN	University of Minnesota
PT	Post training
HPV	Human Papilloma Virus
OSCE	Objective Standardized Clinical Examination
HCCQ	Health care climate questionnaire
TSRQ	Treatment self-regulation questionnaire
MITI	Motivational Interviewing treatment integrity
SBIRT	Screening, Brief intervention, and Referral to treatment
MISC	Motivational Interviewing Skill code
OARS	Open-ended questions, Affirmations, Reflective listening, and Summaries
EPE	Elicit-Provide-Elicit
MINT	Motivational Interviewing network of trainers
DH	Dental hygiene
OHT	Oral hygiene technicians
WBTs	Web based Trainings

INTRODUCTION

Primary care physicians, like dentists, provide a multitude of services from preventive, diagnostic and restorative. Some of the challenges oral healthcare professionals may face in providing care to their patients relate to supporting them in modifying long-standing behaviors that may negatively affect oral health outcomes, adopting and maintaining health-promoting behaviors, and complying with treatment recommendations. (1, 2)

Research has shown that educating patients, while necessary, is not sufficient for modifying long-standing behaviors or insuring compliance (1). Education is a one-way communication where the provision of information and instruction is presumed by the healthcare provider. While this approach delivers valuable information, the provision of knowledge alone doesn't change behavior. Some limitations of relying on classic patient education include: limited opportunity for patients to raise or discuss personal experiences with the problems at hand; potential for patients to be confused by the information load; and risk of limited understanding of information by patients with low literacy or cognitive disabilities.(3)

For education to be effective, the patient must be motivated to apply the given knowledge.

Unless the guidance is tailored to patients' individual needs and decisiveness to change, it's unlikely to succeed in modifying and maintaining the desired behavior change.

Motivation is cultivated when a patient realizes the personal relevance of information. Therefore, using person-centered communication approaches that are grounded in empathy and supporting autonomy are more effective when behavior modification is sought. Motivational Interviewing is an evidence-based communication approach that operates from four perspectives on practice: namely Partnership, Acceptance, Compassion, and Empowerment (PACE). (4, 5)

Motivational Interviewing (MI) is a collaborative conversational approach designed to resolve ambivalence about change by strengthening a person's motivation and commitment to the desired change. (4) What distinguishes MI from other approaches is that it does not impose change that may conflict with the patient's beliefs. Instead, it supports change in a way that aligns with the patient's concerns and values. (6, 7)

Developed by psychologists William R. Miller and Stephen Rollnick in the 1980s, MI was initially used for counseling on alcohol addiction and substance abuse (8). Since then, the use of MI spread to various fields including social work, healthcare, education, and sports. Some examples of specific areas of implementation in healthcare include diabetes management (9), vaccine hesitancy (10), childhood obesity (11), and improving treatment adherence. (12)

MI training In Dentistry

MI training has been theorized and even put into practice in some places in the field of dentistry. Koerber et al. studied the effects of teaching brief motivational interviewing to dental students for smoking-cessation counseling (13), Hinz et al. evaluated the impact of brief training of MI techniques within the dental school curriculum (14) , and several studies have been conducted to evaluate the impact of MI training in dental hygiene practice. (15-17)

The literature demonstrates that MI is a feasible and efficient tool compared to traditional oral healthcare education approaches. However, the extent of implementation of MI training in dentistry, including optimal duration, structure of sessions, and evaluation of training outcomes, remains unclear. (5, 14, 15, 17)

Therefore, our overarching research question is: How are Motivational Interviewing training programs being conducted in dental education/research and what are the characteristics of these trainings?

RATIONALE & OBJECTIVES

MI is an evidence-based approach to behavior change that is increasingly being adopted in dental education and training. This said, the scope and process of implementation of MI training in dentistry has not been reviewed.

The objective of this scoping review is to assess the implementation of MI training in dental education and research.

The specific objectives of this review are to:

1) Describe the structure and design of reported MI training curricula in dental education and research.

2) Identify potential knowledge gaps in reported curricula and propose relevant recommendations for future MI programs.

3) Assess the quality of reporting on MI curricula using the DoCTRINE framework.

REVIEW OF LITERATURE

Origin of Motivational Interviewing

MI has emerged as a widely recognized and effective therapeutic technique that aims to facilitate behavior change by exploring and resolving one's ambivalence about change. (5) MI draws heavily from multiple psychological theories, including Carl Rogers' Client-Centered theory (CCT), which states that "People are inherently motivated toward achieving positive psychological functioning," and Prochaska and DiClemente's Transtheoretical (stages of change) model, which aims to explain the six stages of change people go through. (18, 19)

Client-centered theory, also known as Person-Centered theory or Rogerian theory, was developed by Carl Rogers in the 1940s and 1950s (20). It's a form of talk therapy that emphasizes the client's capacity for self-guidance and psychological growth. The key concepts of CCT are non-directivity, self-actualization, genuineness and congruence, unconditional positive regard, empathetic understanding, and the client as the expert.(20)

Non-directivity refers to the counselor providing a judgment-free environment, allowing the client to explore their thoughts, which leads to self-actualization freely (20). Genuineness and congruence are achieved through honesty with the clients, sharing feelings when appropriate, and supporting them throughout. Moreover, being deeply empathetic, trying to understand the client's experience, and expressing understanding to the client are all ways of building rapport and a trusting relationship. CCT also shows that the clients are the best at understanding themselves and their experiences and are, therefore, capable of finding solutions. (21)

The Transtheoretical model (TTM), developed in 1980's by James Prochaska and Carlo DiClemente, aimed at understanding how individuals progress through the different stages of behavioral change (22). It was originally developed for smoking cessation and is used in health-related behavior counseling. The six stages of change proposed by TTM are: pre-contemplation, contemplation, preparation, action, maintenance, and termination. The model also describes ten processes of change that individuals use to progress through the stages of change. Another critical element of this model is decisional balance, where the individual weighs the pros and cons of changing behavior. As people move through the stages, they realize the balance shifts from disadvantages to advantages of change. (18) The TTM did have its set of limitations, such as no clear idea of how much time is needed for each stage or how long an individual can remain in a stage, as well as the assumption that individuals make logical and rational plans for decision-making, which is not always true. (23)

DiClemente and Velasquez (2002) discuss how the model has played a vital role in the development of MI (p. 202) and has been a "natural fit". (24) Motivational Interviewing (MI) is believed to provide the necessary drive to guide individuals through various stages of change. Indeed, MI is particularly well-suited as a counseling technique for clients in the early stages of change, and this is because of its apparent connection to these stages of change model.

For instance, pre-contemplators, who are resistant to being lectured or given strategies for change when they are not prepared, find MI more accommodating. (24) Similarly, individuals who are contemplating change but aren't quite ready to commit are more receptive to MI's non-confrontational approach, compared to conventional methods that urge or coerce them into changes they are not yet fully prepared for. MI helps explore any ambivalence and weighs out

the pros and cons of any decision. In the maintenance stage, MI can also play a crucial role in bolstering individuals' determination to maintain a certain change and assisting them in creating effective relapse prevention strategies.(24)

MI is an approach that aids resolving any internal ambivalence regarding one's motivation and readiness to change, which are vital elements to traverse the stages of change. MI and TTM both present the significance of collaboration between the client and the counselor, resulting in an encouraging or sympathetic environment (25, 26). Essentially, MI serves as a practical tool within the TTM framework, assisting individuals in progressing more effectively through the various stages of change.

Like CCT, MI shares many vital elements and focuses on the patient's outlook. It uses affirmations and open questioning to help the patients concentrate their minds and bring about positive change.(27, 28) MI's empathetic and non-confrontational style aligns with CCT, resulting in a collaborative and respectful therapeutic relationship

Core Elements of Motivational Interviewing

The skills and principles of MI operate within a framework that is based on three core elements: collaboration, evocation, and autonomy of the client. (4)

Collaboration, instead of confrontation, refers to the relationship between the counselor and the patient and helps build rapport and trust.

Those in professions centered around assistance, healing, and education are often motivated to rectify things because of their inherent desire to assist. Often referred to as the “righting reflex” (4), while noble, it undermines the facts that people's perceptions of the what’s “right” for them vary significantly. The righting reflex is usually expressed as a strong, persuasive effort in which the practitioner uses confrontation in making the case for the other to change behavior. Unfortunately, this reflex could leave some patients feelings defeated and demotivated to change. (24) Furthermore, the receiver may react by taking a defensive stance.

Since most people are often ambivalent about change, when the provider tries to instill their opinions of what is right through confrontation, it is in the nature of the patient’s ambivalence to argue the opposite leading to strengthening the status quo. (24, 29)

On the other hand, a better approach is to draw out the patient's own ideas or reasonings for change. Through evocation, the counselor can guide patients to express potential motivation to change and allow them to articulate their reasoning without imposing their professional opinion. (4, 30)

MI is built on the premise that the power to change rests with the patient, hence respecting patients’ autonomy is a vital element in the process. In MI, patients are responsible for making the changes necessary, which leads them to feeling empowered while giving them responsibility for their decisions. (4, 30)

Principles of Motivational Interviewing

Four distinct principles of MI are expressed: Empathy, Support of Self-Efficacy, Rolling with Resistance, and Developing Discrepancy. (4, 31)

MI highlights the importance of the provider's ability to understand and convey empathy, resulting in a supportive atmosphere. Expressing Empathy involves putting oneself in the patient's shoes and perceiving the world as they do. Empathetic listening helps patients feel heard and understood, thus laying the foundation for productive conversations. (32)

Supporting self-efficacy refers to strengthening the patient's belief in themselves. When a patient had tried to change or had short successes in making those changes, it is the provider's responsibility to support the patient's sense of self efficacy and to highlight the skills that the patient already possesses. (24)

MI also encourages providers to 'roll with' or gently explore resistance. This principle prevents defensiveness and enhances the likelihood of the client considering alternative perspectives (33). The provider's priority should also be to avoid the "righting reflex," which is born from concern for the patient's wellbeing. Righting reflex refers to the tendency of health professionals to advise their patients about the right way to do something in terms of one's health. (4, 30)

Finally, developing discrepancy helps patients realize any gaps between their current situation/behavior and their goals. By encouraging patients to explore the inconsistencies between their current behavior and their primary goals, it aids them to realize the scope and potential for change.(30)

Fundamental Motivational Interviewing skills

MI uses communication skills known as OARS to help address the voice of change: (34) Open-ended questions, Affirmations, Reflective listening, and Summaries are the core skills used by providers to move the MI process forward and build a trusting relationship with the patient to discuss change.

Open-ended questions promote elaboration and deeper thinking of an issue. Patients cannot answer open-ended questions with a yes/no or short answer. This helps the patients themselves to uncover reasons for and possibility of change (change talk). (4, 35)

Affirmations, as stated, are meant to be positive statements that help recognize the patient's strengths and aid them in seeing themselves in a more positive light. Positive affirmations build rapport with the patient; hence, the statements must be valid and realistic, refraining from exaggerated praise. Affirmations help patients feel that change is possible even when previous efforts have failed. (4, 35)

Reflective listening is primarily used to express empathy. By listening carefully and providing reflective responses, the patient feels that the provider understands the issue from their perspective, shows effort, and helps build more trust. By using reflective listening, the provider can help the patient resolve ambivalence by focusing on the advantages of change and the disadvantages of the status quo. (4, 35)

Lastly, summaries are lengthier reflections that recap the provider’s understanding of multiple exchanges. They aim to highlight key elements of the discussion and help communicate the

provider's interest and understanding of these issues. The provider can use them to wrap up, or to shift the focus and prepare the patient to "move on." (4, 35)

“Change talk” in Motivational Interviewing

Change talk refers to the patient’s own statements that may reveal motivation for, consideration of or commitment to change. (4) MI has four fundamental processes that describe the flow of “change talk”, mainly: Engaging, Focusing, Evoking, and Planning. (34) The counselor/clinician seeks to draw out the patients' expressions of change talk, thus triggering the shift towards change and away from the status quo. The more a client or patient talks about change, the higher their chances of changing. There are different types of change talk, like “preparatory change talk”, which involves discussing *desire, ability, reason*, and *need* (DARN) for change using open-ended questions. (4) These initial conversations are then followed by “Implementing change talk” where the focus shifts towards *commitment* and *activation*, where the discussions involve describing and detailing steps to change that are most predictive of a positive outcome. (4)

Brief Motivational Interviewing (BMI)

Brief Motivational Interviewing is a condensed form of MI that is designed to do the same as MI when there is limited time available (36). Brief Motivational Interviewing (BMI) is an adaptation of motivational interviewing skills to the clinical care environment to be used by doctors and other health care professionals. The approach involves establishment of rapport between the

doctor and patient using communication skills like OARS to get a good understand of the patient's health concerns and behavior change goals, all within a window of 15 minutes.(37) BMI is commonly utilized in fast-paced environments like hospital bedsides and outpatient clinics where time is limited.(36) A significant and increasing number of studies have confirmed the effectiveness of brief motivational interviewing (MI) in addressing ambivalence towards modifying behaviors related to eating, exercise, smoking, drug use, and treatment adherence.(38, 39)

Applications of Motivational Interviewing

Motivational Interviewing has been successfully applied in diverse settings, including social work, criminal justice, healthcare, and education.

In social work, MI is a popular tool for facilitating client behavior change and has been shown to enhance the effectiveness of essential elements like follow-ups with the clients and improving engagement and communication. (40)

Within the criminal justice system, MI is increasingly being recognized as a practical approach to address various behaviors contributing to criminal activity. It has been used in correctional counseling to help offenders overcome their reluctance to change and to enhance treatment compliance among drug users. In addition, MI is used by probation officers to increase compliance during court conditions for parole. (41, 42)

Motivational Interviewing in Healthcare

In healthcare, MI has been integrated into patient-centered care models, improving adherence to treatment plans and health outcomes. The patient-centered care model is a healthcare approach emphasizing the importance of understanding and addressing the whole person, not just their medical conditions. It's a holistic model that focuses on providing care that is respectful of and responsive to individual patient preferences, needs, and values, ensuring that patient values guide all clinical decisions. (43)

Numerous studies have shown the effectiveness of Motivational Interviewing across a range of behaviors and populations. Research has demonstrated its efficacy in areas such as substance abuse management (Ref), diabetes management (9), smoking cessation, diabetes and weight management (11).

For example, in addiction treatment, MI has proven effective in engaging individuals in the recovery process and reducing substance use. It does so by building awareness, enhancing motivation, resolving ambivalence, and developing a change plan; all while supporting self-efficacy and adapting to patient's' readiness. (44)

Motivational Interviewing in Dentistry

Preventive dental care is essential for maintaining good oral health and overall wellbeing. It involves practices designed to prevent the onset of dental issues, such as tooth decay and gum disease, the two leading causes of tooth loss . (45) MI is increasingly being recognized as a valuable tool in promoting oral health-related behaviors. Dental professionals can utilize MI to

understand patients' oral hygiene practices, identify barriers to regular dental care, and motivate individuals to adopt consistent and effective oral health behaviors.

Encouraging preventive dental care can be facilitated with MI by exploring patients' attitudes towards regular dental check-ups, dietary habits, oral hygiene practices, etc.

Dental professionals can also apply MI to address dental anxiety, a common barrier to seeking dental care. By exploring patients' fears and concerns, dental providers can collaboratively guide them toward finding their motivation to overcome these barriers or develop strategies to manage anxiety. Training in MI for dental personnel can be a valuable addition to their skill set, as it supports autonomy and can lead to improved oral health outcomes for patients with dental anxiety. (46)

From promoting regular brushing and flossing to addressing lifestyle factors affecting oral health, MI assists dental professionals in eliciting patients' motivations and dealing with the resistance to change.

Motivational Interviewing Training in Dentistry

Dental professionals trained in MI are better positioned to address the patient's concerns, leading to increased adherence to oral health recommendations, improved patient outcomes, and better management of chronic oral conditions. The patient-centered approach of MI actively involves patients in decision-making. It acknowledges their perspectives, leading to a trusting relationship with the dental professionals and improved patient satisfaction. MI training can also help dental

professionals as increased engagement and communication with patients can reduce work-related stress and burnout and improve job satisfaction.

The scope of implementation of MI in dental curricula has not been previously reviewed. Understanding the structure and characteristics of MI training in dentistry can help inform future efforts to integrate MI in dental curricula and research by drawing on the best practices to create more effective training programs and evaluations.

METHODOLOGY

A Scoping review was selected to be the best choice to answer the research question as well as fulfill the objectives. The nature of scoping reviews allows some flexibility in research questions as they can be used to address broader questions which are convenient for exploratory purposes. This allows it to thoroughly map the breadth and depth of existing research, and by summarizing the existing evidence scoping reviews can highlight areas where research is lacking. Their flexibility is also extended to the inclusion of various and diverse study designs and finally they can also serve as a precursor to systematic reviews by refining research questions. (47-49)

This scoping review was reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) standards.(50) We used Joanna Briggs Institute's (JBI) updated guidance (51) which is meant to be used in tandem with PRISMA-ScR and is divided into 9 steps:

1) Defining and aligning the objective/s and question/s.

2) Developing and aligning the inclusion criteria with the objective/s and question/s.

3) Describing the planned approach to evidence searching, selection, data extraction, and presentation of the evidence.

4) Searching for the evidence

5) Selecting the evidence

6) Extracting the evidence

7) Analysis of the evidence

8) Presentation of the results

9) Summarizing the evidence in relation to the purpose of the review, making conclusions, and noting any implications of the findings.

As described in the introduction section of this thesis, the objectives of this scoping review are to examine the characteristics and structure of reported MI training curricula in dental education and research; discover any potential knowledge gaps and propose recommendations for future MI programs; as well as evaluate the quality of reporting of MI training curricula using DoCTRINE criteria.

To do so, a list of inclusion/exclusion criteria were developed in accordance with the set objectives and the research question.

STUDY SELECTION

Inclusion Criteria:

All the studies concerning the implementation of MI within dental education/practice.

All the Studies conducted with dentists, dental students, dental hygienists, or dental auxiliaries.

Primary studies and secondary studies including cross-sectional studies, case-control studies, randomized clinical trials, cohort studies, Case series, case reports, all types of reviews, thesis, and dissertations.

Publications dating from 1980 onwards (MI was introduced in 1980).

Exclusion Criteria:

Non-MI specific behavior counseling training.

Letters, Commentaries, Conference Abstracts, editorials, and duplicate studies.

A full-text paper not available after three attempts to contact the authors.

SEARCH STRATEGY

The search strategy (Figure 1) was developed on the 31st of May 2023, in tandem with a McGill librarian (JB) for the Medline (Ovid) database following which it was translated and adapted to Embase (Ovid), CINAHL, PsycINFO (Ovid), Web of Science and ProQuest. The search was repeated on 12th of June 2024 to check for any newly published articles.

Search tools like Medical Subject Headings (MeSH terms), keywords, truncations and proximity operators were used to search the databases. The concept grid for our search strategy mainly encompassed the topic of dental education (including dentistry, dental hygiene, dental assistants etc.) and the concept of Motivational interviewing (including the various aspects of MI such as patient-centered care, patient education, behavior change, communication skills etc.).

The search strategy initially started as a broad framework, encompassing a wide range of topics. This approach, however, resulted in an excessive number of search results that included many concepts unrelated to the specific information being sought. Recognizing the need for a more targeted approach, collaboration with the librarian (JB) significantly improved the strategy. This led to analysis of the preliminary results and identification of key areas for refinement.

Through this iterative process, the search terms were carefully adjusted and narrowed down to better reflect the precise objectives of the research. Multiple rounds of testing were conducted to assess the effectiveness of the revised strategy, allowing for fine-tuning it until it met the necessary criteria for relevancy and quality. Ultimately, this enhanced search strategy evolved into a final version that proved effective and was subsequently applied across various databases, ensuring a more efficient and relevant information retrieval process.

Figure 1: Search Strategy

No.	Search tools	Number of articles
1	Motivational Interviewing/ or Motivational Interview*.mp.	6533
2	Patient-Centered Care/ or (Person-Centered care or patient centered care).mp.	30708
3	Practice Patterns, Dentists'/ or Dentists/ or dentist*.mp.	146793
4	exp Dentistry/	440776
5	Dental Care/ or Dental practi*.mp.	37898
6	General Practice, Dental/	4885
7	oral health.mp. or Oral Health/	43397
8	dental education.mp. or exp Education, Dental/	23075
9	Dental Hygienists/ or dental hygienists*.mp. or dental assistant/ or dental assistant*.mp.	10797
10	Oral hygiene*.mp. or Oral Hygiene/	25708
11	behaviour change*.mp. or Behavior Therapy/	39474
12	behavior change*.mp.	18222
13	Pediatric Dentistry/ or paedodont*.mp. or pedodont*.mp.	5696
14	(Communication adj3 (training* or education or applied)).tw,kf.	10015
15	(counseling or counselling).mp. or Counseling/	150783
16	periodont*.mp.	115320
17	dental students.mp. or Students, Dental/	11345
18	1 or 2 or 11 or 12 or 14 or 15	246331
19	3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 13 or 16 or 17	591541
20	18 and 19	3828
21	Patient Simulation/	5549
22	19 or 21	596934
23	18 and 22	4282

Screening and Data Extraction

Screening and Selection Procedure

As shown in the PRISMA flow diagram (Figure 2), a total of 12933 articles were retrieved from six databases (Medline (Ovid), Embase (Ovid), CINAHL, PsycINFO (Ovid), Web of Science and ProQuest) and exported to Covidence. Initial screening of the retrieved articles was performed by two researchers (AR, AN) based on the defined inclusion and exclusion criteria. First, the two researchers piloted the screening process by independently reviewing the titles and abstract of 100 papers using Covidence. Then, we calculated the inter-rater agreement or reliability (IRR) which was initially calculated to be 88% and then after further discussion with the research supervisor it was calculated at 98%. Any discrepancies were discussed with the research supervisor (NM) and led to the refinement of the inclusion/exclusion criteria. AR and AN divided the remaining 6480 articles and resumed initial title/abstract screening. After title/abstract screening, 6451 studies were removed as they neither mentioned MI nor described it's use in their study leaving a total of 129 articles for full text retrieval. Next, the same authors independently read the full text of articles included from the first step, applying the same eligibility criteria. During the full text screening, a total of 112 articles were excluded for a multitude of reasons such as, MI training not mentioned and described (81 articles), article published before MI theorized (14 articles), full text articles not available (4 articles), MI training present but not in the field of dental education (7 articles), MI training mentioned but not described (2 articles), and theoretical concepts of MI training discussed in dentistry but not implemented (4 articles). The final selection was done by assessing the full text of articles. In case of disagreement at any stage, the research supervisor (NM) was involved in making a final decision about the inclusion or exclusion of studies.

Data Extraction and Management

Data extraction was performed independently by the 2 researchers (AR, AN) using a data extraction sheet developed by both the reviewers. The two researchers piloted the extraction on a predetermined number of articles (10) and conducted a consensus meeting with the research supervisor. Once the data extraction was agreed upon, the researchers continued the data extraction and data charting independently and cross-checked their work to discuss any discrepancies in a repeated fashion. The data extraction sheet was modified as needed to accommodate new information from studies as they were reviewed. Further, the variables for the extraction table were determined by the research team and were partly based on the framework of a set of guidelines known as the DoCTRINE (Defined Criteria To Report INnovations in Education) (Figure 2) which was developed for "scholarly reporting of educational innovations in curriculum development." (52)

The initial variables included basic information such as author name; year of publishing; country of origin; title; aim and objectives. Study setting (location where the study was conducted); study population and sample size; trainer and trainee profiles; structure and content of training (brief outline of training design and execution); length and duration of training (frequency of sessions and their duration); assessment tools (list of tools such as questionnaires, interviews etc. used to assess and evaluate the effectiveness of the training); and outcomes of evaluations, were the main categories developed to guide the data extraction.

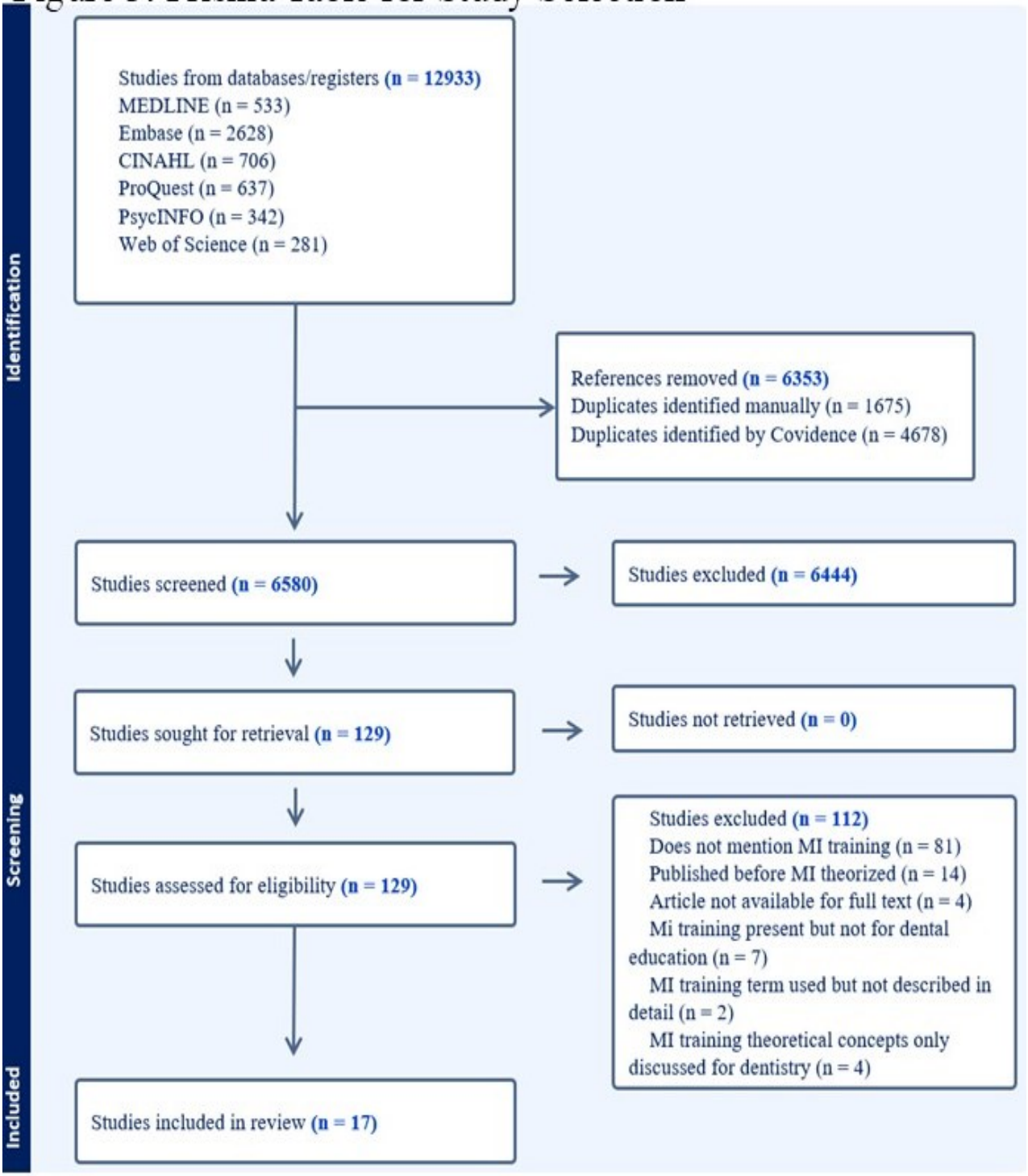
We also used the scoring system of the DoCTRINE (Figure 2) (52) to formally assess the included paper in terms of comprehensiveness of reporting on a new curriculum. The DoCTRINE has 19 items under 5 categories: introduction, curriculum development, curriculum implementation, results, and discussion.

Each criterion is scored as "Y" (1 point) or "N" (0 points), with the total score reflecting how well educational innovation reporting adheres to the checklist's standards. At the end of the checklist the final score is calculated out of 19 by adding the scores of all the items.

Figure 2: DoCTRINE Guidelines

Introduction	Y/N
Need for the curriculum	
Review of relevant literature, theories, models, or published curricula	
Unique contribution of the curriculum to the literature	
Curriculum Development	Y/N
Purpose/goals of the curriculum	
Outcome-based learning objectives	
Target population of learners	
Curriculum implementation	Y/N
Instructional setting for curriculum delivery	
Resources for implementing the curriculum	
Description of instructional methods	
Methods to evaluate achievement of outcome-based learning objectives	
Origin of evaluation instrument(s)	
Results	Y/N
Number of learners participating in the curriculum	
Number of participants included in the evaluation	
Evidence of achievement of outcome-based learning objectives	
Discussion	Y/N
Summary of findings	
Interpretation of findings in relation to the existing literature	
Lessons learned from the implementation of the curriculum	
Limitations of the evaluation of the curriculum	
Describes future implications of the curriculum	

Figure 3: Prisma Table for Study Selection



RESULTS

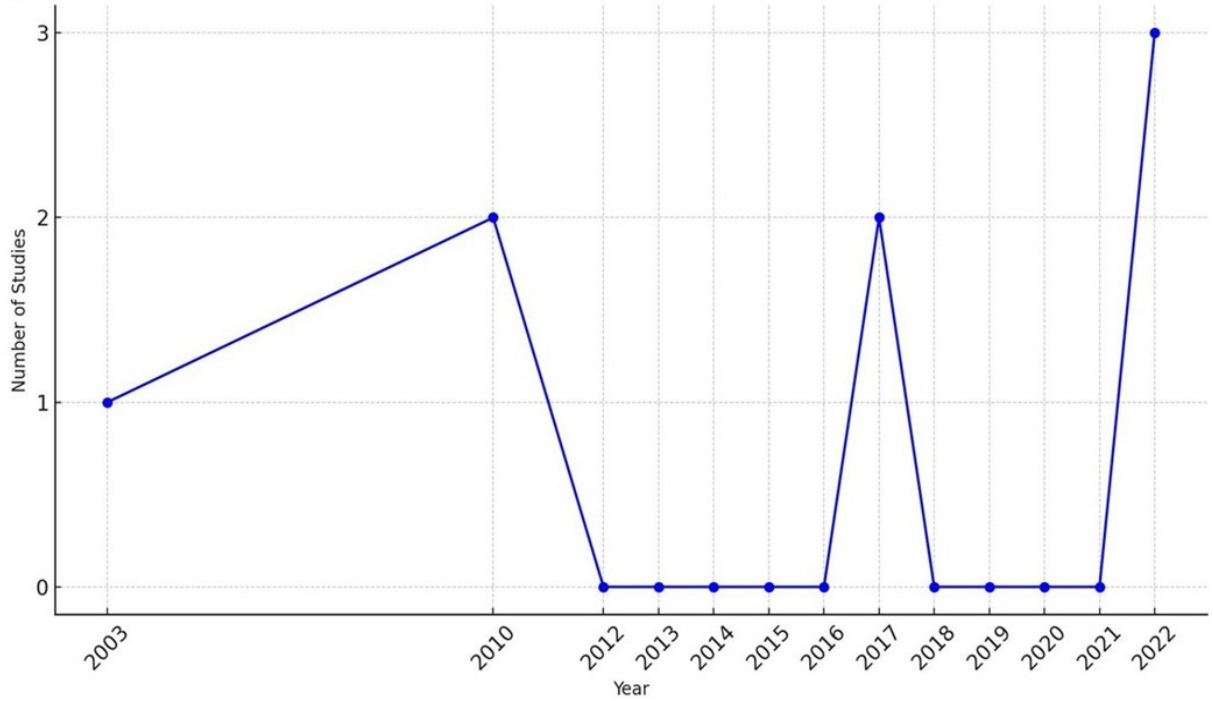
Overview

We retained 17 articles for data extraction. Extracted data were summarized in two tables. The first (Table 1) summarizes the characteristics and structure of the MI trainings described in the papers including learners' profile; trainers' profiles; frequency of sessions; duration of sessions; instructional methods; as well as MI content covered in the training. The second table (Table 2) describes the evaluation of the MI training programs including research design; summary of evaluation findings; and quality of reporting, represented by the DoCTRINE Score.

Publication Year and, Origin:

The graph below (Figure 3) depicts the timeline of the 17 papers included in this review. The graph shows an increase in publishing papers on MI training in dentistry since 2003. In terms of origin (Table 2), twelve (70.5%) of the studies were form the US (13-17, 53-59), two (11.7%) from Germany (60, 61) and the rest form Ireland, Brazil and the Netherlands respectively (62-64).

Figure 4: Reviewed papers (n=17) by year of publication



Implementation of MI Training

Learners' Profiles

As shown in table 1, eight (47%) MI training programs were conducted in dental hygiene schools(15-17, 54-56, 58, 59), one of which included alumni participants and one included faculty instructors. The remaining eight (47%) were conducted within dental schools with undergraduate dental student (13, 14, 57, 60-64). One study was conducted with dental hygiene instructors or faculty. (53)

MI Trainer's Profile

Twelve (70.5%) papers described employing trainers who were specialized/experienced in MI (13, 15-17, 53-55, 57, 58, 61, 63, 64), with four out of the twelve reporting a background in psychology and psychiatry. The remaining five studies did not report the presence of an MI qualified trainer (14, 56, 59, 60, 62). In terms of the number of trainers facilitating the sessions, three (25%) of the twelve studies had 2 trainers delivering the MI training(16, 61, 64). The remaining nine studies reported that one trainer facilitated the MI training. No other characteristics of trainers were reported.

Instructional Methods of MI Training

The different forms of training used in the reviewed papers included lectures and didactic sessions, workshops, videos, coaching, and role-play. Six (35.2%) of the MI trainings used didactic instruction methods(13, 15, 17, 56, 58, 60). Applied training (workshops, coaching/role-play) was reported in five (29.4%) papers(16, 53, 54, 59, 62). The remaining six papers (35.2%) incorporated both didactic as well as practical instructional methods (14, 55, 57, 61, 63, 64).

Furthermore, three (17.6%) papers reported the use of e-learning modalities like videos in their training. (57, 58, 60) Another three papers (17.6%) specified the strategy of providing feedback to the students to improve performance.(15, 53, 56)

Regarding the training content, all papers reported including content on the spirit, principles, and strategies of MI. Four papers (23%) tailored their training around Brief Motivational Interviewing (BMI) (13, 54, 55, 59), a condensed version of MI that aims to aid patients in their

desire to change in shorter appointments, while the remaining papers reported framing the content within the traditional MI framework.

MI Training Frequency and Duration

We categorized the reported frequency of the sessions into one-time/single session and longitudinal/multiple sessions. 14 papers (21.4%) reported a longitudinal format (13, 14, 16, 17, 53-58, 60, 61, 63, 64). Three (21.4%) out of 14 included a separate session dedicated to providing feedback to the students (16, 17, 53). The duration of each session ranged from 30 mins to 1.5 days. Two (11%) papers reported one training session, their durations were 2-days and 90 minutes, respectively(59, 62). One paper did not report on training frequency. (15)

Evaluation of MI Trainings

Study Design and Evaluation Tools

Different evaluation methodologies were used to assess the MI programs: Ten studies (58.8%) were quantitative in nature (13, 17, 57-64); two (11%) were qualitative (14, 15); and five (29.4%) used a mixed-methods approach (16, 53-56). The predominant methods used to evaluate the MI trainings included pre-post questionnaires and the analysis of audio recordings of patient interactions. The pre-post questionnaires evaluated the impact of MI training on the knowledge and attitudes of the trainees while the audio recordings assessed the quality of interactions between the trainees and the patients.

Other evaluation tools were also used in certain studies: 1) the MITI (Motivational interviewing treatment integrity) and MITI-d (German version of MITI) which were used to measure fidelity of MI training (17, 53, 56, 60, 61); 2)An OSCE component was reportedly used to evaluate clinical competence in two of the 17 papers (55, 64); 3) The MISC (Motivation interviewing skills code) was used in one paper to evaluate adherence to MI (17); 4) The Kirkpatrick model was used by Arnett et al. to measure MI competence (55). The Kirkpatrick Model uses four levels of evaluation: reaction of the students' training experience, learning of knowledge and skills attained from the training, behavior as a result of the training, and results of the training to achieve an outcome.(65); 5) Other questionnaires were also reportedly used including the HCCQ (Health care climate questionnaire) and the TSRQ (Treatment self-regulation questionnaire). (16)

The HCCQ and TSRQ are psychological questionnaires used in clinical settings and research to assess motivation, autonomy and self-determination. HCCQ is used to evaluate how well healthcare providers support patient autonomy, primarily for patient-centered care research. (66) TSRQ is commonly used in studies targeting behavior change like smoking cessation. (67)

Outcomes of MI Trainings' Evaluation

In terms of impact on communication skills, one paper reported that students trained in BMI displayed enhanced patient engagement skills compared to the those who were not (16). A study conducted a few years later by the same author found that a comprehensive MI curriculum significantly improved the students' communication skills and MI skills as rated by the most rigorous fidelity measure using the MITI. (56) Other findings included improvement in quality of discussions related to behavior and enhancement of communication skills (such as open-ended

questions and affirmations). (58, 60) Moreover, a marked increase in empathy following MI training was also reported. (60, 61)

In terms of developing and maintaining MI skills Mills et al. found that the students' perceptions of the importance of MI and their confidence in delivering MI were enhanced over time. (58) Early exposure to MI training and consistent reinforcement were recognised as crucial elements in developing MI skills. Also, three papers found that MI programs that integrate feedback sessions regarding patient interactions have a greater effectiveness from the perception of participants and trainers. (17, 53, 59) These studies showed that regular or frequent feedback sessions help enhance the students' confidence and attitude towards delivering MI.

In accordance, Arnett et al. found that a single session of BMI training was insufficient to maintain long-term confidence while delivering MI. (54) Another paper suggested students may need additional ongoing training to achieve competence in MI. (53)

The most common limitations reported across majority of the studies were presence of a small sample size and absence of a control group.(13, 14, 17, 53-55, 57, 58) Another reported limitation was the lack of trained faculty members to mentor clinical MI training. (16)

DoCTRINE Evaluation and Score

We evaluated the 17 papers for quality of reporting using the DoCTRINE scoring system. Eight of the studies accomplished a full score of 19/19. (16, 53, 56-60, 63). This score indicates that these studies adhered to rigorous standards in reporting on implementing the MI training programs. Varying levels of adherence and comprehensiveness in reporting were found in the remaining studies. The study by Curtin et al. scored the lowest (9/19) due to a lack of information on curriculum development and its implementation and an unclear description of training outcomes (62). The remaining studies either lacked information on curriculum implementation or did not specify using any validated evaluation instruments.(13-15, 17, 54, 55, 61, 64)

Table 1: Summary of article extraction on MI training implementation						
Author Name, Year	Learner's Profile	Profile of MI trainer (Number)	Session Frequency	Session Duration	Instructional Methods	MI training content
Arnett 2022	Dental Hygiene Students + dual degree dental Hygiene/dental therapy students	HPV faculty expert and MI trained DH educator (2)	2 sessions	90min	BMI Coaching Role play	BMI Strategies, OARS and EPE
Arnett 2022	Dental Hygiene Students	HPV faculty expert, MI trained DH educator (2)	Control group: 3 in-person sessions +1 BMI coaching session Intervention group: same as above +additional MI refresher and online BMI coaching session	In-person-total duration:1hr 40min BMI coaching: 50min/session MI refresher: 40min Online BMI coaching: 120min	Lectures Coaching Roleplay	BMI strategies Spirit of MI OARS EPE
Arnett 2017	Dental Hygiene Faculty Members	UMKC MI experienced faculty Members (NR)	2 sessions+ several feedback sessions	Session 1: 14 hours (2012) Session 2: 5 hours (2014), grading and feedback sessions: (90 minutes	Workshops Grading and Feedback	MI strategies Spirit of MI OARS EPE

				each) in all semesters		
Bray 2021	Dental Hygiene Students	NR	8 sessions for interventio n group (over one year)	2 hours per session	Didactic lectures 3 Audio recordings with coaching feedback Ongoing support	MI strategies MI Principles Spirit of MI OARS
Bray 2013	Dental Hygiene Faculty Members and Students	Trainer 1: DH program director with MI counselor with formal MI training (Psycholog y department) (2); Trainer 2: DH clinic supervisors (NR)	Faculty: 1 session Students :2 sessions All: multiple follow up feedback sessions	Faculty: 1.5 days Students: 7 hours	BMI Coaching and practice Workshops Role play-assessment of audio recorded patient-interactions	MI strategies Spirit of MI OARS EPE
Calleja 2019	Dentistry, Nursing, Psychology , Counsellin g, Physician assistant students	SBIRT trained dental faculty member (1)	"Multiple"	Not reported	Lectures, Readings Discussion s, Coaching Videos and Demonstrat ions, Roleplay	MI basics, Skills and the change process, Brief interventio n and treatment referral.
Croffoot 2010	Dental Hygiene Students	Registered dental hygienist trained in MI (1)	2 sessions One Individual coaching and	Total duration: 7 hours Coaching and	Lectures, Readings Handouts Communic	MI Principles Use of MI OARS

			feedback sessions	Feeback: 30-40min	ation Exercises	
Curry-Chiu 2015	Dental Hygiene MI trained Alumni primarily practicing full-time in general dentistry	Trained Faculty Members (NR)	Not reported	total duration: 14 hours	Didactic lectures, Written exam, Simulated Patient Exams, Experientia l Practice activities, Audio recordings with coaching feedback, Ongoing support	MI strategies MI Principles Spirit of MI OARS
Curtin 2014	Dental Clinicians and dental hygiene tutors	NR	One workshop	2 days	Not Reported	MI strategies MI Principles Spirit of MI OARS
Faustino-Silva 2019	Dentist and Oral Health Technician s (OHT)	Staff member with PhD in Psychiatry and extensive experience in conducting MI training (1)	2 sessions (2012) + 1 reinforcem ent training (2014)	4 hours each session (2012) + 1-hour (2014)	Experientia l format	MI strategies MI Principles, OARS

Fuhrmann 2021	Dental Students (3rd and 4th year)	NR	3 sessions	1st Session: 10 e-lectures (15 mins each), 2nd Session: Simulated interviews using MI in video form, 3rd Session: apply MI techniques on real patients.	E-Lectures, Videos recordings, Web based trainings (WBTs)	Basics of MI, Directive communication and MI
Hinz 2010	Dental Students (3rd year)	Not Reported in the Methods	2 sessions	1st Session: 18 hours of training, 2nd Session: 3 hours of lectures	Lectures, Role-plays.	Goals of MI. Spirit of MI
Koerber 2003	Dental Students	Licensed clinical psychologist certified to teach Motivational Interviewing (MI) by MINT (1)	1 for control, 4 for Interventional	1st session: 3-4 hours pretraining (common for all) 2nd-4th session: BMI training.	Seminars	Principles of MI, Doing BMI in 5-10 mins
Mills 2017	Dental Hygiene students (1st year)	Faculty members, expert in MI (NR)	2 sessions	1st session: 10 consecutive 50-minute sessions of enhanced MI learning, 2nd session: 110-minute	Readings, Videos, Presentation	Stages of Change and Health Belief Models, application of MI during patient care, Strategies

				class session on MI.		of MI, OARS, Change talk
Schoonheim-Klein 2012	Dental students (3rd year)	Periodontics faculty member and a clinical psychologist trained in MI (2)	Control: 1, Interventional: 3 sessions	M1: 4 hours MI workshop, 1 hour role-play. M2: 4 hours MI workshop, 3-hour role-play. M3: 4 hours MI workshop, 3-hour role-play (more intensive)	Lectures, Workshop, Demonstrations and role-play	Theories of MI, Stages of change, Essentials of MI
Stull 2021	Dual degree Dental hygiene/Dental Therapy students	Not Reported	1 session	90 minutes	Role-play	Using BMI techniques for HPV communication strategies.
Woelber 2016	Dental Students	Psychologist specialized in MI and psychiatrist specialized in MI. (2)	2 sessions	Workshop for 8 hours, group supervision with psychiatrist for 4 hours.	Workshop, Readings	General behavior change, Understanding MI and it's abilities

Table 2: Summary of article extraction on Evaluation findings.					
Author Name, Year	Country	Study Type	Study Design, Description	Summary of Findings	DoCTRINE Score
Arnett 2022	United States	Mixed Methods	Quant: Pre-post questionnaires and delayed post (UMN standardized MI rubric and open-ended questions) Qual: Analysis of 2 audio-recorder patient interactions	1) Student perception and confidence increased from pre to post training (PT) 1 but declined in PT2; 2) Improvement in faculty evaluation from 1st to 2nd patient interaction (PI) 3) BMI training insufficient to retain long-term confidence.	18
Arnett 2022	United States	Mixed Methods	Quant: Case-control design and post-evaluation using UMN Standardized MI rubric, OSCE with patients, and Kirkpatrick model. Qual: Analysis of audio-recorded HPV patient interaction.	1) 2nd Cohort received higher ratings compared to 1st cohort, except for the acceptance component of PI. 2) Both groups improved from PI 1 to PI2 and OSCE.3) ≥ 70% agreement in self-assessment and faculty evaluation for 2 and 3 MI components for cohorts 1 and 2 respectively. 4) Skill-based BMI training improved competence in MI and can be evaluated using the Kirkpatrick Model.	18

Arnett 2017	United States	Mixed Methods	Quant: Pre-post questionnaires Qual: Self-assessment and team grading of student-patient MI interaction using MITI.	1) Despite the confidence, faculty members' ratings for the spirit of MI increased from pre-test to PT1 but decreased by PT2. 2)Workshop benefited by improving faculty member's perception and confidence in teaching MI. 3) Both decreased towards the end of the year. 4) Team grading enhanced perception and teaching MI.	19
Bray 2021	United States	Mixed Methods	Quant: Case control, Multifaceted program evaluation, Qual: Analysis of audio recorded standardized patient interaction using MITI coding	1) Students trained in MI exceeded beginning proficiency and scored higher than the control group in all MITI indexes except for "complex reflections" 2) MI curriculum enhanced communication skills and competence for all the students but additional training might be needed	19
Bray 2013	United States	Mixed Methods	Quant: Pre-post questionnaires *, Final exam scores(students), Qual: self-assessment of	1) Faculty training showed increased perceived importance and confidence in MI strategies. 2) Knowledge acquisition was	19

			Simulated patient interaction. Audio recorded patient interaction. *Additional questionnaires (students): HCCQ, TSRQ	slightly higher for asynchronously delivered training, but no difference was found statistically compared to traditional. 3)BMI-trained students showed slightly decreased motivation and confidence in poor oral health counseling but demonstrated significantly better patient engagement skills compared to those trained traditionally. 4) MI curriculum is effective and can enhance skills.	
Calleja 2019	United States	Quantitative	Quant : Pre-Post evaluation, Questionnaires (attitude on substance use)	1) Dental Students demonstrated the greatest change in attitude toward substance abuse from pre to post-SBIRT training and believed that all medical professionals should receive substance use counselling training. 2) attitude change was more significant among females and black trainees whose belief change from not believing to considering it public health issue.	19

Croffoot 2010	United States	Quantitative	Quant: Pre-Post evaluation and Feedback, Qual: Analysis of audio recorded patient interaction using MITI and MISC	1) Increased MI adherence through increased change talk and decreased closed questions among students. 2) MI adherence and MI non–adherence was related to the length of the session. 3) Mean and SD of summary scores of MITI and MISC indicated MI supportive behaviors. 4) DH students showed improvements in acquiring MI skills following a feedback/coaching session.	18
Curry-Chiu 2015	United States	Qualitative	Qual: Case Study, Thematic analysis of One-on-One interviews, Triangulation analysis of observational field notes and practice setting description	1) All interviewees used MI in their practice to improve patient care and rapport but were not confident about their skills. 2) MI was a superior patient communication style and is beneficial in the dental curriculum was reported. 3) Hygienist reported difficulty in implementing MI with resistant patients and within certain work	16

				environments with time constraints.	
Curtin 2014	Ireland	Descriptive	Not reported	No formal results, authors reported key learning outcomes based on their experience of the workshop: "Fundamentally, the MI training has been implemented for dental clinicians at a postgraduate or professional level. We would suggest that there are positive outcomes in terms of learning potential for trainee dental clinicians at an undergraduate level."	9
Faustino-Silva 2019	Brazil	Quantitative	Quant: Randomized community trial (Longitudinal follow-up), Pre and post evaluation and delayed post-evaluation, Questionnaires used: Importance and Confidence Ruler for question", Qual: Dialogue interview, and Helpful Response Questionnaire	1) MI- knowledge prior to training was homogenous in tests (MI trained) and control groups (No-MI training). 2) The test group showed significant improvements in using open questions, affirmations, and reflective listening, and decreased closed questions. 3) Both the Importance and Confidence of Rulers demonstrated substantial increases. 4)The skills acquired during the training were mainly	19

				maintained over one and two years. 5) Annual follow-up meetings helped reinforce these skills, ensuring continued application of MI techniques.	
Fuhrmann 2021	Germany	Quantitative	Qual: Pre-Post evaluation with feedback and using questionnaires for analysis and MITI-d for evaluation	1) The students demonstrated high MI-adherent behavior, with performance comparable to traditional classroom settings. 2) Global scores for empathy and MI spirit indicated effective MI practice, and students successfully applied MI techniques in patient interactions. 3) Analysis of patient interviews showed adherence to MI principles, indicating effective skill transfer from e-learning to clinical practice.	19
Hinz 2010	United States	Qualitative	Qual: Pre-Post evaluation followed by grading based on accurate usage of MI terms.	1) Most students reported a positive experience using MI with the added benefit of being brief. 2) It helps them better plan their communications with their patients.	17
Koerber 2003	United States	Quantitative	Experimental Pre-Post evaluation	1) Through the training, students showed significant	15

			with analyzing of recorded student interaction videotapes and questionnaires	improvement in their use of BMI techniques, with patient involvement playing a crucial role. 2) The interventions that enabled patient transformation helped establish rapport.	
Mills 2017	United States	Quantitative	Retrospective Pre-Post evaluation, analysis of audio recorded role-play assignments and questionnaires.	1) The enriched curriculum, which provided opportunities for repeated practice, feedback, and the practical application of MI in clinical settings, greatly increased the significance and confidence levels of MI among dental hygiene students. 2) Consistent reinforcement and early exposure to MI throughout the curriculum were recognized as crucial for developing these skills. 3)This study advocates for integrating MI training into dental hygiene education to improve patient-centered communication and behavior-change counselling abilities.	19
Schoonheim-Klein 2012	Netherlands	Quantitative	Pre-Post evaluation with Questionnaire, formative	1) The group of students who received the most extensive motivational interviewing (MI)	15

			assessment (OSCE), Questions from a validated questionnaire developed by Allard (22) for evaluation of dentists' attitudes towards smoking.	education, followed by a formative assessment, experienced a significant reduction in smokers among patients and students. 2) As a result of MI education, the student's understanding of the connection between smoking and periodontitis increased from 33% without MI to over 96% in the groups with MI. 3) Educating dental students in MI positively impacted the percentage of periodontal patients and students who quit smoking. 4)Therefore, involving dental students in smoking cessation with MI shows promise when integrated into periodontal education.	
Stull 2021	United States	Quantitative	Retrospective Pre-Post evaluation with feedback and analysis of audio recorded patient interaction sessions.	1) The results indicated that the intervention and control groups experienced improved knowledge immediately after completing an online educational module. 2) However, there was a slight decline in knowledge after	19

				practical patient interactions, suggesting the importance of holding repeated educational sessions to sustain knowledge levels. 3) Over time and with faculty feedback, confidence in motivational interviewing (MI) skills increased. 4) Although students initially displayed overconfidence, real patient interactions highlighted challenges such as time management and securing patient consent for discussions.	
Woelber 2016	Germany	Quantitative	Pre-Post evaluation with Questionnaires and analysis of audio recorded patient interactions using MITI-d.	1) MI significantly enhanced the quality of behavior-related discussions. Compared to the control group, participants in the MI group demonstrated higher levels of empathy, MI spirit, and MI-adherent communication. 2)The MI group's performance was characterized by a greater use of open-ended questions, complex reflections, and a more favorable	15

		ratio of reflections to questions. 3)These specific enhancements in communication skills are consistent with the strategies employed in MI. 4) Despite these improvements in communication, the duration of behavior-related discussions and the amount of information provided by the students did not show significant differences between the MI and control groups. 5)The substantial impact of scaling and root planing on clinical parameters outweighed any potential influence of MI within the study's timeframe.

Abbreviations: Motivational Interviewing (MI), University of Minnesota (UMN), Post training (PT), Human Papilloma Virus (HPV), Objective Standardized Clinical Examination (OSCE), Brief Motivational Interviewing (BMI), Health care climate questionnaire (HCCQ), Treatment self-regulation questionnaire (TSRQ), Motivational Interviewing Treatment Integrity (MITI), Screening, Brief Intervention, and Referral to Treatment (SBIRT), Motivational Interviewing Skill Code (MISC),

DISCUSSION

The results of our scoping review indicate an increase in publications on MI training programs in dental education over the years. The research studies we reviewed evaluated multiple formats and structures of MI curricula for oral health professionals. Below we present a discussion of the extracted data with focus on the two main themes: the results of the evaluations of MI trainings programs and the structure and format of the MI curricula described in the 17 papers included in this review.

Effectiveness of MI Training

Overall, the papers we reviewed showed that MI training had a positive impact on dental students' communication skills and their ability to provide patient-centered care. Woelber et al., observed that students who received training in Motivational Interviewing (MI) exhibited a significant improvement in the quality of discussions related to behavior compared to those who did not receive such training.(61) Another paper demonstrated a marked improvement in trainees ability to employ techniques like open-ended questioning, affirmations, and reflective listening (61, 63). Communication skills such as those delivered by MI are crucial for establishing trust and providing person-centered care. Effective communication increases patient compliance, reduces dissatisfaction, and enhances dentist job satisfaction. A patient-centered approach also promotes shared decision-making, empowering patients and improving care outcomes. (68)

Furthermore, some of the papers showed an increase in empathy among MI-trained students compared to those who did not receive the training. (56, 60) Studies have shown that stress, burnout and heavy workloads contribute to the decline of empathy among medical students and

professionals over time. (69) This decline negatively impacts patient care, increasing medical errors and reducing patient satisfaction. Integrating empathy-focused education into healthcare curricula is essential to enhance provider well-being and patient outcomes. When dentists exhibit empathy, patients are more likely to feel heard, supported, and satisfied with their treatment, leading to better health outcomes. It helps to alleviate patient anxiety, particularly in dental settings where fear and stress are common. An empathetic dentist-patient relationship also fosters trust, compliance, and overall patient satisfaction. (70)

Trainees reported an increase in perception of importance and confidence in MI skills following training (16, 54). These findings are consistent with other studies from Medicine that reported an increase in trainees' perceptions of MI skills and their confidence in applying it. (71) However, while initial training gives students basic MI skills, long term skill retention requires regular refresher sessions and opportunities for practical application. Indeed, a recurring theme in the papers we reviewed was the decline in confidence and skill retention over time, specifically in the absence of consistent and constant reinforcement (54) (59) (53)

MI Training Duration and Structure

One of the papers we reviewed reported an increase in knowledge immediately after the single session online training module, followed by a significant decline after patient interactions (59). This finding is consistent with other studies on MI in healthcare that showed the importance of longitudinal training, follow-ups, and refreshers to maintain MI skills in clinical practice. (72) (73) (74) (75) For example. Chan et al. (72) Small training sessions like two-day workshops can produce small but significant learning effects, as short workshops have a condensed curriculum

with clear learning objectives to focus on essential MI skills which results in efficient learning. However, these skills deteriorate without opportunities for continued learning. (75) Similarly, Forsberg et al. reported that frequent assessments at fixed intervals over a period of 2.5 years helped maintain proficiency in MI (74)

In terms of instructional methods most of the papers we reviewed employed multiple instructional methods, including didactic lectures, role-play, e-learning modules, and audio-recorded patient interactions. Learning strategies such as role-playing and audio recording with feedback, proved effective in reinforcing MI principles and fostering reflective practice.(16, 17) Successful MI trainings require a focus on "deliberate practice," where students engage in repeated, focused exercises and receive targeted feedback from trainers. This hands-on approach enables trainees to develop competence and confidence in using MI techniques in real-world situations. (76)

E-learning emerged as a viable alternative to traditional training formats. During the pandemic it was common to see many institutions take up E-learning. Fuhrmann et al. demonstrated that students achieved enhanced proficiency through a hybrid model of e-lectures, simulated interviews, and real-patient interactions. (60) Such diversity allows for MI training to become scalable, particularly in institutions with limited in-person training resources.

Brief Motivational Interviewing Training

Dental appointments are often short, making short-from interventions like BMI more practical and ideal than full MI sessions. Patients may also be receiving dental treatments over multiple

visits and hence be seen more regularly by their dentist. The likelihood of behavior change increased with number of encounters and follow ups in studies where MI sessions were lesser than 20 mins. (77) BMI can be used to support patients with dental anxiety, dietary changes, smoking cessation, treatment adherence etc.

Four of the paper we reviewed indicated provision of BMI. However , two of them had training frequencies between 90 minutes and 100 minutes, which may have impacted their effectiveness as it was concluded by the authors that it was insufficient for retaining confidence on the long run.(54, 55) Another study used multiple sessions (2-4 sessions) for BMI training which led to significant improvements in their skills and competency delivering BMI. (13)

Motivational Interviewing and Behavior Change

Dental professionals often encounter patients with complex behavioral health issues, and addressing these challenges requires a deep understanding of motivational dynamics and to guide patients toward behavioral change. The reviewed studies reveal the effectiveness of MI in addressing these challenges. Schoonheim-Klein et al. demonstrated that MI training significantly decreased smoking rates among periodontal patients, highlighting its potential for behavior change in preventive care. (64) Similarly, Calleja et al. found that MI training shifted dental students' attitudes toward addressing substance abuse, with trainees recognizing the importance of integrating behavioral health counseling into dental care. (57) These findings reflect a broader recognition that oral health is closely linked to overall health. MI aligns with the evolving role of dental professionals as advocates for holistic health, equipping them with skills to address oral health issues and broader behavioral risk factors.

Implementation of Motivational Interviewing Training in Dentistry

The integration of MI training into the dental curriculum may pose several challenges. It needs to be seamlessly included without sacrificing any essential components of dental education and without causing a need for additional curricular hours to prevent burnout among dental students. (53)

Several studies identified structural and systemic barriers in MI implementation, including limited faculty expertise; time constraints during patient interactions; and difficulties adapting MI techniques to resistant patients or fast-paced clinical environments.(15, 59) Development of the faculty's proficiency was seen to be crucial in overcoming these barriers, as the teachers' competency in MI greatly influences students' learning outcomes.(16) Time constraints during patient interactions limit the application of MI techniques, especially in clinical settings where efficiency is primarily considered as a priority. Training programs must address this challenge by teaching brief but effective MI interventions, as demonstrated by Koerber et al., where students learned to apply MI strategies within 5-10 minutes.(13) Research conducted by Mills et al. and Bray et al.(16, 58) supports the integration of Motivational Interviewing (MI) training throughout the dental curriculum, ensuring that students encounter MI principles both early on and repeatedly.

The adequate training of faculty members in MI is the backbone of integrating MI training into dental education. Faculty development programs can assist by providing continuous training and support. Arnett et al. conducted 2 workshop sessions followed by multiple 90-minute feedback sessions with dental hygiene faculty members to increase their competency as it had a direct relationship with students' performance. (53)

Dental schools can embed MI into their didactic curricula, wherein MI-trained professionals introduce MI principles in foundational courses in dental education involving theoretical knowledge and basic skills. Applied MI skills can be practiced through role-playing and reviewed in case studies. Additionally, MI can be integrated into clinical training, involving supervised patient interactions, allowing students to practice MI techniques under the guidance of experienced faculty. Using Interprofessional education as a means of training in MI is also possible, promoting a team-based approach to patient care. (13, 57, 61) Finally, embedding MI training in an incremental and longitudinal manner could help strike a balance between the benefits of MI training and the commonly reposted barrier of time constraints. (29, 78)

Benefits of MI Training in Dentistry

In today's healthcare systems, patients treasure shared decision-making and want to have an active role in their healthcare (79). This emphasizes the significance of collaboration between patients and healthcare providers, promoting empathy and respect of patient autonomy throug joint decision-making.

The emphasis on empathy and patient engagement in MI has enhanced the alliance between dental professionals and their patients (60, 61) leading to stronger rapport and resulting in better outcomes and increased patient satisfaction. Moreover, MI has demonstrated its effectiveness in meeting a wide range of patient needs, including the management of dental anxiety, support for smoking cessation, and enhancement of oral hygiene.(14, 64) This adaptability positions MI as an essential instrument in the dental professional's toolkit, allowing practitioners to effectively tackle both routine and intricate patient concerns alike.

MI training addresses the challenge of discussing sensitive topics by equipping students with a structured approach to navigate difficult conversations. Studies by Bray et al. (56) and Arnett et al. (53) found that MI-trained students significantly improved communication skills and confidence levels. This suggests that MI benefits patient care and contributes to the career development of future dental practitioners.

The inclusion of MI in dental education addresses an important gap in preparing students for real-world patient interactions. Many dental students report feeling under-prepared to oversee the complex behavioral aspects of patient centered care.

MI-equipped dental professionals are better positioned to address patient motivation and concerns, and to enhance oral health practices efficacy. (80) MI is centered around patient-centeredness, and by actively involving the patients in decision-making and acknowledging their perspectives, dental professionals can create a more trusting relationship eventually enhancing their own sense of reward and job satisfaction.

Strengths and Limitations

This scoping review, to our knowledge, is the first evidence to date emphasizing and summarizing the implementation of MI training in dental education. Although the quality of reporting of included studies varies, many of the studies had a high DoCTRINE score, indicating thorough reporting on the implementation of MI training. Such practice informs future efforts to design and implement MI programs by providing detailed descriptions of existing programs.

One of the limitations to this scoping review is susceptibility to potential bias, primarily selection bias and publication bias, as studies with positive results are more prone to get published. Also, the retrieved studies were diverse in their study designs which increased the heterogeneity of the reviewed papers. In addition, the absence of standardized evaluation tools in some studies makes it more difficult to compare results. Finally, the majority of the papers focused on self-report evaluation of learners' knowledge and skills potentially limiting the exploration of effectiveness of MI in clinical interactions with patients.

CONCLUSION

The findings from this scoping review emphasize the critical role of Motivational Interviewing (MI) training in enhancing dental students' communication skills, empathy, and patient-centered care abilities. In terms of implementation, applied learning strategies were shown to reinforce MI principles. At the same time, hybrid models that incorporate e-lectures and simulated interviews offer scalable training solutions, particularly in resource-limited environments.

Long-term skill retention remains a key challenge. Confidence and proficiency in MI techniques improve over time, hence the need for continuous reinforcement opportunities to maintain competence in MI skills. Embedding MI principles and skills training throughout the dental curriculum, rather than confining them to isolated training sessions, may address this issue.

Despite challenges such as limited faculty expertise, time constraints, and variability in training methods, the findings show that MI training prepares students for real-world patient interactions and helps them address common issues, such as smoking cessation and dental anxiety while promoting shared decision-making and patient autonomy.

To enhance the effectiveness of MI training, educational institutions must prioritize the development of expert faculty, adopt a consistent training framework, and ensure the availability of resources to facilitate ongoing practice. By addressing these limitations and sustaining MI training throughout the curriculum, dental schools can produce competent, empathetic, patient-centered practitioners better equipped to support behavior change and improve oral health outcomes.

FUTURE DIRECTIONS FOR RESEARCH

The current knowledge on MI training in dental education is limited, highlighting the need to develop and identify the best practices for selecting and designing curricula that effectively incorporate MI. Additionally, interventions should be assessed and improved using valid and reliable measures. Further research is essential to determine the optimal duration and frequency of training required to enhance MI adherence and competence, ensuring long-lasting effects in clinical practice. Effective strategies to train instructors in MI principles and techniques should be explored considering the impact of instructor's proficiency on student learning and performance. Longitudinal studies specifically on MI skills retention for more than one or two years are needed to identify effective reinforcement protocol. Future studies can also compare the effectiveness of various instructional methods and MI training modalities like e-learning and hybrid formats as well as evaluate the cost effectiveness of these methods. Standardized training modalities and evaluation also need to be explored to enable consistent comparisons between studies. Considering the possible time constraints in clinical healthcare practice, more studies can focus on the development of a BMI protocol to be delivered in 10-minute patient interactions.

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APPENDICES

Appendix Table 1: Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	(i)
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	5-9
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	20
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	20
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	No protocol followed
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	34
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	35
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	36
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	37
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	38
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	38
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used	39-40

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		and how this information was used in any data synthesis (if appropriate).	
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	38
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	41
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	42-48
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	48
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that was charted that relate to the review questions and objectives.	42-48
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	49-63
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	64-70
Limitations	20	Discuss the limitations of the scoping review process.	71
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	72-73
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	Not Applicable

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

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