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# Profile of anatomy teachers of students in healthcare professions: a scoping review

Joanne Fevry<sup>1</sup> , Salomon Fotsing<sup>1,2,3,4</sup> , Meriem Merghem<sup>1</sup> , Anne Roberge<sup>1</sup> , Rayan Ramdani<sup>1</sup> ,  
Isabelle Filion<sup>1</sup> , Marie-Cécile Domecq<sup>5</sup>  and Alireza Jalali<sup>1,2\*</sup> 

## Abstract

**Background/objective** Health education programs present a wide variety of anatomy educators' profiles in human anatomy. Anatomy is an essential component of healthcare professional training. However, few studies have examined the professional profile of anatomy teachers and its links to the content taught, the teaching strategies employed, and the assessment methods used. This study aimed to explore the academic backgrounds of these teachers, the health professions in which they teach, the content delivered, and the teaching strategies employed.

**Methods** This work followed the steps outlined by Arksey and O'Malley, as well as the PRISMA-ScR guidelines. Data were sourced from major academic databases, such as Embase, MEDLINE, CINAHL, etc. Five reviewers used Covidence to analyze the articles. Data on teachers and their strategies were extracted and then narratively synthesized.

**Results** Of the 6,779 studies analyzed, 42 were selected. Teachers held a variety of degrees, including PhDs in anatomy and medicine. Most were full-time faculty members, including professors, lecturers and assistant professors with over twenty years of experience. Teaching strategies combined traditional and modern approaches, and assessments included written, practical, and continuous examinations.

**Discussion/conclusion** This study demonstrated that anatomy teachers do not share a single profile. Teaching strategies need to be adapted to regional and institutional contexts. It is therefore necessary to support these teachers to better meet the contemporary demands of anatomy education.

**Keywords** Anatomy education, Anatomy teacher profile, Health professions education, Teaching strategies, Anatomy instructor qualifications, Human anatomy

## Introduction

Anatomy learning is the best way for students in healthcare professions to acquire essential knowledge of the structure of the human body, regardless of their field of study [1–5]. Anatomy enables students to acquire knowledge and skills essential to their future clinical practice [1, 4–6] and is considered to be the cornerstone of medical programs [7]. Anatomy educators play an important role in transmitting this knowledge to students, knowing that this course is indispensable to medical practice and is the key to success for physicians in their practice, regardless of their specialty [1, 5, 8].

\*Correspondence:

Alireza Jalali

ajalali@uOttawa.ca

<sup>1</sup>Faculty of Medicine, University of Ottawa, 451 Smyth (2211), Ottawa, ON K1H 8M5, Canada

<sup>2</sup>Francophone Affairs, Faculty of Medicine, University of Ottawa, Ottawa, ON, Canada

<sup>3</sup>Department of Family Medicine, University of Ottawa, Ottawa, ON, Canada

<sup>4</sup>Institut du Savoir Montfort, Ottawa, ON, Canada

<sup>5</sup>Health Sciences Library, University of Ottawa, Ottawa, ON, Canada



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In fact, according to clinicians and anatomists, a solid grounding in anatomy acquired during medical training contributes significantly to both the physical examination of the patient in order to render a diagnosis and also to the understanding of pathologies to provide better patient care [5, 6, 9]. Furthermore, gaps in clinicians' and surgeons' anatomy knowledge are often related to educators' lack of expertise in teaching this subject [9, 10]. It is therefore important that students be trained by teachers capable of transmitting anatomy knowledge.

In the various health professions education programs, there is a wide variety in the profile of anatomy educators. We found that these educators have not received the same basic training. For example, they may be clinicians with or without basic training in anatomy teaching [10–12], teachers with medical training and experience in cadaveric dissection [11], or teachers with or without basic medical training [11, 13].

To our knowledge, no exhaustive synthesis of current knowledge has specifically addressed the profiles of anatomy educators, along with the teaching and the evaluation strategies they use. This lack of synthesis complicates the identification of training needs, and the development of context specific recommendations. By providing a structured overview of these elements, this scoping review aims to fill this gap by clarifying educators' profiles and teaching practices to improve anatomy education for health science students.

Hence, we conducted a scoping review aimed at mapping the existing literature on the profile of these educators in healthcare professionals' education, in particular with regard to their prior academic training, the healthcare professions in which they teach, course content taught to students, the teaching strategies they use, as well as evaluation strategies and their impact on students' education. More specifically, the research questions are:

- (1) What is the current state of knowledge on the training backgrounds of anatomy educators across healthcare profession? Here, "training backgrounds" include formal academic qualifications, training experience and any additional pedagogical or disciplinary training that may prepare educators to teach anatomy.
- (2) What are the teaching strategies used based on the content to be taught?
- (3) What are the evaluation strategies and the impact of teaching in this context?

## Methodology

### Study design

This scoping review was planned and conducted according to the frameworks introduced by Arksey and O'Malley [14], then enhanced by Levac and colleagues

[15]. The steps included: 1) identifying the research questions, 2) identifying relevant studies, 3) study selection, 4) charting the data, 5) collating, summarizing and reporting the results. This study was carried out in accordance with PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews) guidelines for writing and reading a scoping review [16]. This exploratory study was registered with Open Science Framework (OSF) on March 4, 2025 (<https://doi.org/10.17605/OSF.IO/GH5QT>).

### Step 1: identifying the research questions

The purpose of this study was to explore the profile of anatomy educators in the healthcare professions. More specifically, our research questions are:

- 1) What is the current state of knowledge on the training backgrounds of anatomy educators across healthcare profession?
- 2) What are the teaching strategies used based on the content to be taught?
- 3) What are the evaluation strategies and the impact of teaching in this context?

### Step 2: identifying relevant studies

The search strategy was developed by an academic librarian (Marie-Cécile Domezq) in consultation with the research team. In accordance with the Peer Review of Electronic Search Strategies (PRESS) guide [17], the strategy was subsequently reviewed by a second librarian. This search strategy is presented in Appendix 1 and focuses on keywords used to describe educators' academic profile and strategies they use for teaching and evaluating students. The search included published and peer-reviewed articles from various electronic databases. The search was limited to English and French articles, with no publication date restriction. A first iteration of the search strategy was developed in Medline (OVID) on June 26, 2024, with the final search strategy established on July 16, 2024. Our search identified a total of 10,032 articles: 4384 from Embase, 2962 from MEDLINE, 1267 from CINAHL, 505 from Eric, 487 from PsycINFO, 215 from Education Source and 212 from Web of Science.

### Step 3: study selection

Inclusion and exclusion criteria were defined according to the PCC (Population, Concept, Context) framework as recommended by the Joanna Briggs Institute (JBI) [18]. The population included anatomy educators involved in teaching anatomy in health professions programs, including anatomy teachers, lecturers, instructors, anatomy teachers and researchers, heads of departments, and tutors directly responsible for delivering anatomy content or supporting anatomy learning activities. The concept

focused on the academic and professional profiles of these educators, as well as teaching and assessment strategies used in anatomy courses, and the context was higher education in health-related programs, including undergraduate and graduate courses in medicine, nursing and other health professions.

To this study, the profile of an anatomy teacher is defined by their academic background, professional training, disciplinary expertise and teaching responsibilities, in accordance with how studies on the pedagogy of anatomy characterize anatomy educators [19] (The studies identified were uploaded to Covidence (version 2.0, Veritas Health Innovation, Melbourne, Australia) systematic review and web-based software, where we conducted the article screening and extraction phases. Duplicates were removed. A pilot assessment and screening tool was developed by the research team and tested on 30 articles selected at random. Study selection was done in two steps. First, five reviewers: (Joanne Fevry, JF; Meriem Merghem, MM; Anne Roberge, AR; Ryan Ramdani, RR; Isabelle Filion, IF) independently screened titles and abstracts to determine study eligibility based on established inclusion and exclusion criteria. Second, the full texts of articles were screened by the same reviewers, using the same criteria. Two votes were required for the inclusion of articles. At this stage, articles that, according to the independent reviewers, did not meet the inclusion criteria were excluded. Each assessment and screening step was performed by two reviewers. Disagreements were automatically identified by the Covidence system and then resolved through discussion. Reviewers analyzed the votes until a consensus was reached, a necessary condition for the process to continue. If a consensus

could not be reached, discrepancies were resolved by a third reviewer (JF). The final list of articles was reviewed by the research team to determine whether additional articles should be included or excluded, and no further modifications were made. Overall, our inclusion criteria included: 1) all studies conducted among human anatomy educators in healthcare professions; 2) all study designs used to describe the profile of these educators, whether qualitative or quantitative, regardless of the purpose of the studies; 3) peer-reviewed studies; 4) articles published in French or English with no date restriction. These articles were published in scientific journals, books, book chapters and theses. Articles were excluded if they: 1) lacked stratification in the teacher population in the healthcare professions studied, 2) were not peer-reviewed. The full selection criteria are detailed in Table 1 below.

#### Step 4: charting the data

JF developed the extraction data sheet through an iterative process of revision with the lead supervisors: Alireza Jalali (AJ), Salomon Fotsing (SF). A data extraction grid was then developed by the research team, then tested before being incorporated into Microsoft Excel version 2306 for extraction of variables by independent reviewers (JF, AR, IF). This grid was used for articles from both scientific databases and the grey literature. The extraction sheet included data on publication characteristics (name of lead author, year of publication, title of publication, publication journal, journal's impact factor, country of data collection, funding source, and study registration if applicable), study characteristics (study design, sample size, participants, healthcare professions in which data were collected, inclusion and exclusion criteria), socio-demographic characteristics of participants (gender and age), years of anatomy teaching experience, university degrees, anatomy educators' prior academic training, academic titles, academic contracts, teaching strategies they use, content of courses they teach, evaluation strategies and their impact in this context, depending on the purpose of the study. A pilot data extraction with one article was conducted with all reviewers to ensure a consistent understanding of the variables on the data extraction sheet. No further modifications were subsequently made to the list of variables.

#### Step 5: collating, summarizing and reporting the results

Following data extraction, the results were analyzed and synthesized by the lead author (JF), reviewed by the supervisors (AJ, SF), and then by all co-authors. One reviewer (JF) subsequently analyzed thematic trends using the information extracted from all articles. We conducted a narrative summary of the qualitative data. The reviewer (JF) then compiled a descriptive summary of the

**Table 1** Study selection criteria

Inclusion criteria	Exclusion criteria
Studies involving human anatomy educators working in higher education or university-level healthcare professional education programs (e.g., medicine, nursing, physiotherapy).	Studies involving anatomy teaching at the elementary or high school level, or studies that do not clearly identify or stratify the anatomy educator population.
Study designs: randomized controlled trials (RCTs), non-randomized controlled trials (NRCTs), matched comparison studies, pre-post/post-only studies, cohort studies, qualitative studies.	Non-peer-reviewed publications (e.g., grey literature).
Studies reporting on the professional profile, qualifications, teaching experience, or pedagogical strategies of anatomy educators.	Conference abstracts, letters to the editor and commentaries.
Articles published in French or English.	Articles published in languages other than French or English.
No restriction on publication date.	—

extracted data using key characteristics and themes. The results were structured around information on characteristics of the selected studies and on socio-demographic characteristics of participants, years of teaching experience, university degrees, academic training, academic titles and contracts, teaching strategies used, content of courses taught, evaluation strategies adopted and the impact of this teaching. We synthesized the information gathered to produce a summary of the results, considering the similarities and differences between the studies that could influence our conclusions.

## Results

The initial search generated a total of 10,032 articles. After duplicates were removed, 6779 articles were screened for eligibility and 381 were selected for full-text review (see Fig. 1 below). Among those, 339 articles were excluded and 42 were selected for data extraction as they met the inclusion criteria. Several excluded articles were not reviewed because of their type (conference abstracts, commentaries, letters to the editor, etc.) ( $n=143$ ); some were excluded due to a lack of educator stratification ( $n=87$ ); others had content not relevant to the research question ( $n=74$ ), a study design not clearly defined ( $n=22$ ), wrong context ( $n=10$ ), results not aligned with our study ( $n=2$ ), or language of publication not consistent with the pre-established criteria ( $n=1$ ). Most articles were published in English ( $n=41$ ), with one publication ( $n=1$ ) in French. Detailed data extraction tables for all included studies are available in Appendix 2 (Tables 1a, 1b, 2, 3, 4). In the main text, tables are presented to summarize the main results.

### Characteristics of the selected studies

The studies included in this scoping review were spread across various geographical regions. Most studies were conducted in America ( $n=21$ ) and Europe ( $n=11$ ), with fewer from Africa, Asia and Oceania (see Table 2 below). Of the 18 studies from the American continent, 10 were based solely on data from the United States, while 4 included data from both United States and Canada, and 3 included data from both United States and European countries. Four additional studies used data from Chile and Mexico (see Appendix 2 for more details).

These studies were conducted with human anatomy teachers [20, 21], heads of anatomy departments or academic programs, candidates for anatomy teaching positions, medical students and anatomy teachers, student-tutors in medicine or other healthcare professions, anatomy teachers and researchers, and heads of clinical training programs (diagnostic radiology, general surgery, emergency medicine, family medicine) (see Table 1b in Appendix 2 for details).

These data were collected in several healthcare professions, mainly in medicine ( $n=32$ ) (Table 2). Added to this are physiotherapy ( $n=9$ ), nursing, occupational therapy, dentistry and other paramedical professions, as well as academic disciplines such as anatomy and physiology (Table 1b—Appendix 2).

The 42 articles included were published between 1961 and 2024 (Table 2). These studies used descriptive and/or transverse study designs ( $n=36$ ), with comparative ( $n=8$ ), exploratory ( $n=1$ ), evaluative ( $n=2$ ), documentary ( $n=1$ ), observational ( $n=2$ ) and correlational ( $n=1$ ) analyses, as well as pre-test/post-test study designs ( $n=2$ ), narrative ( $n=1$ ) and systematic ( $n=2$ ) reviews. These articles mostly used quantitative approaches, followed by mixed then qualitative approaches (see Table 2).

### Socio-demographic characteristics

Collecting socio-demographic data is essential to describing the profile of anatomy educators. Information such as gender, age, and years of anatomy teaching allows for a better characterization of the diversity of profiles identified in the literature and provides a more accurate overview of those who teach anatomy in healthcare professional training.

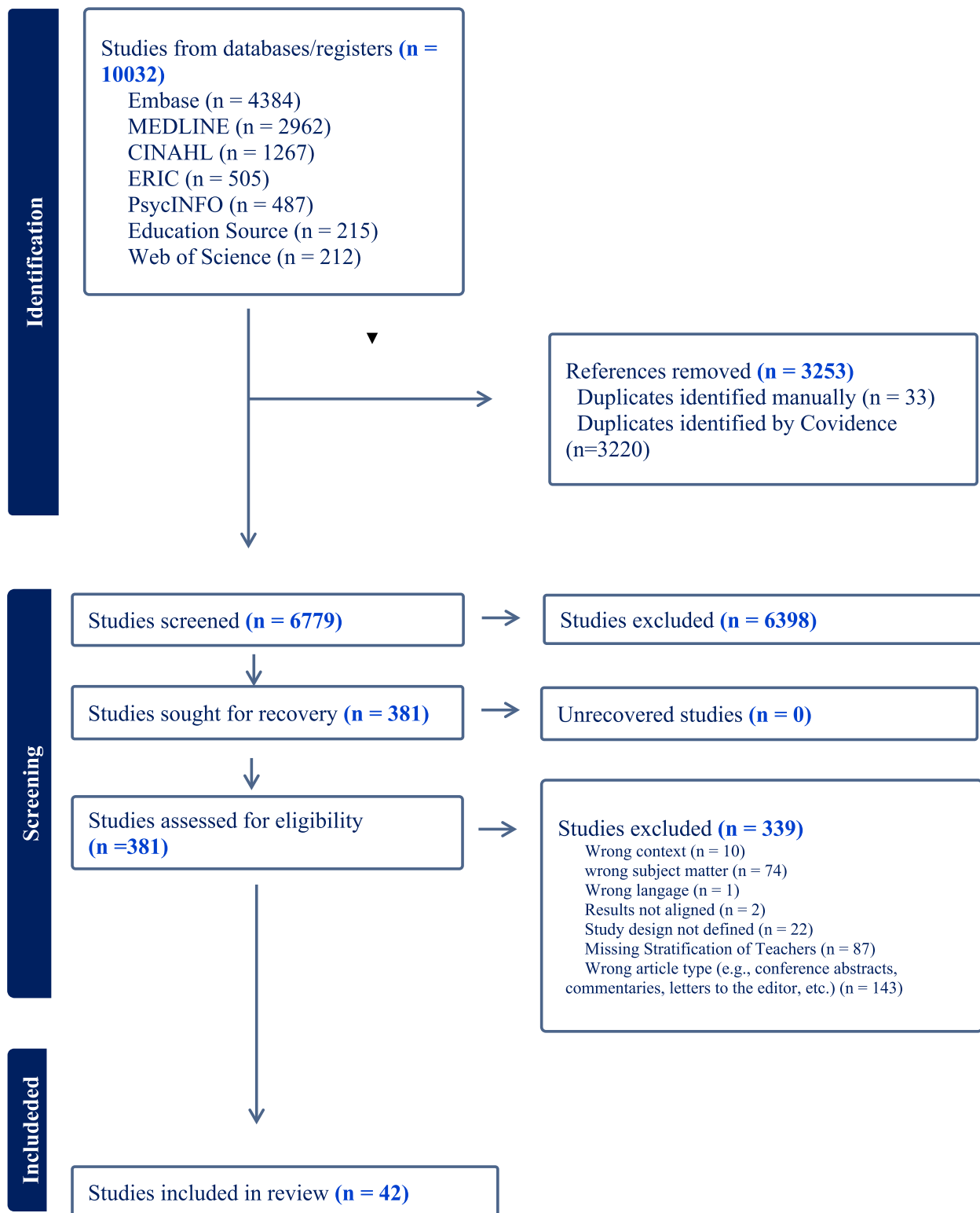
The articles analyzed showed that most anatomy teachers are male ( $n=10$ ). However, some recent studies show a predominance of women (Table 2). One study indicates both genders equally represented [22], while others show variations among groups studied [23, 24].

The results indicate that there is no clear majority regarding age. Some studies report that most anatomy teachers are aged 35 and over, generally between the ages of 31 and 50, or even older [24–27]. They are considered to be the most experienced, most of whom are physicians [13]. Others, younger than age 35 [23, 28], are also very represented, and some are teacher-tutors whose average age in one study is 20.48 years [29] (see Appendix 2 for further details).

The articles analyzed show a wide variation in terms of experience among the teachers studied (Table 2). As indicated in several studies, some teachers had taught anatomy for 5 years or less [24, 30, 31], particularly those employed as anatomy demonstrators with approximately one year of experience [32], or as teacher-tutors with experience varying from 1 to 7 semesters [31]. Others have more experience, up to 10 years [24, 25, 30], or even 30 years or more [22, 24, 25, 33] (Appendix 2 for more details).

### Academic titles and contracts

Our data show that anatomy teachers are recruited as full professors [24, 25, 34–36], lecturers working under the supervision of course directors [28, 30, 35, 37], assistant teachers and adjunct professors [20, 24, 38], associate



**Fig. 1** Illustrating the different steps in the selection process of studies included—PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Reviews)

**Table 2** Descriptive characteristics of the 42 included studies: distribution by year of publication, continent, methodology, socio-demographic characteristics and health professions involved in the data collection

Variable	Category	Studies (n)
Year of publication	Before 2020	28
	In or after 2020	14
Geographic continent	America	18
	Europe	11
	Africa	4
	Asia	3
	Oceania	3
	America/Eur	3
Methodology	Quantitative	32
	Mixed	6
	Qualitative	4
Socio-demographic characteristics	Gender <sup>1</sup> :	
	M > F	11
	F > M	5
	M = F	1
	Age:	
	Less than 35 y/o	10
	More than 35 y/o	9
	Years of anatomy teaching:	
	0–10 years	12
	10–20 years	6
More than 20 years	8	
Health professions	Medicine	32
	Physical Therapy	9
	Other: Nursing, Pharmacy, Occupational Therapy, Radiographic Technology, Optometry, Dentistry, Chiropractic, Public Health, etc	9

<sup>1</sup> M male, F female, y/o years old

teachers [25, 30, 39], senior lecturers [26, 40] and anatomy demonstrators or facilitators [36, 41, 42]. Others are student-tutors [30, 31, 43] or researchers who teach anatomy, some of whom do not have formal clinical or pedagogical training [11, 35] (see Appendix 2 for further details).

Chairs of anatomy and senior lecturers are generally permanent positions [20, 26, 36, 43], whereas assistant teachers, adjunct professors, demonstrators and teacher-tutors are in most cases temporary positions and they are hired for specific academic missions [34, 38, 42]. Regarding their academic contracts, some are employed full-time and assigned to their institutions on a permanent basis, providing them with long-term job stability [13, 24, 38], while others are employed part-time, for a shorter term or half-time [34, 44, 45]. Teachers' academic titles and contracts are detailed in Appendix 2.

**Table 3** Summary of teacher training, teaching strategies, content taught, assessment strategies

Variable	Category	n
Academic training	Doctorate in anatomy or a related field and/or clinicians (physicians or other health professionals).	25
	Master's degree in anatomy or a related field.	13
	Bachelor's degree in anatomy or a related field.	9
	Certifications for continuing education	3
	Researchers	3
Teaching strategies	Postdoctoral training	5
	Traditional approach (lectures, human cadaveric dissection/prosection, ect.)	10
Content taught	Mixed approached (traditional and modern approaches such as VR <sup>1</sup> , online learning, NPT <sup>2</sup> , ect.)	22
	Macroanatomy: (musculoskeletal, cardiovascular, respiratory, reproductive, renal, endocrine, gastrointestinal, skeletal and neuroanatomy systems). Microanatomy: (embryology, histology)	
Evaluation strategies and impact	Oral exams: Improved critical thinking.	
	Multiple-choice and open-ended questions: Improved comprehension.	
	Identifying imagery structures: Improved practical skills.	
	Timed vs. untimed tests: No significant difference.	
	Multiple-choice questions only: Impairs long-term retention.	

<sup>1</sup> VR: virtual reality, <sup>2</sup> NPT: near-peer teaching

### University degrees

Our data show that anatomy teachers have diverse university degrees and professional qualifications, with differences by region and institution. Their educational qualifications vary from bachelor's [26, 30, 43], master's [10, 30, 46, 47] and doctorate [11, 20, 37] degrees, to certifications [40, 47], as well as fellowships and post-doctoral training [30, 42, 48], sometimes with a combination of qualifications (for further details see Appendix 2).

### Prior academic training

Our results show that doctorate degrees in medicine and science (PhD) are very common among anatomy teachers' qualifications (Table 3). Among those with doctorate degrees in medicine, we find professional clinicians and physicians in training in medical-surgical specializations [11, 12, 28, 31, 41, 49]. Others are clinicians or surgeons who are retired [26, 36]. In this category of medically-trained teachers, we also find students with advanced medical training or from other healthcare professions, employed as teacher-tutors in charge of teaching those just beginning their program of study [23, 29, 31, 34]. Regarding those teaching in non-medical schools, most of them have qualifications related to the discipline in which they teach. These are physiotherapists [33, 39, 47], occupational therapists [33], neuroscientists [49], chiropractors [43].

The data also reveal that some of these teachers have qualifications in anatomy or in a related discipline [6, 38], and others have continuing education certifications [40]. Others hold degrees in other disciplines such as biology [20, 47, 49], physiology [47, 49], anthropology [24, 46, 49], veterinary medicine [50] and zoology [47]. In addition, we note that some of these teachers are neither qualified in medicine nor in education, but are scientists hired for their research skills, and some have had anatomy teacher training sessions through their affiliated institutions in order to teach students [11, 22, 38]. See details in Appendix 2.

### Teaching strategies and content of courses taught

As part of anatomy teaching, various teaching strategies are implemented by anatomy teachers and institutions for delivering varied content to students. Anatomy teachers employ traditional teaching strategies sometimes combined with more modern approaches (Table 3), depending on the availability of these resources [24, 33, 35, 37, 43, 44, 49, 51]. The most commonly used traditional approaches include human cadaveric dissection [6, 24, 33, 34, 37, 46, 52], human cadaveric prosection and lectures [34, 42, 53], use of plastinated specimens [43, 44], physical anatomical models [39, 52], and histology and embryology laboratories [10, 24, 37, 49]. In contrast, modern approaches rely on technology to teach anatomical content to students [37, 54]. This includes medical imaging techniques [35, 49], virtual dissection [35, 46], virtual reality [33, 39], tutorial platforms [6, 26, 34, 42] and online learning [35, 49]. Added to this are multimodal approaches combining traditional strategies with modern ones that are frequently used by teachers. This is generally done via seminar sessions held in small groups [26], practical work using the flipped classroom approach [35], problem-based or case-based learning [10, 12, 51] or additional integration of clinical hour sessions for more interactive and participatory learning [29]. In addition, there is also near peer teaching, another type of teaching strategy adopted by some institutions, in which more advanced level students pass on their anatomical knowledge to novice peers or those less advanced [24, 29, 42] (see details in Appendix 2).

The courses taught cover content related not only to macroscopic anatomy, but also to surface, functional, progressive, comparative and microscopic anatomy, which uses tools for studying histological and embryological structures [36, 40, 46] (details are provided in Appendix 2).

Anatomy is sometimes taught as an interdisciplinary subject with other subjects such as physiology, biology, radiology and clinical cases in order to enhance the application and understand of concepts [20, 44, 46]. The content taught varies from one profession to another. It

includes a range of anatomical systems, as detailed in Table 3 above and the Appendix 2.

### Evaluation strategies and their impact in teaching

To evaluate anatomy students' theoretical and practical knowledge, teachers use different approaches for testing students' level of comprehension, which can be broadly categorized into formative and summative assessments (see Table 3).

Formative assessments are primarily used for continuous monitoring of students' acquired knowledge and include unplanned surprise quizzes [11, 34, 43], weekly assessments, and formal review sessions [11, 55]. They also include practical evaluations such as oral tests [6, 28, 36, 37, 48], case studies [10, 34], drawings [6], and the identification of anatomical structures using images, histological slides, radiological images [23, 49], or human cadaver [5, 6, 10, 36, 38, 47, 51]. One-off practical tests [37], spotter examinations [52], and timed or untimed spot tests [48] are also frequently used. Practical laboratory-based evaluations in anatomy and osteology laboratories provide additional opportunities to assess students' applied understanding [6, 10, 37, 39, 48, 52, 55].

Summative assessments, generally used to evaluate students' level of knowledge at specific points in time, include written evaluations such as multiple-choice questions (MCQ), short-and long-answer questions [6, 48], true or false questions, and developmental or matching questions [34]. Some studies also reported the use of synoptic examinations at the end of courses or academic years [36], national examinations form medical students in the United States [28], and student projects in certain programs [10].

Regarding the impact of anatomy teaching as measured by student performance on evaluations, this review reports that MCQ and open-ended questions yield similar results for evaluating acquired knowledge [6]. However, it is indicated that exclusive and systematic use of MCQ for student evaluation may not be adequate to measure in-depth understanding and may adversely affect long-term retention [6]. Another study conducted in several medical schools in South Africa states that timed spot tests are the most widely used, but that no significant difference is observed with untimed spot tests in terms of students' academic performance [48]. However, oral tests seem to promote a more detailed evaluation of anatomical concepts since they require students to structure and clearly explain their ideas [48]. Other authors note that the identification of anatomical structures on ultrasound images is an effective way to evaluate students' ability to put their knowledge into practice in a clinical context [23] (Table 3). Evaluation strategies are summarized in Table 3, with full details in Appendix 2.

## Discussion

This review looks at the profile of anatomy teachers working in healthcare professions. While other studies have focused on anatomy teachers, to our knowledge, no work has yet offered a detailed compilation of their profiles. The 42 articles selected describe a range of profiles in the anatomy teacher population. Most of them hold a doctorate in anatomy (PhD), sometimes combined with a medical degree. The teaching strategies integrate traditional approaches, such as practical laboratory work and lectures, often combined with modern approaches such as virtual technologies. The content taught varies depending on the healthcare professions in which they teach. To evaluate students, they use diverse evaluation strategies, such as written, practical and continuous tests. The teaching provided has a significant impact on theoretical knowledge and the practical application of concepts learned by the students.

Firstly, the results concerning anatomy teachers' academic training are comparable to the data in the current literature. In our study, we observe a strong presence of doctorate degrees in anatomy or related disciplines, sometimes combined with a doctorate degree in medicine, particularly in North American medical schools, such as those in the United States and Canada [20, 38, 49, 56]. This aligns with authors, who note that many anatomy teachers in medical schools in the United States are holders of medical degrees often combined with a PhD in anatomy, whereas in other international contexts, these teachers are recruited for their clinical expertise [57]. The study by Kramer (2008), which gathers data from six African countries, as well as other studies conducted in Mexico or France, report that anatomy teachers are mostly clinicians, few of whom have formal training in anatomy or in education [25, 35, 37, 53]. These observations align with other findings, who state that, depending on the context, anatomy teachers are clinicians who add a practical dimension to the teaching of this discipline [58]. These authors therefore propose a collaboration with competent anatomists to ensure quality training [58]. In addition, literature state that, in other healthcare professions, such as physiotherapy, occupational therapy and dentistry, these teachers generally have degrees related to the healthcare disciplines in which they teach [57], as also shown by our results [30, 43, 47]. Our study also reports a notable shift in teachers' clinical and anatomical qualifications towards scientific research [30]. Several studies confirm this trend and express their concerns regarding the quality of teaching, in view of the priority given to research skills when recruiting these teachers, sometimes to the detriment of clinical and anatomical skills [57, 59]. According to researchers, this trend could jeopardize the quality of the theoretical and practical teaching of this discipline, and they suggest adapting this

teaching to the particular needs of each profession and strengthening teacher training in order to better meet the scientific requirements of modern pedagogy [57, 59, 60]. They also emphasize the importance of a multidisciplinary approach to teaching anatomy and the need to consolidate the academic training of these teachers [57, 59, 61–63].

Secondly, the teaching strategies employed by anatomy teachers are consistent with scientific literature and the choice of pedagogical approaches depends on the availability of institutional resources and their academic titles. According to our study, institutions well-equipped in human, material and financial resources tend to combine traditional strategies with modern ones [24, 33, 44]. However, entities with limited resources tend to rely on more conventional approaches that include the use of chalk and blackboards, as well as restricted dissection sessions or the use of prosected specimens [24, 35, 37, 44]. These results are in line with those observed by other researchers, who highlight that better funded institutions have greater opportunities to combine such things as lectures and cadaveric dissection with contemporary approaches such as imaging and virtual reality, in order to provide students with more balanced training [64, 65]. These results find that structural challenges facing institutions have a significant impact on the choice of pedagogical approaches [64]. However, our results suggest that the exclusive use of modern strategies is not systematically reported in institutions and that traditional approaches continue to occupy an important place in the teaching of anatomy [35], which is consistent with the literature that highlights the importance of traditional approaches, particularly cadaveric dissection which remains a cornerstone in the training of future physicians [66, 67]. Our results also report that professors holding the chair of anatomy often use approaches that focus on theoretical teaching and generally have more resources at their disposal [26, 35, 37]. Unlike those hired on a temporary basis, such as lecturers or assistant professors, who have limited access to institutional resources, their approaches are more interactive and collaborative, such as small group sessions (e.g., dissection or seminars) [34, 51]. These results are in keeping with those of other researchers who note that tenured teachers, because of their institutional obligations, are more inclined to use more traditional approaches that are often research-oriented [57, 65], as opposed to non-tenured teachers, who are more flexible and tend to favour more active and participatory approaches that are student-centered [65]. In contrast with these observations, other writings emphasize that, regardless of teachers' institutional status, teachers should be able to choose their own approach, even if these decisions are influenced by institutional resources and policies [68].

Our study finds that the content taught to students varies essentially according to the healthcare profession, indicating that the nature of anatomical content teaching strategies must be adapted to the nature of the content being taught. However, none of the included articles established a direct relationship between the strategies applied and the content to be taught. Nevertheless, several studies report that certain types of anatomical content, particularly neuroanatomy, are better taught using a multimodal approach because of their complexity, to facilitate students' understanding. This is also in line with the writings of Singh et al. [69], who emphasize the importance of a multimodal approach to better integrate theoretical concepts with practice and stimulate students' long-term memorization [70].

Lastly, the evaluation strategies used for testing anatomy students' knowledge are also used to measure the impact of teaching this subject, as described in the current literature. The writings agree on the importance of adapting evaluations to pedagogical objectives [6, 70]. Our study maps the predominance of MCQs in anatomy assessment as reported in the literature and highlights reported opportunities for more diversified assessment approaches. This approach consists of combining various categories of tests to evaluate students, such as timed practical tests to identify structures, oral tests for understanding concepts, and open-ended questions to develop students' critical reasoning [6, 48]. This diversity in evaluations is useful for measuring student competencies and to better determine their ability to apply anatomical knowledge in the clinical setting. Other authors support our results and emphasize that this combining provides a more comprehensive and beneficial evaluation, useful for measuring the real impact of human anatomy teaching on students' learning [70, 71]. Several findings also report that this approach has a notable influence on student comprehension, long-term memorization and critical thinking, which would be beneficial for professional practice [70, 71]. Conversely, Thompson et al. [71] state that MCQ with either a simple or complex format, while presenting some challenges, are also useful for comprehension and developing clinical reasoning [72]. In addition, our study is critical of timed practical tests, as according to the authors, these types of tests can underestimate students' real abilities due to the time limits often imposed and the stress they can cause [23]. This aligns with the writings of Thompson et al. [71], who emphasize the importance of thoughtful organization of the different categories of questions asked of students during evaluative exams, so as not to compromise their overall performance.

### Limitations

This review on the profile of anatomy teachers presents several limitations. Firstly, most of articles included in this review are from the America continent particularly in United States while the other searches are divided between different countries. This could lead to a geographical bias, given that the skills and experience of these teachers vary from one region or institution to another, while some countries are underrepresented. As a result, more representative studies of continents would help to obtain a more comprehensive view of the ideal profile of anatomy teachers on a global scale. Next, there is wide variation in the objectives of the articles included. For example, some may focus on academic training without really addressing the strategies they employ, and vice versa. This could lead to unclear interpretations of points discussed superficially. Lastly, the results of this study cannot be generalized to all healthcare professions, since the studies were largely conducted in medical schools with a lower representation of the other professions.

### Conclusion

This scoping review aimed to explore the profile of anatomy teachers, as well as their teaching and evaluation strategies. Analysis of the 42 studies reveals a wide range of profiles: the majority hold a doctorate degree in anatomy or a related discipline, sometimes combined with a medical degree. However, depending on regional and institutional contexts, some are clinicians without formal training in anatomy or pedagogy, while others are researchers. Consequently, there is no single profile. The teaching strategies are mostly multimodal, and the evaluations aim to measure memorization and the clinical application of acquired knowledge. Importantly, none of the included studies examined or established a relationship between educators' profiles and their teaching or evaluation strategies. No study established a clear link between the content taught and the pedagogical approaches used. By mapping existing evidence, this review clarifies what is currently known about anatomy educators' profiles and pedagogical practices across healthcare education programs. Future research studies could explore the best strategies to adopt based on the content taught, as well as the ideal profile a teacher should have to teach anatomy courses, to guide training and professional development in this field. These questions could be further examined through qualitative research to provide richer insights.

### Supplementary Information

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Supplementary Material 1.

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### Clinical trial

Not applicable. This study is a Scoping Review and does not involve a clinical trial.

### Authors' contributions

AJ and SF supervised the study and provided critical revisions. JF designed the study, analyzed the data, and drafted the manuscript. MCD, in collaboration with the team, developed the search strategy. MM, AR, RR, and IF contributed to study selection and data extraction. All authors revised and approved the final manuscript.

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### Data availability

The datasets generated and analysed during this scoping review are included in this published article and its supplementary files. The data extraction table is provided as a supplementary file. Screening and data management were performed using Covidence ([72] (<http://www.covidence.org>)).

### Declarations

#### Ethics approval and consent to participate

The institutional ethics board was consulted about this project and confirmed that formal ethics review was not required, as the study involved secondary analysis of published literature for curricular improvement.

#### Consent for publication

Not applicable.

#### Competing interests

The authors declare no competing interests.

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