

Leadership skills development in medical student education: systematic review

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Cite as: Ruiz-Chaves, W., Zeledón-Sánchez, F. (2024). Leadership skills development in medical student education: systematic review. *Revista Digital de Investigación en Docencia Universitaria*, 18(1), e1801. <https://doi.org/10.19083/ridu.2024.1801>

Received: 31/03/2023. **Revised:** 30/11/2023. **Published:** 30/01/2024

Abstract

Introduction: The training in leadership skills among medical students is an increasingly addressed topic due to the need for these professionals to respond to the changing circumstances of their environment. **Objective:** To analyze research trends on the development of leadership skills in undergraduate and graduate medical education during the years 2018 to 2023. **Method:** A systematic review is conducted using the PRISMA methodology, ensuring compliance with a series of indicators for publications of this type. This global review utilized electronic databases such as Scopus, Education Research Complete, PubMed and Web of Science. **Discussion:** From the screening and subsequent analysis, it is concluded that there is a scientific interest in three research areas: development of leadership skills among students, development of educational programs and projects and, finally, gender-based studies.

Keywords: medical education, medical students, leadership, initial training, skills.

Desarrollo de habilidades de liderazgo en la formación del estudiantado de medicina: revisión sistemática

Resumen

Introducción: La formación en habilidades de liderazgo por parte del estudiantado de Medicina es un tema cada vez más abordado en virtud de la necesidad de que este profesional responda a las cambiantes circunstancias de su entorno. **Objetivo:** Analizar las tendencias investigativas sobre el desarrollo de habilidades de liderazgo en la formación de grado y posgrado de la persona estudiante de Medicina durante los años 2018 y 2023. **Método:** Se realiza una revisión sistemática utilizando la metodología PRISMA, de modo que cumplan con una serie de indicadores para las publicaciones de este tipo, dicha revisión, con un alcance mundial, utilizó las bases de datos electrónicas Scopus, Education Research Complete, PubMed y Web of Science. **Discusión:** A partir del cribado y respectivo análisis se concluye que existe un interés científico en tres áreas investigativas: desarrollo de habilidades de liderazgo en el estudiantado, desarrollo de programas y proyectos educativos y, por último, estudios por género.

Palabras clave: educación médica, estudiantes de Medicina, liderazgo, formación inicial, habilidades.

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Introduction

The development of leadership skills in medical students has gained importance in recent years due to the comprehensive education that the medical professional must demonstrate ([Till et al., 2020](#); [Vivas et al., 2021](#); [Marturano, 2020](#)). In this regard, it has been found that the curricula are concerned with disciplinary training, which is fundamental for their future career, but do not include the development of complementary skills that are necessary for the various areas where medical professionals work; hence, it is essential to update medical education. In this sense, [Omonte \(2021\)](#) points out that “with the advances in medical science and technology, it is necessary to make updates and reforms in medical education, and to comply with the formal program regarding the acquisition of content and skills” (p. 1). Furthermore, [Dowton \(2004\)](#) pointed out that leadership has generated little interest in peer-reviewed medical literature.

For the reasons given above, the study of leadership skills in medical students is crucial. First, because leadership strengthens the ability of future physicians to lead healthcare teams, which is essential in dynamic and pressure-driven environments; second, it improves communication and decision-making, vital skills for effective patient management, and interdisciplinary collaboration; third, it prepares physicians for administrative and healthcare policy roles, broadening their impact beyond clinical practice. Finally, it promotes innovation and critical thinking, which are essential for the advancement of medicine and patient care. These skills not only benefit the individual career of the medical professional, but also improve the quality of the healthcare system as a whole.

Regarding the background, [Lyons et al. \(2018\)](#) proposed a systematic review in which they found that the main research studies on medical student leadership have different approaches; however, they indicate that “most studies agree that leadership training has been effective in the medical student body” ([Lyons et al., 2018, p. 7](#)).

[James et al. \(2021\)](#) found, in another literature review, that there is an increased interest in

studying the role of physicians as leaders in their fields and communities, so research is emerging in this area, as well as the need to modify the curriculum.

In another literature review, [Sadowski et al. \(2018\)](#) found that the curricula of some medical programs in England are limited in terms of leadership training; however, they have some methodological approaches that will enhance the development of the skill, so they present some themes that emerged from the review, such as “small group teaching, project-based learning, and mentoring” (p. 8). For their part, [Till et al. \(2020\)](#) point out that, although physicians are generally accepted as leaders because of their patient care, it is certainly a skill that does not come with the title alone. In the specific case of the United Kingdom:

although there is still a lack of evidence on the longer-term outcomes of medical leadership, it is clear that faculty need to be skilled in holding effective developmental conversations and structuring formative experiences for those they educate, and that leadership development must be integrated longitudinally throughout a doctor’s career ([Till et al., 2020, p. 19](#)).

Finally, [Lyons et al. \(2022\)](#) emphasize the need to integrate leadership skills into medical education, to inspire students to specialize in that area. They further state that “residents believe they should learn about leadership during residency” (p. 28).

The studies presented as background confirm the importance of continuing research on the subject due to the need to generate this change in the undergraduate and postgraduate training of medical professionals, so that building a systematic review of research trends will enable the generation of more research on the subject. For this reason, a search was conducted in interdisciplinary databases such as Scopus, Education Research Complete, PubMed, and Web of Science.

The main objective of the article is to analyze the research trends on the development of leadership skills in medical students during undergraduate and postgraduate training in higher education between January 2018 and February 2023. The specific objectives are the

following: 1) to determine the main bibliometric characteristics of research studies on leadership skills in medical students during undergraduate and postgraduate training, and 2) to identify the research areas on the subject in the articles of scientific journals worldwide during the period.

Theoretical Framework

Conceptually, this work defines *leadership skills development* as proposed by [Chen-Quesada & Ruiz-Chaves \(2020\)](#): a set of actions, attitudes, skills, and behaviors that allow the medical professional to communicate effectively, work efficiently in a team, collaborate with other colleagues, and exercise leadership processes in such a way that they are “articulated for the achievement of actions, practices, or functions conducive to individual and group well-being” (p. 38). This vision coincides with that proposed by [Jorna et al. \(2016\)](#) when they point out that, in the field of health sciences, leadership skills let people influence others in different ways for the achievement of common goals, based on “communication, flexibility, teamwork, decision making, patient orientation, motivation, problem solving, and work organization” (p. 72).

On the other hand, a skill is conceived as a person's ability to achieve an activity, which may vary in time and context ([Griffin & Care, 2014](#)). From the perspective of health sciences, the definition provided by the World Health Organization (WHO, 1997) provides an overview that goes beyond just pointing out a person's capacity, as it adds the behavioral component, adaptability, and interaction with others.

Hence, it is considered convenient for the interests of this work, since the undergraduate and postgraduate training of medical students should not only provide solid disciplinary knowledge, but also the ability to relate to others, respond adaptively to challenges, interact with different people, and maintain ethical behavior in all cases.

Therefore, the medical professional needs to develop or strengthen skills; undergraduate and graduate university education should

go far beyond disciplinary training, since professional development should go hand in hand with personal development. [Guerra-Báez \(2019\)](#) indicates that “higher education should pay special attention to internships, since the student is expected to interact with peers, colleagues, superiors, and end users” (p. 7) for the development of skills. Following the proposal of [Till et al. \(2020\)](#), this implies the need to reflect on the curriculum in the training of physicians, since it must be rethought from the perspective of all the agents involved in the educational process: teaching staff, program management, and students.

In relation to leadership, there are various positions that point out the difficulty of defining leadership ([Nye, 2006](#); [Salaman, 2004](#); [Sánchez-Mendiola, 2015](#)), but others propose clear ideas; for example, for [Gordon \(2002\)](#) and [Saavedra-Mayorga \(2014\)](#), leadership should be seen as a social relationship where there are interactions between people, institutions, and both, since they point out that the focus of leadership is the processes of influence that occur between these agents, processes that are changing and socially constructed. Another view of leadership is assumed by [Antonakis & Day \(2017\)](#) and [Inceoglu et al. \(2018\)](#), who visualize it from the perspective of skills and behaviors, given that they are based on the perspective of coexistence between people in organizational contexts. For the purposes of this manuscript, we have considered the definition proposed by [Chen et al. \(2021\)](#), who define it as the ability to “influence, guide, adapt, and lead processes, and this must show clarity, relevance, equity, flexibility, and ethics, since it must be the result of equal dialogue among the members of the group so that they learn and make decisions” (p. 50) as part of the process of evidencing the same ability and complementary ones. From the above, it is essential for a physician in training and, therefore, for those who teach (teaching staff) to make learning adjustments in the curriculum and professional practice, in order to train people with the ability to “do” and “be,” including teamwork, coordination, communication, and other skills that allow them to be a leader in their area.

Method

The present work was based on a systematic review of documents related to the development of leadership skills in the training of undergraduate and graduate medical students, in order to highlight the main research trends on the subject. In addition, the aim was to identify the gaps in the literature, which are fundamental elements in a systematic review (Baker, 2016).

To achieve this, the method used in this work is consistent with that proposed by Page et al. (2021), called Preferred Reporting Items for Statement of Systematic Reviews and Meta-Analyses (PRISMA) in its 2020 version, to systematically structure and organize the results in the above domains. This statement provides a method for conducting a literature review process (Hutton et al., 2016), by providing basic criteria to ensure the scientific nature of the process; for this purpose, a search period was set from January 2018 to February 2023.

In this way, a search was carried out in databases, as sources of information, which are the following: PubMed, Scopus, Web of Science (WoS), and Education Research Complete (ERC). These databases were selected because one is related to the medical field (PubMed) and the other two that incorporate documents from a greater diversity of disciplinary fields and are widely recognized. However, the three databases include mostly English literature and localization; for this reason, it was decided to include a database of solid scientific recognition in the field of education itself and which has the largest amount of literature in Spanish (ERC).

To specify the search, keywords in English and Spanish were used, as well as the combination of these words by means of Boolean characters. These words were included in the title, in the abstract, in the keywords, or in other parts of the document; the details are as follows:

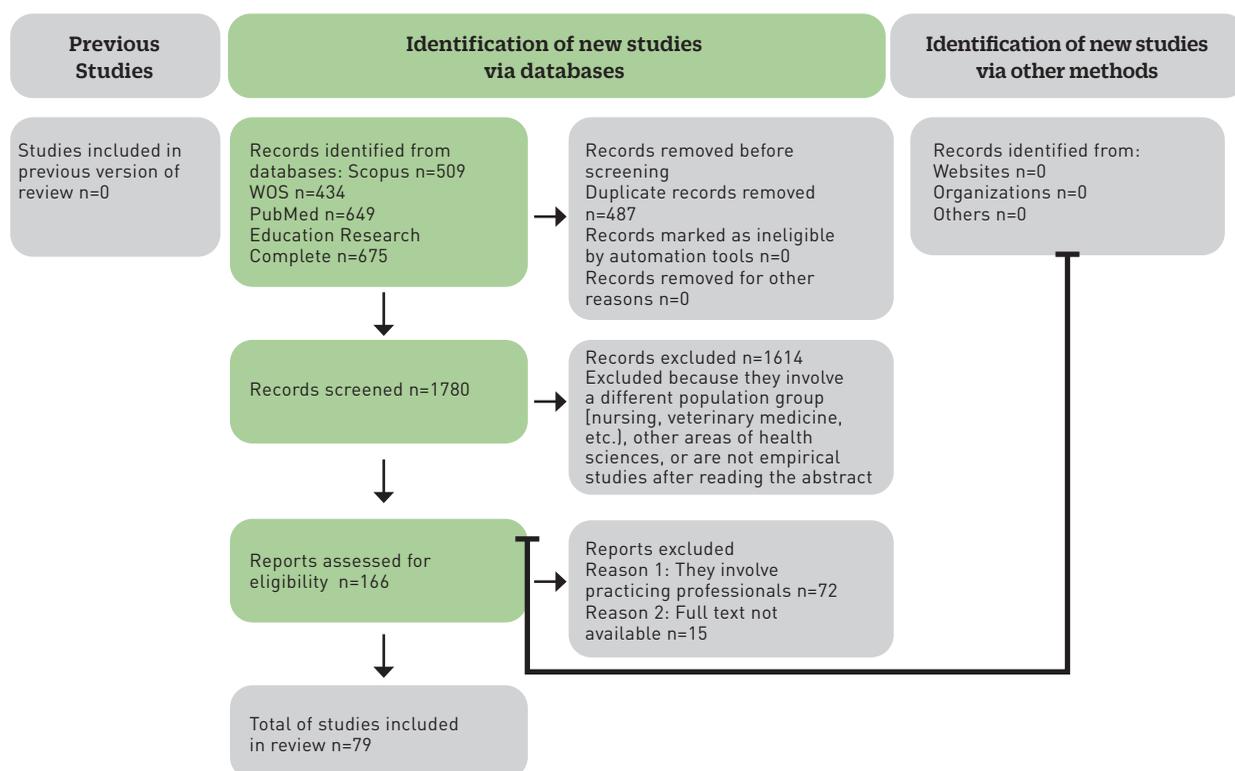
- "Medical education" OR "Medical training" AND "Leadership" OR "Skills"
- "Medical education" AND "Leadership" AND "Students"
- "Medical Education" OR "Medical training" AND "Leadership" OR "Skill"
- "Medical Education" AND "Leadership" AND "Students"

Similarly, some parameters were established for the filtering of the documents in the first search. For example, they had to be in English or Spanish, they had to have been published within a time range from 2018 to February 2023, they had to have been peer-reviewed (under any modality), and the full texts had to be available or at least redirect to where they could be consulted. Then, from the resulting documents, some eligibility criteria were generated. The inclusion criteria were the following: manuscripts resulting from research with qualitative, quantitative, and mixed designs; in addition, they should be related to the implementation of educational leadership programs in undergraduate or postgraduate in the field of medicine. Documents were excluded from the screening process for the following reasons: those that refer to leadership in medical education in general, related to other fields of health sciences other than medicine, and documents that were systematic reviews, clinical case studies, books, manuals, gray literature, or book chapters.

In connection with the document selection process and the reduction of the risk of bias, the authors read both the title and the abstract to verify the eligibility, thematic relevance, and type of manuscript. This review was carried out by the authors, who worked together in the process; however, once the manuscripts were available for selection, they were reviewed again independently. The End-Note® software was used for data extraction, which allows the management of references for the handling of bibliographic lists and citations. The synthesis method used was based on the abstracts of each document; they were tabulated in an MS Excel® document, emphasizing the research topic, participants and their gender, methodology, and main findings.

According to Figure 1, 649 records were found in the PubMed database, 434 in WoS, 509 in Scopus, and 675 in ERC, with a total of 2267 records. The references were entered into the EndNote® software to discard repeated records (n=487). The final number of documents related to the search keywords was 1780. As indicated in the previous paragraph, the authors read the title and the abstract, and verified the thematic relevance, the methodology, and the results. After this process of

Figure 1
PRISMA Diagram Version 2020



Source: Own elaboration.

choosing the studies and reducing the risk of bias, n=166 records were obtained (n=15 records had to be excluded, as they were not available in full text, and n=72 were not relevant to the research study because they referred to the topic but involved practicing medical professionals or focused on other health areas). Finally, n=79 records remained after the process of applying the PRISMA methodology; all of them are related to the development of leadership skills in undergraduate or graduate students in the field of medicine in higher education.

Discussion and Results

For the analysis of the information derived from the application of the PRISMA protocol, the Visualization of Similarities Viewer (VOS-viewer®) software was used, which is used for the structuring and graphic visualization of

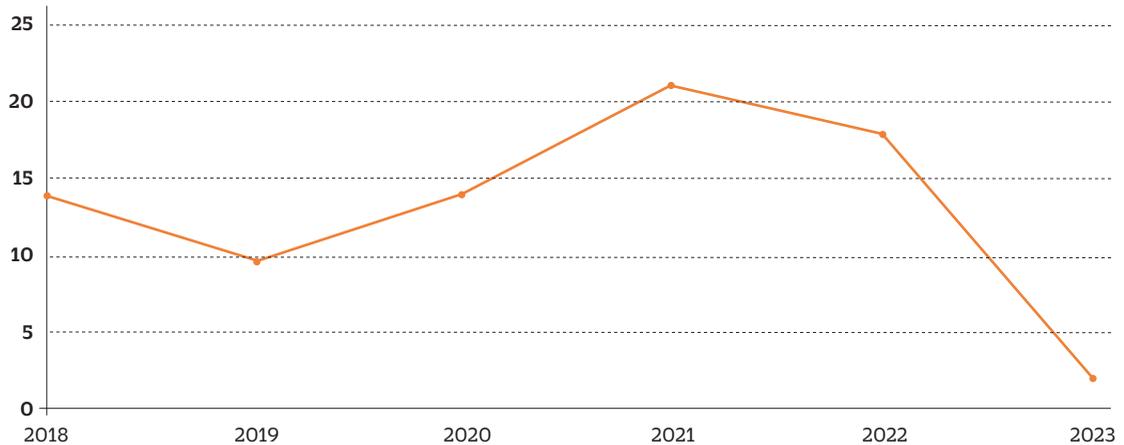
bibliometric networks. Such interconnections can include authors, research studies, or journals, and information grids can be constructed based on citations, co-citations, co-occurrence of keywords, and relationships between authors, among others. In this case, the aim was to analyze the research trends on the development of leadership skills in medical students during undergraduate and graduate education between January 2018 and February 2023; specifically, the focus was on the main bibliometric characteristics and the main research areas addressed.

Main Bibliometric Characteristics

Publications by Year

Studies included according to the aforementioned criteria were analyzed. Out of a total of 79 studies, 14 manuscripts were published in 2018, 10 in 2019, 14 in 2020, 21 in 2021, 18 in 2022, and 2 in 2023, as shown in Figure 2.

Figure 2
Publicaciones por año



Source: Own elaboration.

In general terms, there has been a variable trend in the generation of research studies from 2018 to 2022, ranging from 10 to 20 studies published per year. The pronounced decrease from 2022 to 2023 is due to the fact that the authors included studies published only in January and February of the latter year. It is important to note that although research studies show a stable trend during the study period, there are differences in each year; for example, only 10 studies were published in 2019, while twice as many were published in 2021.

Databases

In relation to the databases used, as indicated in the methodological section, the following were consulted:

1) Web of Science, from the “Web of Science Core Collection” option; 9% of the studies collected for the study were obtained from here. This database is important because it is multidisciplinary, and references are obtained from different thematic areas.

2) Another database, also of recognized validity, is Scopus, which compiles bibliographic data on abstracts and citations of articles in multidisciplinary scientific journals (science, technology, medicine, and social sciences, including education). In this database, 20% of the total number of studies were found, making it the second largest contributor.

3) Education Research Complete since it

includes information specific to the field of education. The documents selected from the latter database correspond to 5%, as shown in Figure 3.

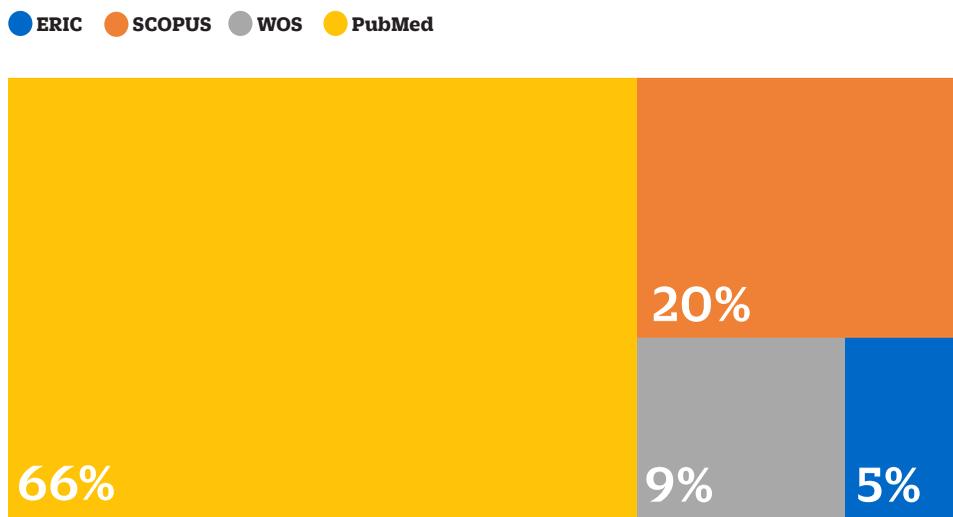
4) Finally, the PubMed database was used, from which most of the records were obtained (66%). This database is a free resource that retrieves specialized literature in biomedicine and health sciences and was considered fundamental for the subject of the systematic review. The selection of these databases provided a broad overview of the information consulted, compiled, and selected for the systematic review, since they are dynamic and constantly updated, and allow information to be obtained with simplicity, efficiency, efficacy, and scientificity.

Recurring Authors

Regarding authors, the list of recurrences made by the VOSviewer® shows ten specialists as those who are most frequently associated with the publication of empirical research manuscripts. Figure 4 shows these authors who have a recurrence of at least two studies published together with all the authors in the figure above.

It is important to point out that the 114 resulting documents correspond to 538 records of individuals (without discriminating whether they are repeated or not); however, there are 34 individuals who have co-authorship links (joint work with other authors) on three occasions,

Figure 3
Percentage of Publications According to Databases Used



Source: Own elaboration.

so Figure 4 shows only the authors with the greatest total linking strength, which would be 10 individuals.

Keywords

Keyword co-occurrence is a technique for analyzing the content of studies by extracting the keywords chosen by the authors of the documents. This makes it possible to exploit the current relationships in the field of research on leadership research among medical students, as well as to determine research trends (Donthu et al., 2021). For this particular case, the network of co-occurrences revealed three research trends according to Figure 5, which were grouped into 1) studies on skills, 2) studies according to the gender of the participants and their impact on the development of skills, and 3) studies related to the educational field itself, which are expanded in the following subsection.

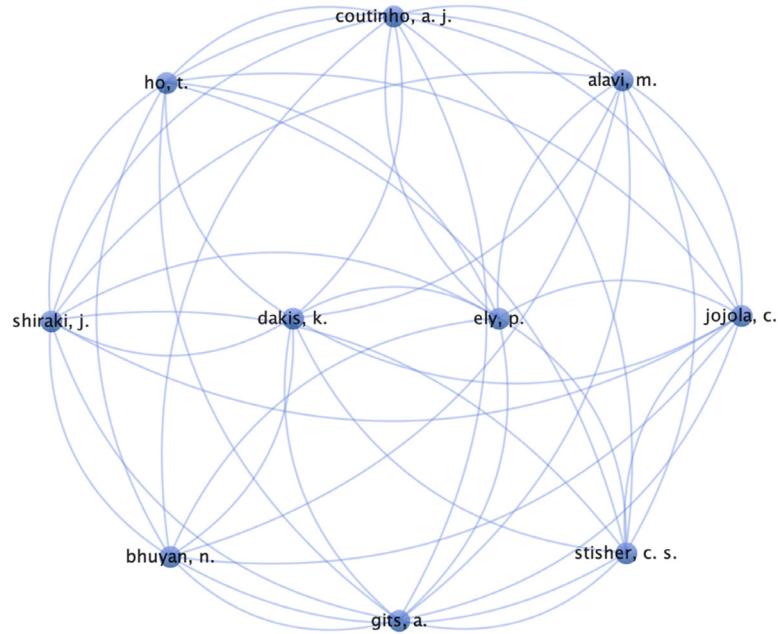
Figure 5 shows 23 keyword co-occurrences, where each word is represented by a node, and the size of this node represents the number of studies in which this word appears. In turn, the clusters

of these nodes are represented by 4 colors, which will be grouped into the three areas indicated in the previous paragraph based on their thematic similarities.

Areas of Research Resulting from Screening

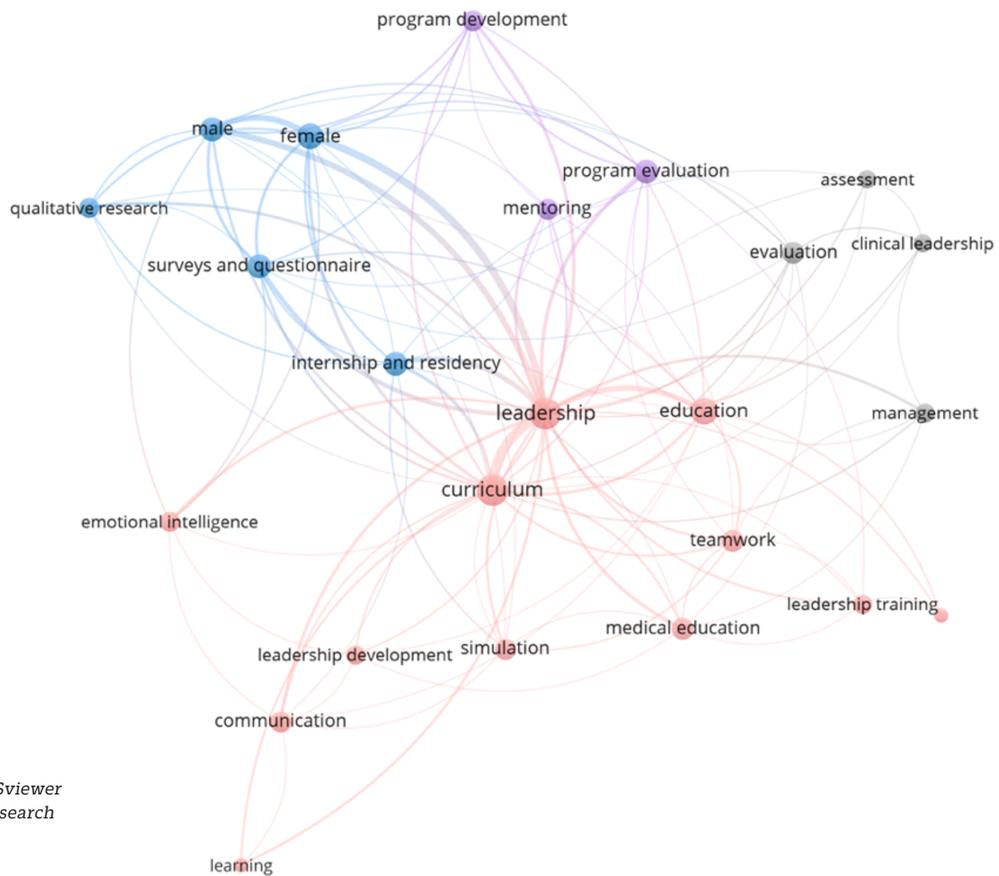
As a central element of the study, three research areas in which studies have been made were determined. A “research area” should be understood as the set of research studies that refer to the specific field or domain in which they are carried out within the group of selected studies published on leadership skills in medical students. For the results section, as indicated above, it was decided to delimit them into 1) studies on the development of leadership skills in medical students, 2) studies of educational programs and projects related to leadership in the training plans, and 3) studies according to the participants’ gender and its impact on the development of skills. It is important to note that research areas are important in the academic and professional world, as they provide a structure and focus for the generation of new knowledge, problem solving, and advancement in the discipline.

Figure 4
Author Recurrence



Source: VOSviewer based on research metadata.

Figure 5
Keyword Recurrence



Source: VOSviewer based on research metadata

However, one of the first areas of research that is evidenced by the relationship between the co-occurrences presented in VOSviewer® has been named “studies on skills”. Within this field, some of the topics addressed in the manuscripts refer to the soft skills that students in the medical field should have, such as teamwork, leadership, collaboration, clinical leadership, problem solving, self-regulation, higher-order thinking, emotional intelligence, and case simulation-evaluation (understood as the ability to approach and identify the health situations presented by patients), as detailed in Figure 6.

Accordingly, the papers focus on the study of leadership skill development in medical students; for example, the studies by Aldersley et al. (2023), Richard et al. (2019), Bharwani et al. (2021), Budakoglu et al. (2021), Chaudhuri et al. (2022), Chavan & Bendriss (2022), Naghi & Salem (2021), Ginzburg et al. (2018), Sullivan et al. (2021), Barajas-Ochoa et al. (2019), Arnold et al. (2018), Reshetnikov et al. (2019), Vo et al. (2023), and Hansen et al. (2022) focus their attention on the

need for the development of leadership skills in the undergraduate training of medical students. Particularly, this is increasingly necessary due to the changing conditions of the profession and the authors point out experiences in the United Kingdom, United States, Canada, India, Turkey, Saudi Arabia, among other places where competency frameworks are created for the training of the medical professional in leadership, prior to carrying out diagnoses that show an initial state of training.

On the other hand, Daaleman et al. (2021), Phillips & Bullock (2018), Shrivastava et al. (2022), Ricotta et al. (2020), Smithson et al. (2020), van Diggele, Lane, et al. (2022a), van Diggele, Roberts, et al. (2022b), Wagenschutz et al. (2019), Young et al. (2022), Merriam et al. (2021), Van Hala et al. (2018), and Wiseman et al. (2022) address the development of other competencies required for the comprehensive practice of the profession, particularly communication, collaboration, teamwork, and emotional intelligence. Also, they point out that these are fundamental to

Figure 6
Topics Addressed in the Skills Research Area



Source: VOSviewer based on research metadata.

complement the leadership of the medical student; in this regard, it should be noted that this area is one of those that produces the least amount of literature.

[Gartland et al. \(2022\)](#), [Cha et al. \(2019\)](#), [Hansen et al. \(2022\)](#), [Lucas et al. \(2020\)](#), [Leenstra et al. \(2021\)](#), [Nabecker et al. \(2022\)](#), [Mai et al. \(2022\)](#), [Mai et al. \(2021\)](#), [Oza et al. \(2018\)](#), and [Phillips & Bullock \(2018\)](#) propose case simulation-evaluation as a necessary skill, since it provides evidence, for example, of the students' capacity to respond to the health situations that afflict patients; in addition, the authors emphasize the implementation of teamwork and the leadership of groups of health professionals in critical situations. For this reason, they point out the need to increasingly implement the practical component throughout the course of study, and not only in internships.

Other studies have been interested in the analysis of the skill as such in students, so that they focus their attention on verifying whether this population evidences it in their student practice or in programs complementary to initial training. [Coffield et al. \(2021\)](#), [Coutinho et al. \(2019\)](#), [Dickerman et al. \(2018\)](#), [Hill et al. \(2018\)](#), [Hopkins et al. \(2018\)](#), [Jones et al. \(2022\)](#), [Kelly et al. \(2019\)](#), [Khan et al. \(2019\)](#), [Kyanko et al. \(2022\)](#), [Linehan et al. \(2021\)](#), [Lyons et al. \(2022\)](#); [Martinez Ozuna et al. \(2020\)](#), [Nakae et al. \(2021\)](#), [Rajeh et al. \(2020\)](#), [Rodríguez et al. \(2021\)](#), and [Alzahrani et al. \(2021\)](#) applied studies with student population to quantify or qualify the presence of the skill according to the objective of each study. Some studies used already validated instruments such as the Multifactorial Leadership Questionnaire.

In relation to studies in the research area, it should be noted that there has been an increase in the number of studies on the subject in the last five years: in 2018 eight publications were identified, while in 2022 there were fifteen manuscripts, as shown in Table 1. This situation evidences the need to continue researching on the thematic area, since the results of the processes show that the interest in the study of the skills of medical students in higher education is current and little explored in the last five years, although there have been considerable advances and some opportunities that will be discussed below.

Another area of research evidenced in the VOSviewer® reports is called "studies on educational programs and projects". Within this field, there are studies that refer to educational programs that allow the development of leadership skills, which focus on the curricular area; in addition, there are some studies on educational projects that combine the research subject addressed from mentoring with evaluation and extracurricular activities; and finally, there are complementary programs in medical education and pilot projects in the educational field, as shown in Figure 7.

To begin the analysis, there is a greater concentration of studies that focus their attention on the curriculum, understood as the "instrument that makes it possible to materialize, at different levels, the intentions and educational demands that come into play and interact in the educational process" ([Molina, 2019, p. 47](#)). They point out that a key element for comprehensive training is that the curriculum includes aspects related to clinical leadership and transformational leadership; this conception of the curriculum can be related to an approach that emphasizes content and courses. There are also experiences that strengthen programs to include the components of innovation, leadership, and learning through discovery as cross-cutting themes. Another element in this area are studies that focus on the analysis of formal medical programs, as well as complementary programs to visualize how leadership is included in their curricula, including the studies by [Bayer et al. \(2020\)](#), [Barnes et al. \(2021\)](#), [Corliss et al. \(2021\)](#), [Díaz et al. \(2021\)](#), [Nicol & Gordon \(2018\)](#), [Rosenman et al. \(2019\)](#), [Schleiff et al. \(2021\)](#), and [True et al. \(2020\)](#).

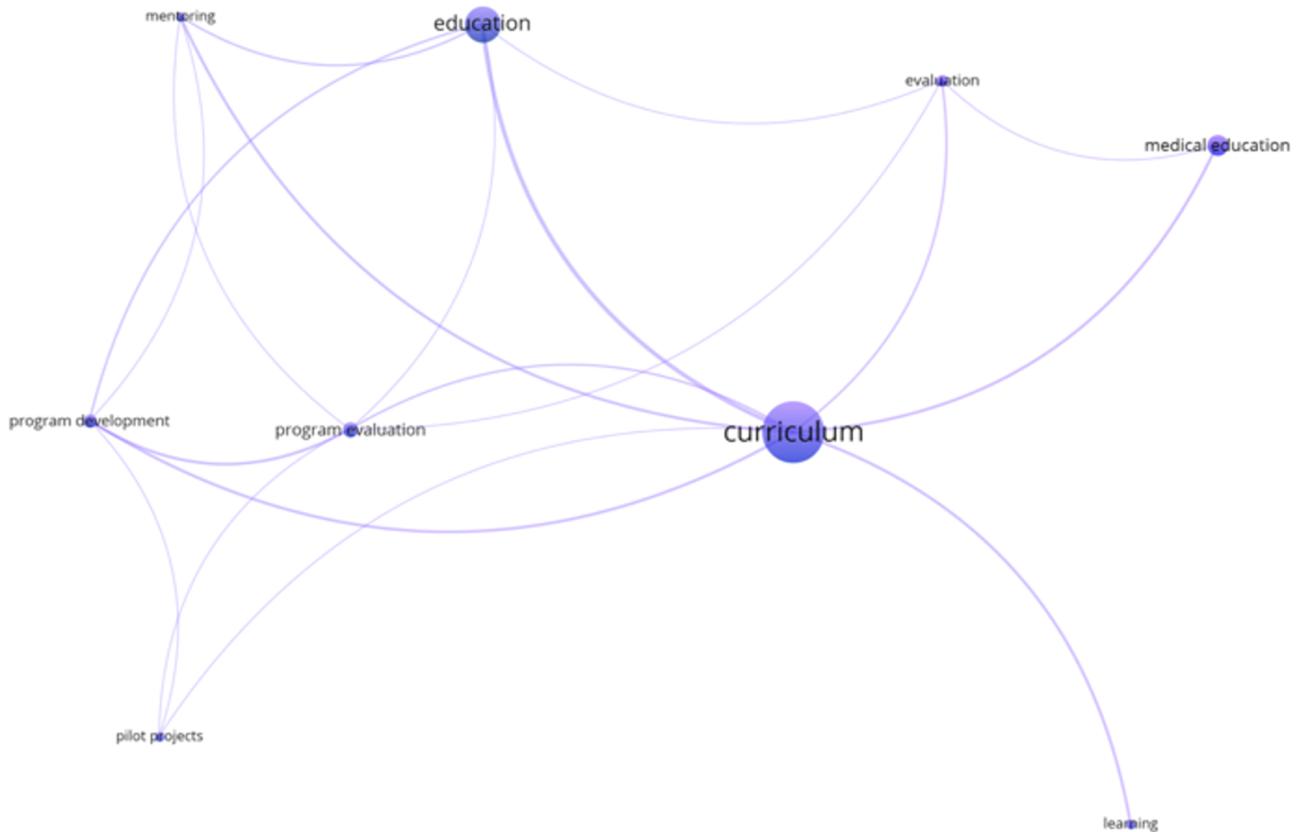
Another part of the studies analyzed is focused on understanding the educational projects that make it possible to combine knowledge of the research subject addressed from mentoring, evaluation, and extracurricular activities; for example, the influence of the motivational aspects of mentors in the training of medical students in these programs is addressed, but also how the absence of mentors in the training of students affects the responsiveness of residents. The need to develop educational projects complementary to the initial training of students is pointed out, so that it is from there that this comprehensive education is provided.

Table 1
Distribution of Authorship by Year of Publication in the Skills Research Area

Year	Number of publications	Authors
2023	2	Aldersley et al.; Vo et al.
2022	15	Chaudhuri et al.; Chavan y Bendriss; Gartland et al.; Hansen et al.; Jones et al.; Khan et al.; Kyanko et al.; Lyons et al.; Mai et al.; Nabecker et al.; van Diggele et al. (a); van Diggele et al. (b); Shrivastava et al.; Young et al., Wiseman et al.
2021	14	Bharwani et. al; Budakoglu et al.; Coffield et al.; Daaleman et al.; Leenstra et al.; Linehan et al.; Mai et. al.; Naghi y Salem, Nakae et al.; Rodríguez et al.; Sullivan et al.; Tupesis et al., Alzahrani et al., Merriam et. al.
2020	6	Lucas et al.; Martínez Ozuna et al.; Phillips y Bullock; Rajeh et al.; Ricotta et al.; Smithson et al.
2019	6	Cha et al.; Coutinho et al.; Kelly et al.; Reshetnikov et al.; Richard et al.; Wagenschutz et al.;
2018	8	Arnold et. al.; Dickerman et al.; Ginzburg et al.; Hill et al.; Hopkins et al.; Oza et al.; Phillips y Bullock; Van Hala et al.

Source: Own elaboration.

Figure 7
Topics Addressed in the Research Area of Educational Programs and Projects



Source: VOSviewer based on research metadata.

In addition to this, experiences such as STEP, LDI LHE, Stanford Leadership Development Program, and ELP are presented for the development of extracurricular or complementary programs based on leadership, as well as programs focused on the evaluation of competencies. Some relevant studies related to this include the ones published by [Achar et al. \(2022\)](#), [Cafferty et al., \(2020\)](#), [Donaghy et al. \(2018\)](#), [Ferris et al. \(2018\)](#), [Hernández et al. \(2022\)](#), [Toma et al. \(2020\)](#), [Vattanavanit et al. \(2020\)](#), and [Vu et al. \(2020\)](#).

A third area of studies presents research on complementary programs in medical education and pilot projects in the educational field for leadership training in medical students. These studies address the development of didactic approaches that enhance skills through different methodologies, such as project-based learning or case studies and personal stories, as well as with pilot programs related to community leadership that may have professors and medical students as part of social activities. The studies conducted by [Beldick et al. \(2021\)](#), [Matthews et al. \(2018\)](#), [Thach et al. \(2018\)](#), [Kersemaekers et al. \(2020\)](#), [Idso et al. \(2019\)](#), and [Curry et al. \(2020\)](#) stand out in this field.

Finally, in regards to studies related to the research area, Table 2 shows that there is a variable trend in studies during the last five years. In both 2018 and 2021, six manuscripts were identified respectively; only in 2020 there was an increase of one more, while in 2019 and 2022 there were three and two respectively, as shown in Table 2. This situation shows that the educational area itself has been little explored; it is a challenge for future research to continue to venture into topics related to curriculum and didactics, or even topics that have not been fully addressed, such as learning assessment, pedagogical mediation, or the impact of these complementary leadership training programs.

To conclude this subsection, the last research area identified in Figure 8 is research on the development of skills according to the participants' gender and ethnic identification in the student space, and on the perception of leadership in the student body according to gender in internship programs. It is important to point out that this area is the one with the lowest number of relationships

or co-occurrences according to the VOSviewer® representation, a situation that is evidenced by the small amount of research studies that can be catalogued in this area, as detailed below.

Accordingly, some studies can be grouped based on the gender of the participant or on ethnic identification in the student space. On the one hand, [Coe et al. \(2020\)](#) and [Hoque et al. \(2021\)](#) show that there is underrepresentation of women and ethnic minorities in mentoring or student leadership training processes. Hence, it is suggested that training programs, together with the development of leadership skills, should pay more attention to the inclusion of these two groups in such processes. As an additional element, it is interesting to note that these studies include not only the student population, but also practicing medical professionals.

On the other hand, [Lee et al. \(2022\)](#) presented a study on the perception of leadership in medical students according to gender, showing that a statistically significant proportion of medical students believe that a leader in their specialty should be of the same gender.

Table 3
Distribution of Authorship by Year of Publication - Area of Gender

Year	Number of publications	Authors
2022	1	Lee et al.
2021	1	Hoque et al.
2020	1	Coe et al.

Source: Own elaboration.

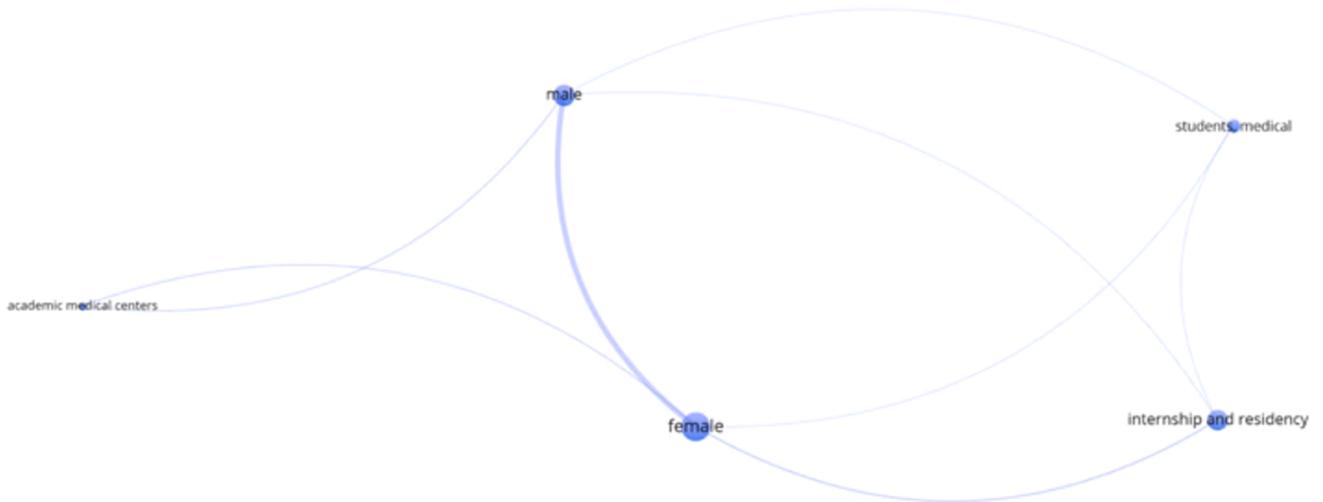
Finally, Table 3 presents the publications in the research area, which represents the smallest number in the systematic review, with only three studies. It should be noted that this is a recent area of interest, although the topic is widely addressed in studies with practicing medical professionals. Thus, studies by gender or ethnic minorities constitute a challenge for future research, so that it is known how, from the initial training of students or in postgraduate training, skills that affect the quality of the graduating professional can be strengthened.

Table 2
Distribution of Authorship by Year of Publication in the Research Area of Educational Projects

Year	Number of publications	Authors
2023	2	Aldersley et al.; Vo et al.
2022	15	Chaudhuri et al.; Chavan y Bendriss; Gartland et al.; Hansen et al.; Jones et al.; Khan et al.; Kyanko et al.; Lyons et al.; Mai et al.; Nabecker et al.; van Diggele et al. (a); van Diggele et al. (b); Shrivastava et al.; Young et al., Wiseman et al.
2021	14	Bharwani et. al; Budakoglu et al.; Coffield et al.; Daaleman et al.; Leenstra et al.; Linehan et al.; Mai et. al; Naghi y Salem, Nakae et al.; Rodríguez et al.; Sullivan et al.; Tupesis et al., Alzahrani et al., Merriam et. al.
2020	6	Lucas et al.; Martínez Ozuna et al.; Phillips y Bullock; Rajeh et al.; Ricotta et al.; Smithson et al.
2019	6	Cha et al.; Coutinho et al.; Kelly et al.; Reshetnikov et al.; Richard et al.; Wagenschutz et al.;
2018	8	Arnold et. al.; Dickerman et al.; Ginzburg et al.; Hill et al.; Hopkins et al.; Oza et al.; Phillips y Bullock; Van Hala et al.

Source: Own elaboration.

Figure 8
Topics Addressed in the Research Area of Gender and Place



Source: VOSviewer based on research metadata.

Conclusions

The results of the systematic review, in accordance with the first specific objective, reveal three clearly defined research areas in relation to research production in the last five years: development of leadership skills in medical students, development of educational programs and projects in training plans and, finally, studies by gender and its impact on the leadership of medical students. In this regard, [Sánchez-Mendiola \(2015\)](#) points out that it is essential “that the health professional reflects on the basic concepts of leadership (...); let us not forget that effective leadership in medicine and medical education translates into improved clinical and learning outcomes” (pp. 106-107). Therefore, the systematic review shows that the development of leadership skills in undergraduate and graduate students has been of varying interest in the scientific community during the last five years; however, it needs to be strengthened given the changing and complex situations that all professionals must face in contemporary society.

In accordance with the above, a first trend supported by the evidence is that most research is focused on the research area of leadership skills development in the student; it is of interest to study soft or life skills required by any professional, but it is even more necessary for a specialist in health sciences and who is in constant interaction with other people, That is why it was considered convenient to study teamwork, problem solving, emotional intelligence, collaboration, communication, among others. This is in agreement with what [Simón and Pérez \(2023\)](#) stated when they claimed that “social skills are essential in the social development of human beings. Most of life is spent interacting with other people, whether at work, in the community, or at school” (p. 61), with “school” defined as those spaces of formal education to which people are mostly exposed. In this respect, regarding the gaps within the research area on the development of leadership skills in the student body, it could be pointed out that it is necessary to expand the specific study of other skills and how they all interact for the achievement of leadership

as a fundamental skill, that is, what the integral development of the skill contributes to the training of students. In addition, it is important to analyze how these skills are put into practice in different contexts, which may be from the initial training in the courses of the discipline or in residency or postgraduate specialty programs.

The second research area refers to the development of educational programs and projects in the training plans and requires further research, so that it is not only limited to exploring the students' practices, but also what the teaching staff does from the pedagogical mediation for the training in skills, as long as this person is also recognized as an educational leader. Another gap detected refers to the student's learning process and how he/she achieves self-regulation for the development of skills. It is also necessary to go deeper into the complementary programs in leadership training, which, as noted in the previous section, if they are carried out, not all studies detail their impact on students, training, and implementation. The tendency is to focus on the study of the curriculum in its approach centered on content and courses, but not on other functions such as learning experiences or concrete classroom practice, as an institutional project or from its social function.

From the last point of view, in the social dimension of the curriculum, there is a gap but it constitutes a field of action to continue generating scientific knowledge, since improving the curriculum of the training of medical students can have an impact on improving the “understanding and conceptualization of social reality” ([Hernández & García, 2017, p. 6](#)), a situation that will definitely improve the attitude and positive feelings towards the development of leadership skills. Finally, another gap detected in this research area refers to the deepening of the study of mentoring and how it actually plays a role in skill development. There are studies that focus on the student mentor, but not on its impact on the rest of the student body.

As part of the conclusions of the last research area related to gender-based studies and its incidence in the leadership of medical students, it was indicated that although there is research

related to gender, the studies are insufficient to determine them as a trend, since studies in the last five years that include the target population of this work represent the smallest number of scientific publications. In this regard, there is a gap to be addressed and deepened, particularly in terms of how the gender or ethnic identity of the student body affect or do not affect the development of skills. This is interesting because there are positions that point out that “the ability of women to inspire and motivate employees derives from their more developed interpersonal skills” (Painter-Morland, 2011, parr 13) since they show a more transformational type of leadership. However, there are other contrary views that point out that “transformational leadership cannot be associated exclusively with women (some women are successful in adhering to the traditional male model, while some men adopt transformational leadership)” (Painter-Morland, 2011, parr 18). Other studies with a student population in the educational area indicate that there are no significant differences in the evidence of leadership skills (Díaz Gómez, 2020).

In sum, the authors conclude that most of the studies on the topic were related to leadership skills as such, since they address this component as a central element of their research activities. This makes it possible to identify fertile ground for future research studies to delve deeper into complementary topics from a more comprehensive vision of the educational phenomenon; however, it also allows professionals in educational leadership to contribute to knowledge.

References

- Achar, R. N., Kobayasi, R., Claassen Enns, S. & Zen Tempiski, P. (2022). Medical Students’ Participation in Extracurricular Activities: Motivations, Contributions, and Barriers. A Qualitative Study. *Adv Med Educ Pract*, 13, 1133-1141. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9514135/pdf/amep-13-1133.pdf>
- Aldersley, K., Gibb, J., Grainger, C., Abou-El-Ela-Bourquin, B., Badhrinarayanan, S., Bhanot, R., Clark, R., Douglas, H., Fukui, A., Hana, Z., Imtiaz, I., Kalsi, T., Kerwan, A., Khera, R., MacLachlan, E., McGrath, J., Meredith, E., Penrice, S., Saleh, D., ... Devine, O. P. (2023). Medical leadership training varies substantially between UK medical schools: Report of the leadership in undergraduate medical education national survey (LUMENS). *Medical Teacher*, 45(1), 58-67. <https://doi.org/10.1080/0142159X.2022.2078185>
- Alzahrani, S. H., Baig, M., Omer, A. R. & Algethami, M. R. (2021). Medical Students’ perceptions and attitudes toward Medical Leadership and Management. *Pakistan Journal of Medical Sciences*, 37(1), 223-228. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7794128/pdf/PJMS-37-223.pdf>
- Antonakis, J. & Day, D. (2017). *The nature of leadership*. Sage. <https://us.sagepub.com/en-us/nam/the-nature-of-leadership/book242522>
- Arnold, L., Cuddy, P. G., Hathaway, S. B., Quaintance, J. L. & Kanter, S. L. (2018). Medical School Factors That Prepare Students to Become Leaders in Medicine. *Academic Medicine*, 93(2), 274-282. <https://doi.org/10.1097/ACM.0000000000001937>
- Baker, J. D. (2016). The Purpose, Process, and Methods of Writing a Literature Review. *Association of periOperative Registered Nurses Journal*, 103(3), 265-269. <https://aornjournal.onlinelibrary.wiley.com/doi/epdf/10.1016/j.aorn.2016.01.016>
- Barajas-Ochoa, A., Ramos-Remus, C., Castillo-Ortiz, J. D., Yanez, J., Barajas-Ochoa, Z., Sanchez-Gonzalez, J. M., Hernandez-Avila, M., Cordova-Villalobos, J. A., & Bustamante-Montes, L. P. (2019). Flaws in the design of the Examen Nacional para Aspirantes a Residencias Medicas produce inequity. *Salud Publica de Mexico*, 61(2), 125-135. <https://doi.org/10.21149/9790>
- Barnes, T., Yu, T. C. W. & Webster, C. S. (2021). Are We Preparing Medical Students for Their Transition to Clinical Leaders? A National Survey. *Medical Science Educator*, 31(1), 91-99. <https://doi.org/10.1007/s40670-020-01122-9>
- Bayer, C. R., Respress, E., Josiah Willock, R. & Heiman, H. J. (2019). Curriculum Mapping and Needs Assessment to Inform the Training of Health Policy Leaders. *Ethnicity & Disease*, 29(2), 413-420. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6604771/pdf/ethndis-29-413.pdf>
- Beldick, S. R., Ooi, G., Shah, S. A., Morano, M., Li, C., Zimmerman, M. & Levine, L. (2021). Physician Executive Leadership Plus: An Approach to Business and Management Education for Medical Students. *Journal of Medical*

- Education and Curricular Development*, 8, 1-14. <https://doi.org/10.1177/23821205211051803>
- Bharwani, A., Swystun, D., Paolucci, E. O., Ball, C. G., Mack, L. A. & Kassam, A. (2021). Assessing leadership in junior resident physicians: Using a new multisource feedback tool to measure Learning by Evaluation from All-inclusive 360 Degree Engagement of Residents (LEADER). *Bmj Leader*, 5(4), 238-246. <https://bmjleader.bmj.com/content/leader/5/4/238.full.pdf>
- Budakoglu, I. I., Coskun, O., Karabacak, O. & Karabacak, N. I. (2021). Curriculum Implementation for Leadership and Teamwork: Medical Students. *Gazi Medical Journal*, 32(1), 23-27. <https://medicaljournal.gazi.edu.tr/index.php/GMJ/article/view/2116/2459>
- Cafferty, L. A., Crawford, P. F., Jackson, J. T. & Ledford, C. J. W. (2020). Residency Leader Motivations to Engage Residents and Residency Faculty in Scholarship: A Qualitative Study. *Family Medicine*, 52(8), 581-585. <https://doi.org/10.22454/FamMed.2020.437433>
- Cha, J. S., Anton, N. E., Mizota, T., Hennings, J. M., Rendina, M. A., Stanton-Maxey, K., Ritter, H. E., Stefanidis, D. & Yu, D. (2019). Use of non-technical skills can predict medical student performance in acute care simulated scenarios. *American Journal of Surgery*, 217(2), 323-328. <https://doi.org/10.1016/j.amjsurg.2018.09.028>
- Chaudhuri, A., Saldanha, D., Sarkar, S. K. & Bhattacharya, D. (2022). A Study to Evaluate the Leadership Skills, Personality Types, Leadership Styles, and Mental Health Status of First-Phase MBBS Students of a Peripheral Medical College in West Bengal. *Medical Journal of Dr. D.Y. Patil Vidyapeeth*, 15(5), 701-706. https://journals.lww.com/mjdy/Fulltext/2022/15050/A_Study_to_Evaluate_the_Leadership_Skills.13.aspx
- Chavan, A. K. & Bendriss, R. (2022). Leadership Curriculum in Medical Education: Exploring Student and Faculty Perceptions in a US Medical School in Qatar. *Journal of Healthcare Leadership*, 14, 163-173. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9547622/pdf/jhl-14-163.pdf>
- Chen, E., Ruiz, W., Quirós, C., Acuña, A. & Torres, D. (2021). *Competencias para la capacidad gerencial de las personas directivas y su vinculación con las juntas: módulo de aprendizaje*. CIDE-Universidad Nacional. <https://repositorio.una.ac.cr/handle/11056/18861>
- Chen-Quesada, E. & Ruiz-Chaves, W. (2020). Competencias que potencian la capacidad gerencial en las personas directivas para el trabajo efectivo con las Juntas Administrativas y de Educación en el sistema educativo costarricense. *Innovaciones Educativas*, 22(32), 36-50. <https://doi.org/10.22458/ie.v22i32.2964>
- Coe, C., Piggott, C., Davis, A., Hall, M. N., Goodell, K., Joo, P. & South-Paul, J. E. (2020). Leadership Pathways in Academic Family Medicine: Focus on Underrepresented Minorities and Women. *Family Medicine*, 52(2), 104-111. <https://doi.org/10.22454/FamMed.2020.545847>
- Coffield, J. A., Choi, J., Choi, I., Walker, B. B., Walters, K., Hill, J. R., Sejin, K., Rechtman, J. E., Carmichael, K. P., Pidaparti, R. & Welch-Devine, M. (2021). Graduate Scholars Leadership, Engagement, and Development: Initial Design, Implementation, and Lessons Learned. *Journal of Higher Education Outreach & Engagement*, 25(1), 65-86. <https://openjournals.libs.uga.edu/jheoe/article/view/1596/2646>
- Corliss, S. B., Abrams, S., Cox, S. & Nelson, E. A. (2021). Learning New Skills in Innovation, Leadership, and Discovery During a 9-Month Scholarly Concentration: Results from the First Cohort at a New Medical School. *Medical Science Educator*, 31(2), 331-336. <https://doi.org/10.1007/s40670-020-01168-9>
- Coutinho, A. J., Bhuyan, N., Gits, A., Alavi, M., Ho, T., Shiraki, J., Dakis, K., Jojola, C., Stisher, C. S. & Ely, P. (2019). Student and Resident Involvement in Family Medicine for America's Health: A Step Toward Leadership Development. *Family Medicine*. 51 (2), 166-172. <https://journals.stfm.org/media/2143/coutinho-2018-0291.pdf>
- Curry, L. A., Ayedun, A. A., Cherlin, E. J., Allen, N. H. & Linnander, E. L. (2020). Leadership development in complex health systems: A qualitative study. *British Medical Journal Open*, 10(4), 1-10. <https://bmjopen.bmj.com/content/bmjopen/10/4/e035797.full.pdf>
- Daaleman, T. P., Storrie, M., Beck Dallaghan, G., Smithson, S., Gilliland, K. O. & Byerley, J. S. (2021). Medical Student Leadership Development through a Business School Partnership Model: A Case Study and Implementation Strategy. *Journal of Medical Education and Curricular Development*, 8, 1-7. <https://journals.sagepub.com/doi/pdf/10.1177/23821205211010479>
- Díaz Gómez, E. R. (2020). Liderazgo transformacional y equidad de género: el caso de estudiantes de posgrado. *Universidad y Empresa*, 22(39), 1-21. <https://revistas.urosario.edu.co/index.php/empresa/article/view/7854/8514>
- Díaz, D. H. S., Kothari, P., Williams, R. L., Lee, R., Mancias, P., Davis, J. A. & Sánchez, J. P. (2021). Office of Medical Education: Opportunities for Trainees to Engage

- and Lead in Curricular Innovation and Reform. *MedEdPORTAL*, 17, 1-6. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7970638/pdf/mep_2374-8265.11112.pdf
- Dickerman, J., Sánchez, J. P., Portela-Martínez, M. & Roldán, E. (2018). Leadership and Academic Medicine: Preparing Medical Students and Residents to Be Effective Leaders for the 21st Century. *MedEdPORTA*, 14, 1-8. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6342431/pdf/mep-14-10677.pdf>
- Donaghy, G., McKeever, K., Flanagan, C., O'Kane, D., McQuillan, B., Cash, J., Jack, C. & Lundy, C. (2018). Helping doctors in training to STEP-UP: A leadership and quality improvement programme in the Belfast Health and Social Care Trust. *Ulster Medical Journal*, 87(2), 112-116. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5974639/pdf/umj-87-02-112.pdf>
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285-296. <https://doi.org/10.1016/j.jbusres.2021.04.070>
- Downton, SB. (2004). Leadership in medicine: where are the leaders?. *The Medical Journal of Australia*, 181(11), 652-654. <https://onlinelibrary.wiley.com/doi/epdf/10.5694/j.1326-5377.2004.tb06509.x>
- Fassiotta, M., Maldonado, Y. & Hopkins, J. (2018). A long-term follow-up of a physician leadership program. *Journal of Health Organization and Management*, 32(1), 56-68. <https://www.emerald.com/insight/content/doi/10.1108/JHOM-08-2017-0208/full/html>
- Ferris, F. D., Moore, S. Y., Callaway, M. V. & Foley, K. M. (2018). Leadership Development Initiative: Growing Global Leaders... Advancing Palliative Care. *Journal of Pain and Symptom Management*. 55 (2S), S146-S156. <https://www.ipsmjournal.com/action/showPdf?pii=S0885-3924%2817%2930391-3>
- Flurey, C. A., Tugwell, P. S., Black, R. J., Halls, S., Page, M. J., Robson, J. C., Sahbudin, I., Siddle, H. J., Sinnathurai, P., Stok, K. S. & Richards, B. (2019). The OMERACT Emerging Leaders Program: The Good, the Bad, and the Future. *J Rheumatol*, 46(8), 1047-1052. <https://www.irheum.org/content/jrheum/46/8/1047.full.pdf>
- Gartland, R., Conlon, L., Livingston, S., Glick, J. E., Bach, G. & Abboud, M. E. (2022). Resuscitation Leadership Training: A Simulation Curriculum for Emergency Medicine Residents. *MedEdPORTAL*, 18, 1-7. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9550795/pdf/mep_2374-8265.11278.pdf
- Ginzburg, S. B., Deutsch, S., Bellissimo, J., Elkowitz, D. E., Stern, J. N. H. & Lucito, R. (2018). Integration of leadership training into a problem/case-based learning program for first-and second-year medical students. *Advances in Medical Education and Practice*, 9, 221-226. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5898582/pdf/amep-9-221.pdf>
- Griffin, P. & Care, E. (2014). *Developing learner collaborative problem-solving skills*. Melbourne Graduate School of Education. <https://sodas.ugdome.lt/bylos/GENERAL/8af7dd98-d82c-4d81-90ed-7f912c0dfcf0.docx>
- Gordon, R. (2002). Conceptualizing leadership with respect to its historical-contextual antecedents to power. *The Leadership Quarterly*, 13(2), 151-167. <https://www.sciencedirect.com/science/article/abs/pii/S1048984302000954>
- Guerra-Báez, S. P. (2019). Una revisión panorámica al entrenamientodelashabilidadesblandasenestudiantes universitarios. *Psicología Escolar e Educativa*, 23, e186464, 1-11 <https://www.semanticscholar.org/reader/30d164e00f6d4ddf5e5e0ca2b2ed0894c9c725f1>
- Hansen, M., Harrod, T., Bahr, N., Schoonover, A., Adams, K., Kornegay, J., Stenson, A., Ng, V., Plitt, J., Cooper, D., Scott, N., Chinai, S., Johnson, J., Conlon, L. W., Salva, C., Caretta-Weyer, H., Huynh, T., Jones, D., Jorda, K., ... Guise, J. M. (2022). The Effects of Leadership Curricula With and Without Implicit Bias Training on Graduate Medical Education: A Multicenter Randomized Trial. *Academic Medicine*. 97(5), 696-703. <https://doi.org/10.1097/ACM.0000000000004573>
- Hernández, M. & García, B. (2017). Curriculum y práctica docente: hacia una educación transformadora. XIV Congreso Nacional de Investigación Educativa - COMIE. México. <https://www.comie.org.mx/congreso/memoriaelectronica/v14/doc/2688.pdf>
- Hernández, R. G., Thompson, D. A. & Cowden, J. D. (2022). Responding to a call to action for health equity curriculum development in pediatric graduate medical education: Design, implementation and early results of Leaders in Health Equity (LHE). *Frontiers in Pediatrics*, 10, 951353, 1-9. <https://doi.org/10.3389/fped.2022.951353>
- Hill, D. A., Jiménez, J. C., Cohn, S. M. & Price, M. R. (2018). How To Be a Leader: A Course for Residents. *Cureus*, 10(7), e3067, 1-7. <https://doi.org/10.7759/cureus.3067>
- Hopkins, J., Fassiotta, M., Ku, M. C., Mammo, D. & Valantine, H. (2018). Designing a physician leadership

- development program based on effective models of physician education. *Health Care Management Review*, 43(4), 293-302. <https://doi.org/10.1097/HMR.000000000000146>
- Hoque, S., Baker, E. H. & Milner, A. (2021). A quantitative study of race and gender representation within London medical school leadership. *International Journal of Medical Education*, 12, 94-100. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8411335/pdf/ijme-12-94.pdf>
- Hutton, B., Català-López, F. & Moher, D. (2016). The PRISMA statement extension for systematic reviews incorporating network meta-analysis: PRISMA-NMA. *Medicina Clínica*, 147(6), 262-266. <http://dx.doi.org/10.1016/j.medcli.2016.02.025>
- Idso, J. M., Helmen, Z. M., Hueston, W. J. & Meurer, J. R. (2019). Student Leadership Development Initiative: A Pilot for a Sustainable, Replicable Model for Incorporating Leadership into Medical Education. *Wisconsin Medical Journal*, 118(1), 39-41. <https://wmjonline.org/wp-content/uploads/2019/118/1/39.pdf>
- Inceoglu, I., Thomas, G., Chu, C., Plans, D. & Gerbasi, A. (2018). Leadership behavior and employee well-being: An integrated review and a future research agenda. *The Leadership Quarterly*, 29(1), 179-202. <https://doi.org/10.1016/j.leafqua.2017.12.006>
- James, E., Evans, M. & Mi, M. (2021). Leadership Training and Undergraduate Medical Education: a Scoping Review. *Medical Science Educator*, 31(4), 1501-1509. <https://doi.org/10.1007/s40670-021-01308-9>
- Jones, S. K., Chan, K. H., Bourdage, J. S. & Bharwani, A. (2022). Identifying leadership in medical trainees: Evaluation of a competency-based approach. *British Medical Journal Leader*, 6(1), 20-29. <https://bmjleader.bmj.com/content/leader/6/1/20.full.pdf>
- Jorna Calixto, A. R., Castañeda Abascal, I. & Véliz Martínez, P. L. (2016). Percepción de habilidades de liderazgo en hombres y mujeres para la dirección en salud en Cuba. *Revista Cubana de Salud Pública*, 42(1), 70-79. <http://scielo.sld.cu/pdf/rcsp/v42n1/spu08116.pdf>
- Kelly, C., Coutinho, A. J., Goldgar, C., Gonsalves, W., Gutkin, C., Kellerman, R., Fetter, G., Tuggy, M., Martinez-Bianchi, V., Pauwels, J., Hinkle, B. T., Bhuyan, N., McCrory, K., Roett, M. A., Snellings, J., Yu, K., & Bentley, A. (2019). Collaborating to achieve the optimal family medicine workforce. *Family Medicine*, 51(2), 149-158. <https://doi.org/10.22454/FamMed.2019.926312>
- Kersemaekers, W. M., Vreeling, K., Verweij, H., van der Drift, M., Cillessen, L., van Dierendonck, D. & Speckens, A. E. M. (2020). Effectiveness and feasibility of a mindful leadership course for medical specialists: A pilot study. *BioMed Central Medical Education*. 20(1), 34. <https://doi.org/10.1186/s12909-020-1948-5>
- Khan, N., Rogers, A., Melville, C., Shankar, R., Gilliar, W., Byrne, P., Serafimov, A., Sira Mahalingappa, S., Sehdev, S., Sri, A. & Dave, S. (2022). Using medical education as a tool to train doctors as social innovators. *British Medical Journal Innovations*. 8(3), 190-198. <https://innovations.bmj.com/content/bmjinnov/8/3/190.full.pdf>
- Kyanko, K. A., Fisher, M. A., Riddle-Jones, L., Chen, A., Jetton, F., Staiger, T. & Schwartz, M. D. (2022). National Health Policy Leadership Program for General Internists. *Journal of General Internal Medicine*, 37(16), 4137-4143. <https://doi.org/10.1007/s11606-022-07455-y>
- Lee, I. R., Jung, H., Lee, Y., Shin, J. I. & An, S. (2022). An analysis of student essays on medical leadership and its educational implications in South Korea. *Scientific Reports*, 12(1), p. 5788. <https://doi.org/10.1038/s41598-022-09617-8>
- Leenstra, N. F., Jung, O. C., Cnossen, F., Jaarsma, A. D. C. & Tulleken, J. E. (2021). Development and Evaluation of the Taxonomy of Trauma Leadership Skills-Shortened for Observation and Reflection in Training: A Practical Tool for Observing and Reflecting on Trauma Leadership Performance. *Simulation in Healthcare*, 16(1), 37-45. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7850591/pdf/sih-16-37.pdf>
- Linehan, A. R., Chartier, A. R., He, Y., Sobin, M., Hueston, W. J. & Meurer, J. R. (2021). Student Leadership Development Initiative: Benefits of a Unique Medical Student Organization. *Wisconsin Medical Journal*, 120(3), 230-232. <https://wmjonline.org/wp-content/uploads/2021/120/3/230.pdf>
- Lucas, R., Kothari, P., Adams, C., Jones, L., Williams, V. N. & Sánchez, J. P. (2020). We Are All Leaders: Introducing Self-Leadership Concepts Through the Lens of Improving Diversity in the Health Care Workforce. *MedEdPORTAL*, 16, 11011. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7666830/pdf/mep_2374-8265.11011.pdf
- Lyons, O., Su'a, B., Locke, M. & Hill, A. (2018). A systematic review of leadership training for medical students. *New Zealand Medical Journal*, 131(1468), 75-84. <https://journal.nzma.org.nz/journal-articles/a-systematic-review-of-leadership-training-for-medical-students>
- Lyons, M. D., Oyler, J., Iossi, K. & Merriam, S. (2022). Leadership Experiences of Internal Medicine Residents: A Needs Assessment for Leadership Curricula. *Journal of*

- Healthcare Leadership*, 14, 155-161. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9509665/pdf/jhl-14-155.pdf>
- Mai, D. H., Newton, H., Farrell, P. R., Mullan, P. & Kapoor, R. (2021). Assessment of Clinical Leadership Training Needs in Senior Pediatric Residents. *Journal of Medical Education and Curricular Development*, 8, 1-9. <https://doi.org/10.1177/2382120520988593>
- Mai, D. H., Newton, H., Farrell, P. R., Mullan, P. & Kapoor, R. (2022). Implementation of a Clinical Leadership Curriculum for Pediatric Residents. *Journal of Medical Education and Curricular Development*, 9, 1-6. <https://doi.org/10.1177/23821205221096354>
- Martínez Ozuna, G., Santos Guzmán, J., Leal Beltrán, E. & Hernández Ángeles, A. L. (2020). Liderazgo transformacional en estudiantes de ciencias de la salud. *Transformational leadership in students of health sciences*, 34(2), 1-15. <http://scielo.sld.cu/pdf/ems/v34n2/1561-2902-ems-34-02-e1920.pdf>
- Matthews, J. H., Morley, G. L., Crossley, E. & Bhandari, S. (2018). Teaching leadership: The medical student society model. *Clinical Teacher*, 15(2), 145-150. <https://asmepublications.onlinelibrary.wiley.com/doi/epdf/10.1111/tct.12649>
- Marturano, A. (2020). Liderazgo en medicina: uniendo competencias sociales a valores morales. *Medicina y Ética*, 30(2), 637-652. <https://publicaciones.anahuac.mx/index.php/bioetica/article/view/445>
- Merriam, S. B., Rothenberger, S. D. & Corbelli, J. A. (2021). Establishing Competencies for Leadership Development for Postgraduate Internal Medicine Residents. *Journal of Graduate Medical Education*, 13(5), 682-690. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8527928/pdf/j1949-8357-13-5-682.pdf>
- Molina, Z. (2019). *Fundamentos del currículo*. EUNED.
- Nabecker, S., Huwendiek, S., Roten, F. M., Theiler, L. & Greif, R. (2022). Team leadership assessment after advanced life support courses comparing real teams vs. Simulated teams. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.1020124>
- Naghi, M. & Salem, M. R. (2021). A Modified Delphi Study for the Development of a Leadership Curriculum for Pediatric Oncology. *Asian Pacific Journal of Cancer Prevention*, 22(5), 1659-1665. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8408386/pdf/APJCP-22-1659.pdf>
- Nakae, S., Haywood, Y., Love, L. J., Kothari, P., Saldaña, F. & Sánchez, J. P. (2021). Office of Student Affairs: Engagement and Leadership Opportunities for Medical Students, Residents, and Fellows. *MedEdPORTAL*, 17, 11093. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7880253/pdf/mep_2374-8265.11093.pdf
- Nicol, J. W. & Gordon, L. J. (2018). Preparing for leadership in General Practice: A qualitative exploration of how GP trainees learn about leadership. *Education for Primary Care*, 29(6), 327-335. <https://www.tandfonline.com/doi/full/10.1080/14739879.2018.1528896>
- Nye, J.S. (2006). *The Powers to Lead*. Oxford. https://books.google.com.ec/books?id=qNcqZLYL-AIC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
- Omonte, E. E. T. (2021). El reto de actualizar la enseñanza médica. *Educación Médica*, 22(2), 59. <https://www.elsevier.es/es-revista-educacion-medica-71-pdf-S1575181321000966>
- Organización Mundial de la Salud [OMS] (1997). *Life Skills Education for Children and Adolescents in School*. Division of Mental Health and Prevention of Substance Abuse, WHO.
- Oza, S. K., van Schaik, S., Boscardin, C. K., Pierce, R., Miao, E., Lockspeiser, T., Tad, Y. D., Aagaard, E. & Kuo, A. K. (2018). Leadership Observation and Feedback Tool: A Novel Instrument for Assessment of Clinical Leadership Skills. *Journal of Graduate Medical Education*, 10(5), 573-582. <http://dx.doi.org/10.4300/JGME-D-18-00113.1>
- Painter-Morland, M. (2011). *Género, liderazgo y organización*. BBVA. <https://www.bbvaopenmind.com/wp-content/uploads/2013/02/BBVA-OpenMind-G%C3%A9nero-liderazgo-y-organizaci%C3%B3n-Mollie-Painter-Morland.pdf.pdf>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D. et al. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *British Medical Journal*, 372(71), 1-9. <https://www.bmj.com/content/bmj/372/bmj.n71.full.pdf>
- Phillips, S. & Bullock, A. (2018). Clinical leadership training: An evaluation of the Welsh Fellowship programme. *Leadership in Health Services*, 31(2), 226-237. <https://www.emerald.com/insight/content/doi/10.1108/LHS-06-2017-0038/full/pdf?title=clinical-leadership-training-an-evaluation-of-the-welsh-fellowship-programme>
- Phillips, S. & Bullock, A. (2020). Longitudinal impact of Welsh clinical leadership fellowship. *Leadership in Health Services*, 33(1), 1-11. https://orca.cardiff.ac.uk/id/eprint/128069/1/PDF_Proof.PDF

- Rajeh, N., Grant, J., Farsi, J. & Tekian, A. (2020). Contextual Analysis of Stakeholder Opinion on Management and Leadership Competencies for Undergraduate Medical Education: Informing Course Design. *Journal of Medical Education and Curricular Development*, 7, 1-24. <https://doi.org/10.1177/2382120520948866>
- Reshetnikov, V. A., Tvorogova, N. D., Hersonskiy, I. I., Sokolov, N. A., Petrunin, A. D. & Drobyshev, D. A. (2019). Leadership and Emotional Intelligence: Current Trends in Public Health Professionals Training. *Frontier in Public Health*, 7, 413. <https://doi.org/10.3389/fpubh.2019.00413>
- Richard, K., Noujaim, M., Thorndyke, L. E. & Fischer, M. A. (2019). Preparing Medical Students to Be Physician Leaders: A Leadership Training Program for Students Designed and Led by Students. *MedEdPORTAL*, 15, 1-10. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7012310/pdf/mep-15-10863.pdf>
- Ricotta, D. N., Ranchoff, B. L., Beltran, C. P., Hale, A. J., Freed, J. A. & Huang, G. C. (2020). The Mindful Manager: Validation of a Rounding Leadership Instrument for Residents. *Journal of General Internal Medicine*, 35(4), 1161-1166. <https://doi.org/10.1007/s11606-019-05348-1>
- Rodríguez, D. C., Jessani, N. S., Zunt, J., Ardila-Gómez, S., Muwanguzi, P. A., Atanga, S. N., Sunguya, B., Farquhar, C. & Nasuuna, E. (2021). Experiential Learning and Mentorship in Global Health Leadership Programs: Capturing Lessons from Across the Globe. *Annals of Global Health*, 87(1), 61. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8284496/pdf/agh-87-1-3194.pdf>
- Rosenman, E. D., Vrablik, M. C., Broliar, S. M., Chipman, A. K. & Fernández, R. (2019). Targeted Simulation-based Leadership Training for Trauma Team Leaders. *The Western Journal of Emergency Medicine*, 20(3), 520-526. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6526881/pdf/wjem-20-520.pdf>
- Saavedra-Mayorga, J. J. (2014). *Les mécanismes d'influence dans la relation de leadership: deux études de cas en Colombie*. Institut d'Administration des Entreprises (IAE), Thèse Doctorale. Université de Caen.
- Sadowski, B., Cantrell, S., Barelski, A., O'Malley, P. G. & Hartzell, J. D. (2018). Leadership Training in Graduate Medical Education: A Systematic Review. *Journal of Graduate Medical Education*, 10(2), 134-148. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5901791/pdf/j1949-8357-10-2-134.pdf>
- Salaman, G. (2004). Competences of managers, competences of leaders. En: Stores, J. (ed.). *Leadership in Organizations*. Routledge.
- Sánchez-Mendiola, M. (2015). Liderazgo en medicina: ¿debemos enseñarlo y evaluarlo?. *Investigación en Educación Médica*. 14(4), 99-107. <https://library.co/document/q075gwzx-liderazgo-en-medicina-debemos-enseñarlo-y-evaluarlo.html>
- Schleiff, M. J., Mburugu, P. M., Cape, J., Mwenesi, R., Sirili, N., Tackett, S., Urassa, D. P., Hansoti, B. & Mashalla, Y. (2021). Training Curriculum, Skills, and Competencies for Global Health Leaders: Good Practices and Lessons Learned. *Annals of Global Health*, 87(1), 1-16. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8284497/pdf/agh-87-1-3212.pdf>
- Shrivastava, S., Martínez, J., Coletti, D. J. & Fornari, A. (2022). Interprofessional Leadership Development: Role of Emotional Intelligence and Communication Skills Training. *MedEdPORTAL*, 18, 1-8. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9098732/pdf/mep_2374-8265.11247.pdf
- Simón, Y. y Pérez, M. T. (2023). Revisión bibliográfica sobre las habilidades sociales en escolares primarios. *Serie Científica de La Universidad de las Ciencias Informáticas*, 16(2), 61-79. <https://publicaciones.uci.cu/index.php/serie/article/view/1299/1061>
- Smithson, S., Beck Dallaghan, G., Crowner, J., Derry, L. T., Vijayakumar, A. A., Storrie, M. & Daaleman, T. P. (2020). Peak Performance: A Communications-Based Leadership and Teamwork Simulation for Fourth-Year Medical Students. *Journal of Medical Education and Curricular Development*, 7, 1-5. <https://doi.org/10.1177/2382120520929990>
- Sullivan, E. E., Moftah, D., Mbye, P., Weilnau, T. & Tobin, J. N. (2021). An e-leadership training academy for practicing clinicians in primary care and public health settings. *Journal of Clinical and Translational Science*, 5(1), 1-7. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8111608/pdf/S2059866120005749a.pdf>
- Thach, S. B., Hodge, B., Cox, M., Parlier-Ahmad, A. B. & Galvin, S. L. (2018). Cultivating Country Doctors: Preparing Learners for Rural Life and Community Leadership. *Family Medicine*, 50(9), 685-690. <https://journals.stfm.org/media/1828/thach-2018-0052.pdf>
- Till, A., McKimm, J. & Swanwick, T. (2020). The Importance of Leadership Development in Medical Curricula: A UK Perspective (Stars are Aligning). *Journal of Healthcare Leadership*, 12, 19-25. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7079548/pdf/jhl-12-19.pdf>
- Toma, M., Blamey, A., Mahal, D., Gray, N. M., Allison, L., Thakore, S. & Bowie, P. (2020). Multi-method evaluation of a national clinical fellowship programme to build

- leadership capacity for quality improvement. *British Medical Journal Open Quality*, 9(4). <https://bmjopenquality.bmj.com/content/bmjgir/9/4/e000978.full.pdf>
- True, M. W., Folaron, I., Colburn, J. A., Wardian, J. L., Hawley-Molloy, J. S. & Hartzell, J. D. (2020). Leadership Training in Graduate Medical Education: Time for a Requirement? *Military Medicine*, 185(1-2), e11-e16. <https://doi.org/10.1093/milmed/usz140>
- Tupesis, J. P., Lin, J., Nicks, B., Chiu, A., Arbalaez, C., Wai, A. & Jouriles, N. (2021). Leadership Matters: Needs Assessment and Framework for the International Federation for Emergency Medicine Administrative Leadership Curriculum. *Academic Emergency Medicine Education and Training*, 5(3), 1-12. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8122125/pdf/AET2-5-e10515.pdf>
- van Diggele, C., Lane, S. & Roberts, C. (2022a). Student Interprofessional Facilitator Training (SIFT) program: Building capacity in clinical education leadership. *BioMed Central Medical Education*, 22(1), 1-11. <https://doi.org/10.1186/s12909-022-03725-9>
- van Diggele, C., Roberts, C. & Lane, S. (2022b). Leadership behaviours in interprofessional student teamwork. *BioMed Central Medical Education*, 22(1) 1-7. <https://doi.org/10.1186/s12909-022-03923-5>
- Van Hala, S., Cochella, S., Jaggi, R., Frost, C. J., Kiraly, B., Pohl, S. & Gren, L. (2018). Development and Validation of the Foundational Healthcare Leadership Self-Assessment. *Family Medicine*, 50(4), 262-268. <https://journals.stfm.org/media/1575/vanhala-2017-0158-of.pdf>
- Vattanavanit, V., Khwannimit, B. & Nilmoje, T. (2020). Comparison of knowledge and confidence between medical students as leaders and followers in simulated resuscitation. *International Journal of Medical Education*. 11, 19-24. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7246126/pdf/ijme-11-19.pdf>
- Vivas, D. A., Reinoso, N. & Jaimes, D. A. (2021). Profesionalismo médico como competencia, una visión desde la narrativa: estado del arte. *Educación Médica*, 22, 517-520. <https://doi.org/10.1016/j.edumed.2021.01.010>
- Vo, A., Torti, J., Haddara, W. & Sultan, N. (2023). Exploring medical students' perspectives of physician leadership. *BioMed Central Medical Education*, 23(1), 1-12. <https://doi.org/10.1186/s12909-022-03971-x>
- Vu, J. V., Harbaugh, C. M., De Roo, A. C., Biesterveld, B. E., Gauger, P. G., Dimick, J. B. & Sandhu, G. (2020). Leadership-Specific Feedback Practices in Surgical Residency: A Qualitative Study. *Journal of Surgical Education*, 77(1), 45-53. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6944744/pdf/nihms-1539024.pdf>
- Waesche, R. M., Schmidt, C. & Mörstedt, A. B. (2021). [Generations Y and Z-New challenges for hospital leadership]. *Anaesthetist*, 70(12), 1011-1021. <https://doi.org/10.1007/s00101-021-01026-2>
- Wagenschutz, H., McKean, E. L., Mangrulkar, R., Zuales, K. & Santen, S. (2019). A first-year leadership programme for medical students. *The Clinical Teacher*, 16(6), 623-629. <https://deepblue.lib.umich.edu/bitstream/handle/2027.42/152529/tct13005.pdf?sequence=1&isAllowed=y>
- Wiseman, M., Hartzell, J., Kelly, W. F., Hemmer, P. A. & Stein, M. (2022). Reflective Essays During Clerkship Following a Pre-clerkship Leadership Curriculum. *Journal of Medical Education and Curricular Development*, 9, 1-8. <https://doi.org/10.1177/23821205221091523>
- Young, L., Spain, E. & Brennecke, L. (2022). Using a Case Study to Teach Leaders How to Enact Positive Organizational Change. *Journal of Leadership Education*, 21(1), 184-195. <https://doi.org/10.12806/V21/I1/A2>