The Hidden Curricula of Medical Education: A Scoping Review

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Abstract

Purpose—To analyze the plural definitions and applications of the term "hidden curriculum" within the medical education literature and to propose a conceptual framework for conducting future research on the topic.

Method—The authors conducted a literature search of nine online databases, seeking articles published on the hidden, informal, or implicit curriculum in medical education prior to March 2017. Two reviewers independently screened articles with set inclusion criteria, and performed

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Kappa coefficient tests to evaluate inter-reviewer reliability. They extracted, coded, and analyzed key data, using grounded theory methodology.

Results—The authors uncovered 3,747 articles relating to the hidden curriculum in medical education. Of these, they selected 197 articles for full review. Use of the term "hidden curriculum" has expanded substantially since 2012. U.S. and Canadian medical schools are the focus of two-thirds of the empirical hidden curriculum studies; data from African and South American schools are nearly absent. Few quantitative techniques to measure the hidden curriculum exist. The "Hidden curriculum" is understood as a mostly negative concept. Its definition varies widely, but can be understood via four conceptual boundaries: (1) institutional-organizational, (2) interpersonal-social, (3) contextual-cultural, and/or (4) motivational-psychological.

Conclusions—Future medical education researchers should make clear the conceptual boundary or boundaries they are applying to the term "hidden curriculum," move away from general musings on its effects, and focus on specific methods for improving the powerful hidden curriculum.

Since its initial description in the 1960s and its application to medical education in 1994, the reach of the so-called "hidden curriculum" in medical education has continuously expanded. [1–3] Frederic Hafferty originally defined the term with respect to medical education as the "set of influences that function at the level of organizational structure and culture."[4] He described the hidden curriculum generally as the "'understandings,' customs, rituals, and taken-for-granted aspects of what goes on in the life-space we call medical education" and viewed the hidden curriculum in medical education as an institutional-level concept best visible in "(1) policy development, (2) evaluation, (3) resource allocation, and (4) institutional slang."[4](p404) In the 20 years since this original conceptualization, researchers across the medical education spectrum have used the term to expose and explain a number of "hidden" facets of learning and teaching.[5–8] The effects of what is described as the hidden curriculum are rarely innocuous, and in fact, are, in many ways, more influential than the formal curriculum.[4, 9–11]

According to recent studies, the hidden curriculum is responsible for any number of ills, from discouraging medical students from pursuing surgical specialties and encouraging inappropriate student mobile device use, to increasing medical school admissions biases. [12–14] This vast and expanding use of the term has led some to doubt its continued utility in medical education. For instance, Macleod questions the benefit of labeling the diversity and breadth of issues now categorized as hidden curriculum as such, writing, "What are the consequences of 'lumping' together a series of related but clearly disparate issues? What is brought to light and what is left invisible?"[15] (p540) Macleod suggests that the medical education community shift from repeatedly identifying what she sees as no longer "hidden" issues to, instead, actively addressing these now-visible practices. She goes so far as to question the continued use of the term within medical discourse, writing that while the hidden curriculum has historically been a powerful tool for curricular innovation, now may be the time to retire it in favor of more actionable concepts.[15] Also, Martimianakis and colleagues recently conducted a scoping review and explored the link between the hidden curriculum and humanism in medicine.[16] Their valuable results show that the hidden curriculum is responsible for much of future physicians' professional identity formation.[16]

Given this finding and Macleod's concerns, we believe that it is essential for researchers to understand how the hidden curriculum is defined and applied within the literature to enable more effectively categorizing or analyzing its effects. Thus, we conducted this scoping view to systematically analyze the definitions and uses of the term "hidden curriculum" in the medical education literature. Our ultimate goal was to provide a strategic and deliberate framework for using the term "hidden curriculum" in the future.

Method

We employed a rigorous scoping review methodology[17] to map medical education's "hidden curriculum" literature. Scoping reviews are used for a variety of purposes, including to examine the extent, range, and nature of research activity; to determine the value of undertaking a full systematic review; to summarize and disseminate research findings; or to identify gaps in the existing literature.[17] This scoping review focuses on conceptual mapping, the process of establishing how a particular term—in this case "hidden curriculum,"—is used in the literature. We observed that within the medical education literature the term seemed to lack a distinct and universal definition; this ambiguity and its effects on curricular understanding prompted us to adopt this "concept mapping" approach, which we felt would allow for more systematic interventions based on *specific* meanings, knowledge, and learning encompassed by the hidden curriculum.

The particular approach to and level of rigor of a scoping review is important, as the technique is not standardized.[18,19] To ensure the reliability of our methods, we used the five-step approach originally described by Arksey and O'Malley[17] and later refined by Levac and colleagues: (1) identifying the research question, (2) identifying relevant studies, (3) selecting the studies, (4) charting the data, (5) collating, summarizing, and reporting the results.[20]

1. Identifying the research question

Our scoping review focused on answering the question, *How is the term "hidden curriculum" understood within medical education?* After conducting background research, we discovered that the terms "informal curriculum" and "implicit curriculum" are often used in conjunction with, or as synonyms for, "hidden curriculum." Thus, we decided to include these terms in our analysis.

2. Identifying relevant studies

After considering our project goals and consulting our university-affiliated librarian, we drafted the following Boolean search query for our database search: ("hidden curriculum" OR "implicit curriculum" OR "informal curriculum" OR "hidden curricula" OR "implicit curricula" OR "informal curricula") AND ("medicine" OR "medical"). Scoping reviews that aim to map global concepts such as the hidden curriculum must be comprehensive; thus, we scanned 7 databases: PubMed, Scopus, Web of Science, Proquest, Science Direct, JSTOR, and EBSCO Host (filtered to relevant results from ERIC, World Cat, Academic Search Complete, OCLC Article First, and PsycINFO). We conducted the initial search on October 20, 2015, and a follow-up search on March 21, 2017. In addition, because of our placement

in South Africa and the failure of some of the larger databases to include local journals, we decided to conduct direct searches of the African Journals Online database and the African Index Medicus. We did not limit the results by publication date, language, or study type at this stage.

3. Selecting the studies

We imported all the titles our search uncovered into Endnote software and deleted duplicates. Two of us (C.L. and T.M.) independently applied a screening tool to all retrieved article titles and abstracts to determine their eligibility for full article review. We used a kappa coefficient reliability test to determine the reliability of our screening tool. Because the initial test of 50 articles resulted in a kappa value of 0.78 (standard deviation [SD] = 0.151), which was below our goal of 0.90 ('almost perfect'),[21] we refined the screening tool and conducted a second test on 100 new articles. That test yielded an acceptable kappa coefficient of 0.96 (SD = 0.0332), and given the new high level of reliability, we (C.L., T.M.) each independently reviewed all nonduplicative titles and abstracts for inclusion. After this review, all of us discussed any discrepancies and came to a consensus on which articles to include for full review.

Next, each of us read a designated number of the articles selected for full review. We each applied strict inclusion/exclusion criteria to determine eligibility. To be included in the data extraction sheet, each article needed to

1. focus on and explicitly name the hidden, implicit, or informal curriculum,

2. involve medical school curricula—not solely curricula from other disciplines such as nursing, science, pharmacology, or the like, and

3. focus on students obtaining their medical degree, as that is understood in various countries (i.e., undergraduate medical education [UME] in the United States), and not exclusively on residents or fellows.

We excluded books, book reviews, commentaries, and letters to the editor, as well as non-English articles.

To confirm selection process rigor, we searched the bibliographies of ten selected articles for the terms "hidden" and "informal."[22–31] The search recovered no new articles, providing further support of the rigor and comprehensiveness of our search protocol.

4. Charting the data

We employed Arksey and O'Malley's "descriptive-analysis" approach to data extraction, summarizing information from the selected articles and recording the data in an Excel sheet (Microsoft, Redmond, Washington).[17] This allowed us to analyze the selected articles through a common framework. We also followed Levac and colleagues' recommendations for the data charting process.[20] First, we collectively developed the data extraction form to include both demographic data (e.g., year of publication, location of publication) and thematic categories (e.g., definitions of key terms, effects of curricular reforms, conclusions). The review process was iterative; that is, we added and edited columns to our spreadsheet as necessary throughout the process.

5. Collating, summarizing, and reporting the results

We synthesized and collated various themes that emerged from the data extraction sheet. The extraction sheet informed both quantitative and qualitative results and became a platform for synthesizing various definitions and effects of the hidden curriculum. We used qualitative thematic analysis, based in the grounded theory process of descriptive coding,[32] to generate the four conceptual boundaries (see Results). We extracted all the definitions of "hidden curriculum," "informal curriculum," and "implicit curriculum," directly from the data on our extraction sheet. We generated open descriptive codes (i.e., *organizational, institutional, interpersonal, interactions, norms, experiences, behaviors, socialization, outside formal, location, implicit, unintentional, culture, value*) directly from the definitions in the articles. Next, as outlined by Saldaña,[32] we synthesized these primary descriptive codes into coherent axial codes, grouping similar definitions (i.e., *organizational/institutional/structure, interpersonal/interactions/socialization, location-based/outside of formal/settings related, intention-determined/implicit*). The theoretical codes, presented below in Results as the four conceptual boundaries, emerged from each of these axial codes. Next, we coded the selected articles a final time to examine them for the presence of any conceptual boundaries (non-exclusively) and to gather final frequency statistics.

Results

Descriptive summary

Our initial search uncovered 3,747 titles, of which 749 were duplicative. After applying our screening tool to the remaining 2,998 titles, we identified 197 articles to include in our final analysis (see Figure 1 and Supplemental Digital Appendix 1). Of these 197, 121 (61%) were published after 2010, and only 14 (7%) were published between 1980 and 1999 (Figure 2). The bulk of the articles were either qualitative studies (n = 84; 43%) and perspective pieces (n = 71; 36%). Literature reviews (n = 17; 9%), mixed method studies (n = 13; 6%), and quantitative studies (n = 12; 6%) each constituted less than 10% of the total.

Of the 109 empirical studies, over two-thirds (n = 76; 70%) were conducted in the United States or Canada or in Central America. Other settings included Europe (n = 18; 16%), Asia (n = 8; 7%), and Oceania (n = 5; 5%). Our search produced only two empirical studies from Africa (2%), despite including the continent-specific databases—African Journals Online and the African Index Medicus—in our search (see Table 1). The hidden curriculum is understood as deeply context- and culture-dependent making this geographic gap problematic.[26, 33]

Although much of the literature speaks generally of the hidden curriculum within UME, some authors focused special attention on certain topic areas, including the hidden curriculum in relation to palliative and end-of-life care, [34–40] the surgical rotation,[41–44] postmortem exercises,[22,45–47] and attitudes toward marginalized or underrepresented groups. [48–51]

Identifying the hidden curriculum

Systematic techniques for identifying or categorizing the hidden curriculum are rare.[52] Through this scoping review, we compiled a list of research methods used to study the hidden curriculum. The most commonly used *quantitative* tools were the Communication, Curriculum, and Culture (C3) Survey and the Patient-Provider Orientation Scale.[53–56] Both of these tools, however, measure the hidden curriculum solely with respect to the patient-centeredness of care and do not extend to other elements of UME.[55] We noted that additional study- or site-specific surveys were employed in the three remaining quantitative studies, [34,57,58] but we identified no other standardized measurement tool for assessing the hidden curriculum. This lack of standardization is likely due to the ambiguity of the definition of "hidden curriculum" across settings and among authors, which we discuss in depth below.

The majority of *qualitative* studies employed interviews and focus groups of medical students to explore their self-identified understanding of the hidden curriculum; however, some studies used non-institution specific surveys such as Australia's Critical Reflection Tool to analyze the informal elements of their curriculum.[59] A number of investigators plumbed student and faculty reflections—written on paper and online—to find information relating to hidden curriculum[11,41,60–62]; however, the effectiveness of these methods for identifying the hidden curriculum is dependent on the definition of the term itself, something that is up for debate.

Addressing the hidden curriculum

Through our review, we extracted any methods cited as effective in changing or preserving the hidden curriculum. The most common recommendation was that schools make the hidden curriculum explicit to both faculty and students.[63–68] "Painful feedback," one author's term for the process of making the hidden curriculum visible, encourages presenting direct evidence of the harmful elements of the hidden curriculum to students and other stakeholders.[69] Open discussion and self-reflection were also often encouraged. [24,31,70–74] Chuang and colleagues state that separating curricular analysis at the individual, departmental, and institutional levels is necessary to ensure multilevel interventions.[75] Encouraging small-group learning, patient-centered curricula, humanities education, and better integration of marginalized groups also had positive effects on the hidden curriculum. [31,62,76–78]

Ambiguity in hidden curriculum

We noted ambiguity in both the definition and application of the term "hidden curriculum." Hafferty first described the term "hidden curriculum" in relation to medical education in 1994 and later (1998) distinguished it from the "informal curriculum."[2,4] As mentioned, Hafferty delineated the "hidden curriculum" as "a set of influences that function at the level of organizational structure and culture"; he felt the "hidden curriculum" included "the commonly held 'understandings', customs, rituals, and taken-for-granted aspects of what goes on in the life space we call medical education."[4](p404) Informal curriculum for him, on the other hand, is an "unscripted, predominantly ad hoc, and highly interpersonal form of teaching and learning that takes place among and between faculty and students."[4](p404) In

his understanding, the two terms are overlapping and influence one another but are not synonyms.

Through this scoping review, we found that the literature extends well beyond Hafferty's original definitions. The search tool uncovered articles variously referencing the "hidden," "implicit," or "informal" curriculum. Specifically, of the 197 articles we fully reviewed, 156 included at least one of our key terms (see Table 1): "hidden" (n = 184; 93%), "informal" (n = 76; 39%), and "implicit" (n = 4; 2%). Using the extracted definitions from the articles, we were able to compare definitions across articles and map how each concept is defined in reference to the others. The most common and perhaps most alarming finding from this process was the ambiguous and interchangeable use of the terms "hidden" and "informal." Of the 197 articles we reviewed, 17% (n = 33) included both the terms "hidden curriculum" and "informal curriculum" without providing distinct definitions; that is, the authors of these articles often treated the two phenomena as equivalent (we included these 17 articles both in our count for articles citing the "hidden curriculum" and in our count of articles citing the "informal curriculum). Four articles included the term "implicit curriculum," and in two, [23,26] the term was also used interchangeably with "hidden curriculum." Some authors clearly see the hidden and informal curriculum as interchangeable while others see them as distinct concepts.

Conflicting connotations of hidden curriculum

The term "hidden curriculum" is ambiguous and generally non-neutral term.[16] By extracting the effects of the hidden curriculum from the articles we reviewed, we found the literature often portrays the hidden curriculum as negative or intrinsically in conflict with the formal curriculum. Balboni and colleagues' comments illustrates this sentiment: "We refer to the [hidden curriculum] as the process… which instills behaviors, attitudes, and values among trainees *in tension* with the ideals of the medical profession."[79][emphasis added] Further, the literature cites the hidden curriculum as a major factor in the erosion of idealism[63] and the increase in cynicism[80] and bias[81] that occur during medical school.

We found far fewer insights depicting the hidden curriculum as a positive element within UME, although they do exist. For example, some elements of the hidden curriculum, such as rural health placements or medical clerkships, seem to have an overall positive effect on students' experiences and their developing professionalism.[30,82,83]

Conceptual classification of hidden curriculum

As noted, we observed that the approach to and application of the "hidden curriculum" varies widely across the literature. To better understand the ambiguity, we attempted to map the use of the term. Using definitions extracted from all included articles and grounded theory methodology, four different but overlapping conceptions emerged (see Table 2). We propose the term is understood, depending on the article, as (1) an institutional-organizational concept, (2) an interpersonal-social concept, (3) a contextual-cultural concept, and (4) a motivational-psychological concept. As shown in Table 2, each conceptual boundary lends itself to a distinct disciplinary lens, retrospectively, policy, sociology, anthropology, and psychology.

Once we delineated the four classifications, we worked to understand their frequency of use and overlap. We noted that the various uses or conceptions of the term are not exclusionary or necessarily distinct; instead, authors have used them in tandem. Among the 197 articles we reviewed, the hidden curriculum as an institutional-organizational concept, applied in 82 articles (42%), was the most common. The interpersonal-social conception, applied in 57 articles (29%) was the 2nd most common, followed by contextual-cultural (applied in 40 articles [20%]), and, finally, motivational-psychological (applied in 20 articles [10%]). Notably, a full fifth of the articles (n = 41 [21%]) did not include a direct definition for the term "hidden curriculum." Additionally, another 20% of the articles (n = 40) used a definition that included more than one conceptual boundary. The most common overlap, used in 35 articles (18%), was between the institutional-organizational and interpersonal-social conceptions. Gaufberg exemplifies this cross-concept application when she writes,

> we use the term "hidden curriculum" to refer to learning that occurs by means of informal interactions among students, faculty, and others [*interpersonal-social*] and/or learning that occurs through organizational, structural, and cultural influences intrinsic to training institutions [*institutional-organizational*].
> 71 (italicized words in brackets added for illustration)

Researcher positionality in hidden curriculum studies

Importantly, the conceptual boundary used in hidden curriculum studies is not arbitrary but, instead, is likely informed by the researcher's (or researchers') reflexivity, expertise, and/or fields of study—and, in turn, the boundaries chosen by individual researchers directly affect their study methods, outcomes, and recommendations. Table 2 highlights the discipline most associated with the various conceptions. For instance, researchers who view the hidden curriculum as an interpersonal-social concept are likely to use sociological methods to explain or uncover its effects. The methods of these studies often involve eliciting self-reflection from individual students, and the results focus on individual- or departmental-level interventions. On the other hand, research that examines the hidden curriculum as solely an institutional-organization concept must extend beyond the individual learner to the culture of the medical school as an organization; thus, the unit of analysis for these studies is almost always the medical institution. Proposed interventions from these studies often entail changes to policy, programs, or curricula, and they usually differ in scope from those using other conceptual boundaries.

Discussion

Use of the term "hidden curriculum" in the literature is clearly on the rise: nearly half of the articles we included have been published since 2012. Further, although originally understood as distinct phenomena,[2] "hidden" and "informal" curricula have become increasingly blurred, as shown in the 17% of articles that use the terms synonymously. Thus, we believe that it is essential for scholars to effectively describe what they mean by the hidden curriculum and where they see its influence within UME.

Recommendations for scholars investigating the hidden curriculum in UME

Recommendation 1: Specify the conceptual boundary and the context—The conceptual boundaries outlined here may provide clarity to a term that has garnered criticism from some[15] due to its ambiguous and seemingly ubiquitous use. The widespread application of "hidden curriculum" as a term may make researching and evaluating the efficacy of various hidden curriculum reforms difficult. In addition, UME operates in many contexts—whether these are formal classroom teaching, medical clerkships, electives, or other spaces. Although many norms and values span learning environments, hidden curricula and their impact are context-dependent and should not be viewed as a monolith spanning all settings. Therefore, education policy would benefit greatly if authors explicitly addressed the following in publications regarding the hidden curriculum: (1) the conceptual boundary or boundaries they are applying to the term, and, (2) the specific learning environments in which they see the hidden curriculum acting (i.e., is the hidden curriculum bounded or unbounded by certain spaces?). Recommendations to address the hidden curriculum will vary based on the conception used, so the efficacy and efficiency of curricular reforms may depend on employing the proposed conceptual framework outlined in Table 2.

Recommendation 2: Clarify research methodologies and results—We argue that UME is filled with hidden curricula—not blanketed by a singular hidden curriculum. We believe that, moving forward, authors should make explicit the what, where, and how of their hidden curriculum as they see and are investigating it—within both the methods and results sections of their research reports. Explicitly specifying will allow policymakers and curriculum developers to better identify literature related to their own particular needs and initiatives. Using a more systematic framework for discussing the hidden curriculum will also better inform the teaching practices of medical educators themselves. Asking students to reflect generally on the "hidden curriculum" they experienced during their years in medical school is akin to asking them to reflect on the complete formal curriculum: both tasks are daunting and likely to yield unspecific or incomplete and possibly unhelpful results.

Recommendation 3: Remember the positive—To better understand and therefore harness the power of the hidden curriculum, however defined, researchers may also need to focus on its *positive* effects. By better studying and publicizing these positive examples, the medical education community may find ways to blunt the broader harmful effects.

Recommendation 4: Consider other settings—Research into hidden curricula in UME has so far been limited mostly to the United States and Canada. Two-thirds of the empirical studies in this review involved U.S. and/or Canadian medical schools. The medical education community's understanding of hidden curricula is based on a very specific medical education system. For instance, U.S. and Canadian medical schools award medical degrees solely to physicians in training who have completed their undergraduate (baccalaureate) education, whereas many medical schools in Africa and Europe employ an UME system through which trainees earn both their baccalaureate and medical credentials. These two approaches likely differ in many aspects, including goals and expected competencies. Additionally, as Fins and del Pozo point out, the hidden curriculum varies

among cultures or locations, even if they employ a similar curricular format.[26, 33] We believe, therefore, that any new research must examine medical schools in these under-studied regions (Africa, South America) to avoid creating a sense of homogeneity among what may be very different hidden curricula.

Recommendation 5: Develop more quantitative tools for studying hidden curricula—We noted a paucity of quantitative studies examining the hidden curriculum. This deficit is likely due, at least in part, to the inherent difficulty in measuring much of what is bounded by this term. The hidden curriculum is deeply contextually and culturally dependent and thus does not lend itself well to quantifiable measurement[26,33]; however, some quantitative measurement tools do exist. The most commonly used quantitative tools cited in the articles we reviewed are the C3 Survey and Patient-Provider Orientation Scale. [53–56] These tools are limited in that they measure the hidden curriculum only with respect to the patient-centeredness of care. Developing new quantitative measurement tools to evaluate the hidden curriculum in relation to other topics (e.g., standardized exam performance, student mental health, and specialty choice) would be of benefit.

Study limitations

Although we sought to be as thorough as possible, the study is limited to the articles uncovered by the nine literature bases we searched. We believe our inclusion/exclusion criteria were clear and effective—and multiple independent reviews and the results of our kappa coefficient tests support the reliability of the article selection process—yet we may have inadvertently excluded some relevant studies. Also, per the scoping review approach, we did not consider the quality of the studies we included; this lack of discrimination should also been considered when extrapolating results.

Conclusions

As of now, the term "hidden curriculum" in medical education remains shrouded in a fog of vague definitions and widespread application. This scoping review illuminates the various ways the term is used, and we encourage future authors to move away from general musings on its ill effects toward, instead, studies that consider context and conceptual boundaries, clarify investigators' positions, consider the positive, evaluate diverse settings, and lead to new tools for measuring hidden curricula. These efforts might help improve the powerful hidden curriculum of medical education.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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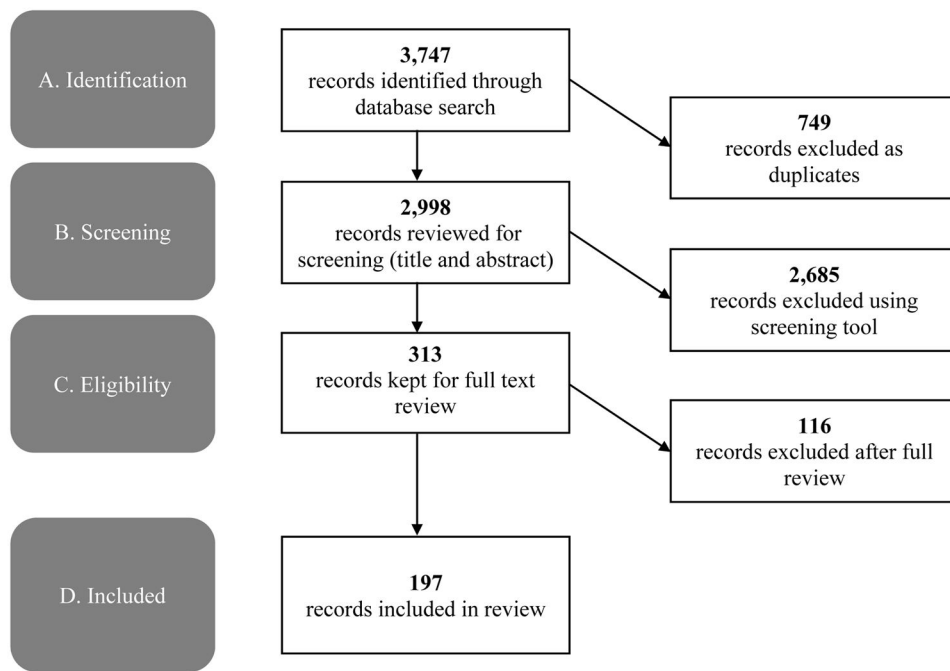
Figure 1.
Flowchart of search process and results. The flowchart outlines the process through which the authors selected the articles included in this scoping review.
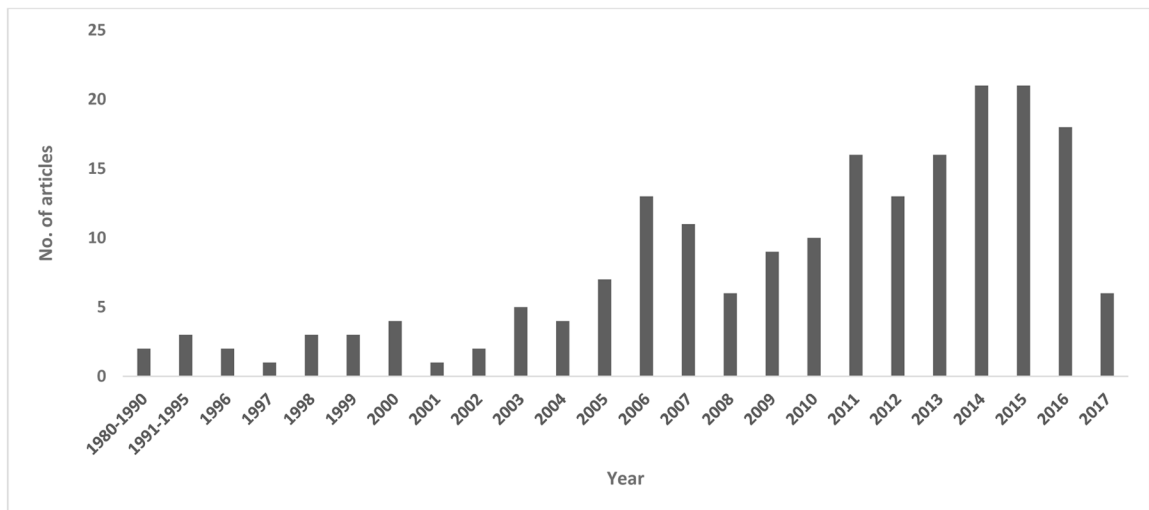
Figure 2.
Publication frequency of articles included in this scoping review by year. Note: The years on the x-axis are in non-linear groups due to the relatively few publications in years prior to 1996.

Table 1

Summary of Articles Included in 2017 Scoping Review of the Medical Education Literature on the "Hidden Curriculum"

Characteristic	Number (%)
Study type	
Qualitative	84/197 (43)
Perspective	71/197 (36)
Review	17/197 (9)
Mixed methods	13/197 (6)
Quantitative	12/197 (6)
Study location[a]	
The United States, Canada, and Central America[b]	76/109 (70)
Europe	18/109 (16)
Asia	8/109 (7)
Oceania	5/109 (5)
Africa	2/109 (2)
South America	0
Term used	
Hidden	184/197 (93)
Informal	76/197 (39)
Implicit	4/197 (2)

[a]The denominator includes only the 109 empirical studies; the authors have excluded reviews and perspective pieces.

[b]Here Central American comprises Grenada.

Table 2

Conceptual Boundaries of the Hidden Curriculum, Developed Through Grounded Theory Qualitative Analysis of 197 Articles on the "Hidden Curriculum" Discovered Through a 2017 Scoping Review

Concept (and frequency of use[a])	Example "definitions" from the literature	Description	Disciplinary lens
Institutional – organizational (n = 82 [42%])	• "[The hidden curriculum is] a set of influences that function at the level of organizational structure and culture."[4]	• Based on Hafferty's original definition, the hidden curriculum operates at the institutional level[4]	Policy and business
	• "We defined the hidden curriculum as the physical and workforce organizational infrastructure that influences the learning process."[84]	• Powerful tool for analyzing organizational or macroculture of medical education[86]	
	• "The hidden curriculum is defined as the organizational structure and culture that influences learning."[85]	• Focuses on medical school structure, norms, and culture [33,81,87–89]	
		• Visible within institutional policy, evaluation activities, resource allocation, and institutional slang[4]	
Interpersonal – social concept (n = 57 [29%])	• "The premise of this hidden or informal curriculum is that students learn such things as professional behavior not only in classes but also in their day-to-day interactions with faculty, residents, staff, and patients in the context of clinical care." [90]	• Denotes interpersonal learning, either structured or unstructured [10, 93–94]	Sociology
		• Socialization process of medical student learned via interaction [95]	
	• "[T]he implicit messages being conveyed continually to students through a lecturer's or a role model's example, rather than the person's spoken words."[91]	• Often uncovers various subcultures within medical education (e.g. physician, student, patient, medical specialty)[86]	
	• "The hidden curriculum runs parallel to the formal curriculum and is a process of socialization to the complexities of physician–patient, physician–interprofessional team, and physician–community relationships."[92]	• Deeply dependent on learning environment[96]	
		• Synonymous with Hafferty's definition of "informal curriculum"[4]	
Contextual – cultural concept (n = 40 [20%])	• "The "hidden" or "informal" curriculum [is] the broader cultural milieu of medical education that occurs outside of formal instruction." [97]	• Broad categorization that encompasses any knowledge transmission occurring outside the "formal curriculum"[73]	Anthropology
	• "Implicit curriculum includes learning activities (also referred to as the hidden or informal curriculum) that occur in the shadow of the explicit curriculum but are beyond direct control of curriculum leadership, such as the modeling of behaviors of residents."[23]	• Often is transmitted beyond traditional and/or explicit learning environments [11,76,98]	
		• The broadest conceptualization of the term, applicable to anything learned without being explicitly stated in the curriculum	
Motivational – psychological concept (n = 20 [10%])	• "Unintended lessons in education through informal dialogue, messages, and interactions at school"[99]	• Determined by the motivation behind the knowledge exchange	Psychology
	• "In addition to the intentional teaching of knowledge and skills by surgeons to their trainees and protégés is the unintended, often	• Hidden curriculum, under this definition, is largely unintentional	

Concept (and frequency of use[a])	Example "definitions" from the literature	Description	Disciplinary lens
	unrealized transmission of implicit beliefs, attitudes, and behaviors through a process called the hidden curriculum"[44] • "The hidden curriculum refers to attitudes and values unwittingly transmitted to students both by what is (and is not) taught and how such teaching features in the curriculum."[46]	• Authors use terms such as "unintended,"[100] "unrealized,"[41] and "tacit"[101] to describe this categorization of hidden curriculum	
Undefined (n = 41 [21%])	• No direct in-text definition of the terms "hidden," "informal," or "implicit" curriculum found within the article	• Definition of term is assumed to be understood by author without directly explaining in the article	

[a]The denominator for the frequency of use is 197, the total number of articles subjected to a full review. Notably, 20% of the articles (n = 40) contained elements of two or more conceptual boundaries, which highlights the non-exclusivity of these definitions. The most common overlap, occurring in 35 articles (18%) was between the institutional-organizational and interpersonal-social conceptions.