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Systematic Reviews And Their Epistemological Foundations: A Narrative Review Of The Literature

Oscar Eliezer Mendoza de los Santos[1] , Gabriela María Luisa Riquelme Alcantar[2] , Adalberto de Hoyos Bermea[3]

[1]*https://orcid.org/0000-0001-9448-4947, CIDETAC, Universidad Autónoma de Tamaulipas, omendoza@uat.edu.mx*
[2]*https://orcid.org/0000-0001-7775-2938 , CIECAS, Instituto Politécnico Nacional, griquelme@ipn.mx*
[3]*https://orcid.org/0000-0001-7509-7714, CIECAS, Instituto Politécnico Nacional, adehoyos@ipn.mx*

Abstract

Systematic reviews are often recognized as the best source of evidence in several fields. However, the literature indicates a lack of reflection on their epistemological foundation. This article describes a narrative review of the literature that deals with these issues to form a state of knowledge. From searches in various databases, the scarcity of approaches to the epistemology of the systematic review stands out. Among the main interests detected are the discussions regarding positivist positions in carrying out reviews; criticism of reflexivity in the review process; the relevance of the hegemonic model of Evidence-Based Medicine; and the need for methods to synthesize mixed evidence.

Keywords: systematic review, epistemological foundations, evidence synthesis, scientific evidence, evidence-based practice.

Introduction

The increase in empirical research in multiple fields of science, starting in the 20th century, made it imperative to develop methods that allow scientists and professionals to review and synthesize the evidence regarding a given issue (Sánchez-Meca, 2010). Although the review of the scientific literature is an activity as old as science itself, the conscientious interest in the development of systematic review techniques is relatively recent.

In this sense, in recent decades, there has been a considerable growth of research whose objective is the characterization and, or systematized synthesis of sets of scientific research in various areas (Shadish & Lecy, 2015). The general label under which this type of effort has been covered is that of systematic reviews (SR), defined as a type of research which has as a source of data the existing scientific literature on a given topic. Their goals are to identify, evaluate, describe and, in many cases, synthesize the results of the investigations exposed in the literature in question, through strictly specified and impartially applied methods, (Letelier, Manríquez, and Rada 2005; Ferreira González, Urrútia, and Alonso-Coello 2011).

Despite the increasingly frequent use of systematic reviews (Fontelo & Liu, 2018), it should be noted that they are not exempt from criticism regarding their limitations and validity. Thus, the claim to place the systematic review as the best source of scientific evidence has been criticized (Jansen 2017; Greenhalgh, Thorne, and Malterud 2018); on the other hand, numerous claims have been made regarding the excessive use of positivist methods, such as meta-analysis, to synthesize scientific findings (Brannan et al.,

2017). Likewise, their contribution to the generation of scientific knowledge has been questioned. Various authors (Meerpohl et al., 2012) have pointed out that systematic reviews present a lower degree of scientific originality (in the sense of the novelty of the knowledge acquired) and a decreased methodological rigor in comparison with primary research.

A central argument of this article is that the answers to this type of criticism and problems require a deep epistemological reflection that contributes in clarifying issues related to the conception of the systematic review as a form of research (for example, from positivist paradigms).Some of these issues are the nature of the knowledge obtained in this type of review, the value of the methods by which the scientific evidence is synthesized, the relationship that the systematic review has with different scientific and practical disciplines, among others.

However, as Schryen, Wagner, and Benlian (2015) have pointed out, there is a lack of efforts to analyze and discuss the conceptual and epistemological foundations of systematic reviews and their contribution to the development of science. This scarcity is evident in many texts. Although the features and technical guidelines for the development of systematic reviews are addressed, little or no attention is paid to the foundation of these forms of research.

For this reason, this article aims to undertake a narrative review of the literature dealing with these problems to critically establish an overview of the latest advances in this matter. To do this, in the first instance, the main features of systematic reviews are described in a general way. Subsequently, an analysis of the identified literature is offered, detailing the proposals and arguments related to epistemological aspects of this type of review. This article expects to contribute to the knowledge of the epistemological foundations of the systematic reviews and the discussion about its legitimacy as a form of research.

Features of systematic reviews

In general, any systematic review is made up of the following steps, which are carried out following objective and strictly specified methods: 1) structuring of the question that guides the review, 2) identification of relevant studies, 3) evaluation of the quality of said studies, 4) data analysis and, or synthesis, and 5) presentation of results (Khan et al. 2003; Perestelo-Pérez 2013).

Gough, Oliver, and Thomas (2012) point out that traditional reviews of the scientific literature have been characterized by the critical exposition of the findings of a series of research works, but without considering specific criteria when choosing which of these works should be included, or not, in the review. This review presents information on the aspects of interest to the reviewer following a narrative format, which is why they are generically referred to as narrative reviews (Letelier et al., 2005).

Thus, through systematic reviews, we seek to overcome some of the limitations or problems that arise in traditional assessments of the literature, such as selection bias derived from the lack of explicit criteria for selection and integration of literature (Torgerson 2003; Urra Medina and Barría Pailaquilén 2010).

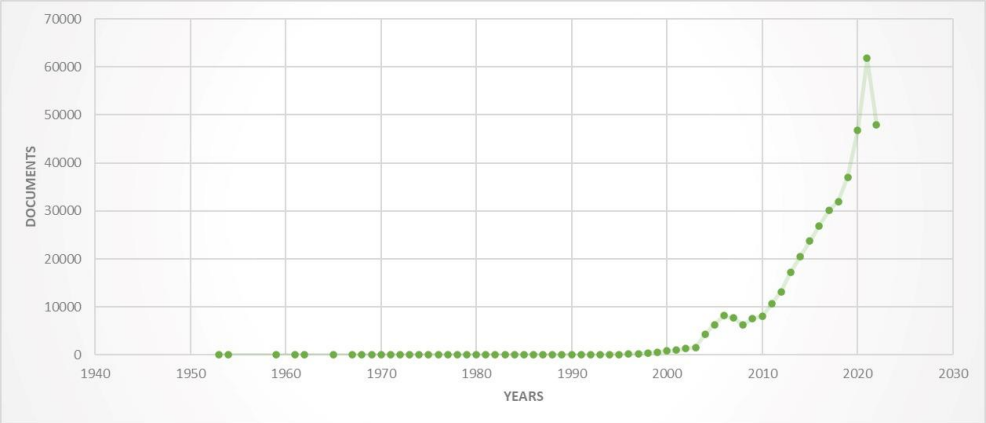
The position of this article is that classic reviews are not without value. However, given the rapid increase in primary research publications in multiple science sectors, it has become imperative to generate alternatives that allow professionals to reach reliable conclusions regarding the research evidence, thus optimizing decision-making in particular items (Sánchez-Meca, 2010). Following Petticrew and Roberts (2006), if a review intends to be a genuinely relevant summary concerning what the scientific

evidence supports on a given topic, said summary must be comprehensive, objective, and reliable, even when it is recognized that said qualities are not always attainable in an absolute way. For this reason, systematic reviews have been placed at the top of the hierarchy of scientific evidence (Burns et al., 2011).

These reviews have taken a leading role in making informed decisions in areas such as human development and implementation of public policies (Oliver et al., 2018) and, especially, in the so-called Evidence-Based Medicine (EBM), whose primary interest is to provide reliable information on the effectiveness of different treatments or interventions, which could help clinical decision making, by synthesizing information from multiple randomized trials (Solomon 2011; Vidal, Borroto, and Oramas 2014).

The interest in carrying out this type of review is reflected in the growth of its production in recent decades. A quick search in Scopus, using the term "systematic review," yields 395,857 documents. As seen in figure 1, the number of systematic reviews (in the case of Scopus) is null or very low before the year 2000, detecting an increase from 2008. It is essential to note that between 2010 and 2021, a total of 324,265 systematic reviews have been produced, corresponding to 81.9% of the total production and that 62,058 reviews of this type have been reported only in the year 2021.

Figure 1. Documents by year in Scopus under the term “systematic review.”



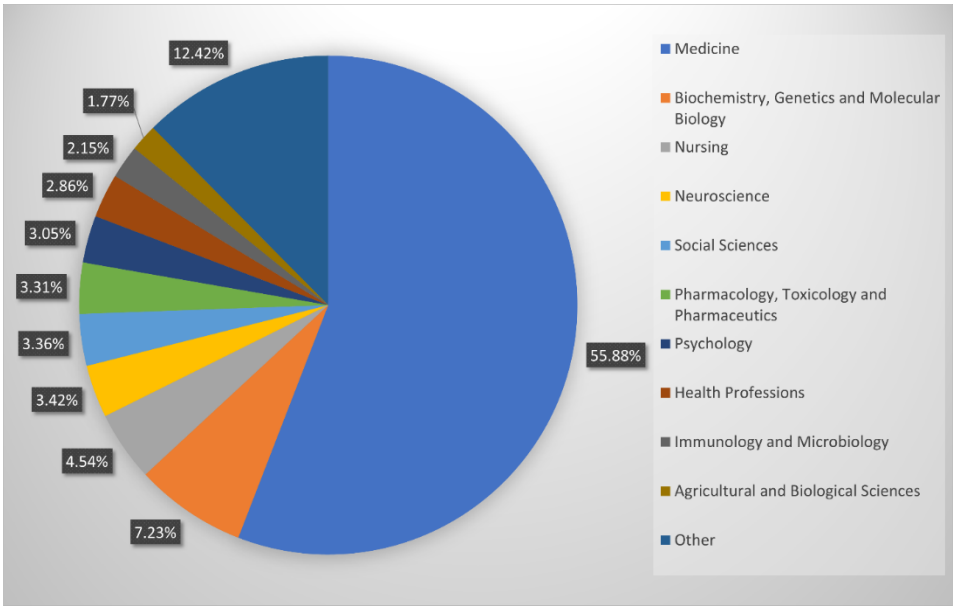
Source: (Elsevier, 2022)

Note: The graphic shows the number of documents per year that include the term “systematic review” in the title, abstract, or keywords. It can be seen how the distribution of texts is concentrated towards the year 2000 and later.

In addition, figure 2 shows that 56% of the documents found correspond to the area of medicine. However, if we consider the percentages of areas such as nursing (4.6%), immunology (2.1%), and pharmacology (3.3%), among others, the proportion of reviews in the health area exceeds 66%.

Figure 2. Percentage distribution of the texts detected in Scopus by area of knowledge.

Most of these correspond to the field of medicine.



Source: (Elsevier, 2022).

As seen in figure 2, the high percentage in medicine (56.0%) contrasts with that reported for social sciences (3.3%). This situation can be explained because systematic reviews have always been strongly linked to the area of health and evidence-based medicine (Clarke & Chalmers, 2018), where the quantitative-experimental tradition prevails. Given that the adoption of qualitative approaches is usual in the social sciences, it is expected that specific difficulties will arise in using systematic reviews in this field.

Currently, systematic reviews are used in different fields and in the face of highly relevant problems, for example, the controversy to determine the effectiveness of treatments for Covid-19, such as chloroquine and hydroxychloroquine (Ghazy et al., 2020). Additionally, we find some classic review like that of Martinson (1974) to determine the effectiveness of efforts aimed at the rehabilitation of prisoners; the study by Gilbert et al. (2005) on the correlation between sleep position of infants and Sudden Infant Death Syndrome; as well as the meta-analysis carried out by Smith & Glass (1977) for the evaluation of the effectiveness of psychotherapy.

The data shown explains the concept of a systematic review and its presence in the scientific panorama. The article starts from this context to offer a more detailed analysis of the epistemological issues linked to these reviews.

Methods

Type of investigation

A narrative review of the literature was carried out, describing and discussing a set of texts on the epistemological foundations of SR from a contextualized and theoretical perspective (Rother, 2007).

Search strategy

The following databases were searched: Philosopher's Index, PhilPapers, Humanities, JSTOR, Web of Science, Scopus, and ProQuest. The search syntax was, in each case: (epistemology OR epistemological OR epistemic OR philosophy OR philosophical) AND

("systematic review" OR "systematic reviews" OR "evidence synthesis" OR “research synthesis”).

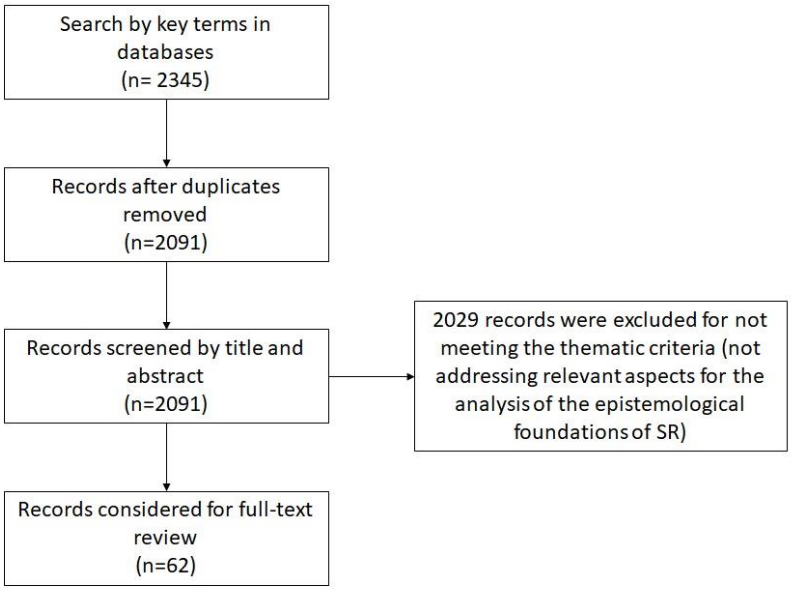
In the case of Philosopher's Index, PhilPapers, and Web of Science and Humanities, the terms were searched anywhere in the text. In contrast, in the case of Scopus, ProQuest and Jstor, given the large number of results obtained, only the title, abstract, and keywords were assessed, discarding documents not directly related to the systematic reviews. Only articles in English and Spanish languages were included.

A specific time interval was not established, as we considered it more important to locate those reflections of a philosophical/epistemological nature on systematic reviews, regardless of their year of publication.

Results

Figure 3 summarizes the review process. In addition to the material detected in said search, literature outside the latter is used, to which the authors of this article already had prior access, such as Gough, Oliver, and Thomas (2012), Patry (2013), Weisburd, Farrington, and Gill (2016), which was included due to its relevance to the issues addressed here.

Figure 3. General flow chart of the review carried out.



Source: self-made.

Note: The diagram shows the general flow of the search in the databases and the selection of texts. Given the nature of this review, an assessment of the methodological quality of the selected material was not carried out.

Discussion

This discussion has been structured around two main axes: 1) Epistemological positions to carry out a systematic review and 2) Epistemological principles that support the systematic review. Thus, in the first of these axes, issues related to the presence of positivist approaches in the field of SR are particularly discussed, as well as the conceptions of objectivity and evidence that arise from these positions. In the second axis, special attention is paid to the principles that support the systematic review as a form of research, which

allows weighing its use from non-positivist perspectives and in contexts other than EBM.

Epistemological positions in conducting systematic reviews

The main concern that stands out in the detected literature revolves around the epistemological positions from which one starts to carry out SR, which affect all stages of a review, from the definition of the criteria used to select primary studies, as well as the critical evaluation of the same, all the way to the final steps of synthesis and presentation of the findings (Sheble, 2014).

According to Hammersley (2001), it is possible to detect a positivist trend within these reviews in at least two ways. First, it should be noted that numerous SRs have been carried out that prioritize the inclusion of experimental and quantitative studies as a source of solid evidence, leaving aside any other type of studies; second, how these SRs are constructed is based on a positivist perspective, in which it is highly valued to carry out literature reviews with the highest possible degree of objectivity, by using statistical methods to integrate the scientific evidence and avoid any bias. Hammersley considers that even though it has been proposed that it is possible to include qualitative studies within an SR, it is not entirely clear how such work can be carried out, given the positivist framework on which systematic reviews are based.

For their part, Suri and Clarke (2009) point out that it is possible to identify two fundamental aspects in the execution of SR, namely: 1) the one that prioritizes the use of meta-analysis (quantitative synthesis) and 2) the other focused on the integration of qualitative research. The first approach starts from basic epistemic assumptions, such as the interest in using quantitative data, which statistical techniques can integrate; and the preponderance of experimental research to achieve scientific knowledge. On the other hand, the need to include qualitative research in systematic reviews has been pointed out, seeking the development of strategies of search, evaluation, and synthesis of the evidence obtained in qualitative studies. Notwithstanding this distinction, the fore mentioned authors indicate that, researchers who use SRs (in either of the two aspects) favorably value the use of clearly specified protocols to guide their reviews, exhaustive searches, as well as the objectivity and transparency of the review process carrying out an SR. The reproducibility of the results, as well as the analysis that emerges from them, is one of the features that guarantee the objectivity of the systematic reviews in both aspects discussed. Suri and Clarke (2009) consider that on many occasions, the prescriptions of objectivity and transparency neglect, however, the reflective component that is a fundamental part of the literature review process.

Similar criticism has been made by MacLure (2005), who considers that the excessive positivist pretensions of SR weaken the central acts of all revision: reading, writing, and, in general, all those intellectual acts derived from these, such as interpretation, argumentation, and analysis. He suggests that in this field, there seems to be a solid propensity to consider that data speaks for itself once it is extracted and evaluated. But this trend is difficult to sustain, since it is accepted that none of the steps of a systematic review is free of value judgments (value-free). Even in the data integration steps that are usually considered objective consider values, such as those that are the product of measurements (Birchley & Ives, 2022).

In addition, Polonioli (2020) warns that, although SRs enjoy transparency and reproducibility (aspects that are usually highly valued in the scientific field), the discoverability of new information may be reduced in such forms of review, being an aspect that could benefit more from narrative forms of review (especially with the advancement of artificial intelligence that

contributes considerably to personalized literature recommendations). This is somewhat related to the statement that the systematic review, rather than being a process of generating theory, is a means of aggregating similar data to test it (Birchley & Ives, 2022).

Nevertheless, Holman (2019) considers that it is essential not to ignore that objectivity, rigor in articulating evidence evaluation rules, and transparency of the procedures used are virtues (especially of SRs that operate on quantitative data, such as meta-analysis) that not only serve as a means of constraining research but can contribute to productive disagreement and the resolution of methodological disputes. Hence, it is not simply the blind mixing of data. The evaluation of the quality of research and evidence (through specific criteria) that are considered in a review provides meta-scientific knowledge, that is, knowledge about scientific research, for example, the rigor of its methodological design, representativeness of the sample, type of data analysis, and others Mendoza (2021).

In any case, if one considers that SRs have been strongly associated with medical research from the beginning, such a predominance of quantitative methods and the preference for statistical and experimental data is not surprising. In addition, the hierarchical system of evidence that emerged in EBM, regarding which it should be said, various questions and criticisms have been formed (La Caze 2011, Stegenga 2014) may have contributed to conceptualizing in a debatable way the role of a systematic review and its relationship with other forms of research. In this regard, Mebius (2014) has suggested that automatically taking the evidence from a particular type of research (e.g., experimental) as if it were of better quality is unjustified. His reasoning is based on two fundamental premises: 1) the same research method can produce disparate evidence 2) even an incomplete or faulty methodological choice can produce evidence of great value[1]. It suggests, therefore, that the evidence obtained through the execution of different research designs be corroborated by comparing evidence from experimental studies with that of non-experimental studies.

Moreover, although SRs (especially from experimental studies) can be considered to provide substantial synthetic knowledge with a high degree of internal validity (validity of causal inferences) (Moosapour et al., 2021), this does not mean that these reviews are superior and replace other means of obtaining evidence, such as qualitative research, which has particular implications in the external validity of scientific findings, as well as in clinical judgment (Mickenautsch, 2010). Hence it can be questionable to consider this the golden standard of the MBE model for the synthesis of evidence (Malterud, 2019).

Despite the hegemony of the type of SR associated with EBM, its use is becoming more frequent in various fields such as psychology, linguistics, social work (Braye & Preston-Shoot, 2007), and criminology (Weisburd et al., 2016) and even philosophy (Polonioli, 2019). To the extent that each of these disciplines has their own objects of study and defined methods for constructing data and interpreting evidence, the question arises as to whether it is necessary to configure systematic reviews with specific epistemological assumptions and, consequently, methodologies according to said assumptions.

Thus, in the educational field, the role of the systematic review has been analyzed in detail, recognizing that, although there are certain commonalities between the use of SR in medicine and the educational field, in the latter, the situation may be different because while in the traditional model of EBM aspects of

effectiveness and technical and experimental efficiency have been highlighted, elements of a social and ethical nature have been left aside, so the use of SRs that integrate other types of research should be considered experimental (Evans & Benefield, 2001).

There are specific assumptions of certain types of systematic reviews regarding the nature of scientific knowledge and how to obtain it. The so-called "paradigm wars" have been a topic that has appeared relatively frequently in the field of SR and evidence synthesis (Lockwood et al., 2019) and generally, in social scientific research (Alastalo, 2008); these are discussions of great relevance since they constitute a core aspect of our understanding of the world. In this context, Suri and Clarke (2009) and Suri (2013) propose a form of selective eclecticism, from which the diversity of means to carry out the synthesis of scientific research is recognized, and which responds to the evolution of primary research, which has been changing over time, conceptualizing objects of study in a different way and approaching them with other methods in addition to experimental and statistical meta-analysis. Likewise, from positions such as critical realism, frameworks have been proposed for the synthesis of evidence using multiple methods; the importance of synthesizing information to identify the mechanisms that link scientific results with practical considerations and decision-making has been underlined (Boyle et al., 2016).

There seems to be, therefore, no reason to suppose that a systematic review is inherently positivistic. Thus, it is possible to consider methodologies and evidence of a heterogeneous nature to address specific problems, which is increasingly common, as can be seen in the developments regarding the synthesis of qualitative evidence and mixed evidence (Thorne 2017, Pluye and Hong 2014), as well as the inclusion of non-randomized or even observational quantitative studies (Moosapour et al., 2021). To understand how this would be possible, it is convenient to start by recognizing those assumptions common to all systematic reviews, that is, those presuppositions from which one can start to develop SR of various epistemological commitments.

In this sense, Gough, Oliver, and Thomas (2012) suggest that a systematic review is made up of various activities, both equally important: identifying and describing the research on a particular object of study; critically and systematically evaluating research, and finally, integrating the findings into a coherent proposal or set of recommendations, that is, synthesize scientific research. They also emphasize the plurality of ways to carry out literature reviews, which they conceptualize as legitimate forms of research by indicating that the term "systematic review" suggests that literature reviews are, by themselves, pieces of research that need to be carried out according to a method (Gough, Oliver, et al., 2012).

This appreciation is important for at least two reasons: first, it gives an insight to the foundations of SR by defining them as a form of research in itself, which must, therefore, follow certain principles to produce its knowledge and, of course, distinguish it from other forms of knowledge production. Secondly, this notion contradicts the fairly widespread idea of instrumental SRs, which serve as a mere bridge between scientific research and the development of public policies (Hammersley, 2001). If the systematic review constitutes a form of study in itself, it is a rational, critical and dynamic activity that can be useful not only as a tool for making informed decisions in practical settings but also for producing genuine knowledge through perfectible methods.

Epistemological principles of systematic reviews

Gough, Oliver, and Thomas (2012) justify the use of SR and its place as a genuine epistemic activity arguing that: i) any individual investigation is fallible, either by chance or because of how it was designed, conducted and reported; ii) any individual study may be of limited relevance due to its scope and context; iii) a review provides a more comprehensive and robust picture based on multiple studies and settings, rather than single investigations; iv) the task of keeping abreast of all previous research and new research is usually too long for a single individual; v) the findings of a review provide a context for interpreting the results of new primary studies; and vi) undertaking new primary studies without being informed about previous research may be unnecessary, inappropriate, irrelevant, and even unethical.

The above are some general epistemological principles on which SRs are based. Thus, the first of these assumptions highlights the fallibilist nature of knowledge, that is, the notion that no belief (including scientific hypotheses and theories) can be conclusively justified, therefore always having a margin to doubt its veracity (Niiniluoto, 1999). On the other hand, the point seems to be related to the cumulative nature of scientific knowledge, which has been widely discussed in the philosophical and scientific literature (Bird, 2008). Faced with a growing accumulation of knowledge, it is necessary to develop methods and techniques to be able to evaluate and synthesize scientific findings, while reducing biases in evidence selection, which, has a strong relationship with the principle of total evidence (Mebius et al., 2016).

Points iv, v and vi are related to access to knowledge and scientific evidence and the use of these in scientific practice. A single individual's difficulty in keeping abreast of new research is an aspect of great importance related to the social nature of science as an eminently human activity. Having access to exhaustive reviews of the scientific literature opens the door not only to the possibility of staying up to date on a specific subject but also to making contextualized interpretations of the results of new scientific studies, making it possible to evaluate their coherence concerning the body of knowledge already established. This makes it possible to determine the value of the latest findings, as well as their epistemic justification in the scientific context, since results that contradict what has been established by previous research will have to be thoroughly reviewed to find the reason for said contradiction, which can be found, by. For example, methodological deficiencies of the study and inadequate interpretation of results may also indicate weaknesses in the theory that prevent the incorporation of genuine empirical findings.

It should be noted that in none of the cases described is it indicated that SRs should be applied in a specific field of knowledge (for example, medicine), nor should they follow a strictly quantitative or qualitative approach or focus on research that has a particular design (e.g., experimental designs) (Moosapour et al., 2021). This is consistent with a vision according to which SRs must be carried out in different ways, considering the various types of primary research on an object of study, the variety of data types, diversity of analysis and interpretation techniques, among others. In this sense, such an integral and comprehensive conceptualization of the systematic review highlights the scientific and structured nature of these but, at the same time, allows compatibility with the plurality of methods for its development, which implies the acceptance of epistemological assumptions underlying the different forms of SR (Gough, 2015).

Although, in theory, it is easy to raise these issues, in practice, it can be complex to identify and, consequently, summarize in detail the different epistemological perspectives from

which the different types of reviews start, as Gough and Thomas (2012) argue, there are some obstacles in this regard. Rarely there is an explicit statement of the epistemological positions of a review and often multiple epistemological outlooks are traceable within a single study. Recent evidence suggests (at least in the case of qualitative SRs) that authors often do not explicitly state their epistemological positions, which is not the same as lacking an implicit epistemological position (Kelly et al., 2018).

On the other hand, this multiplicity in epistemological positions on the same SR is, without a doubt, an aspect that requires a deep reflection that goes beyond the limits of this work; however, it is possible to consider that to a certain extent, it seems to be a sensible possibility, which has been reflected in the development of mixed systematic reviews (Gough 2015, Pluye and Hong 2014). Additionally, from positions such as critical multiplism (Figueredo 1993, Patry 2013), the execution of multiple studies concerning the same phenomenon has been promoted, making joint use of different methodologies and theoretical approaches, assuming that this can contribute to attenuating biases brought about by the isolated use of each perspective.

As can be seen, the former is a considerably more comprehensive perspective on SR (compared to the classic MBE model), which does not limit the conceptualization of the systematic review to a mere disciplinary and methodological scope. Such a vision responds to the great confusion that seems to exist around the terminology used in literature reviews because, despite the different labels that are usually attributed to the various forms of reviews, there are multiple commonalities among them (Gough, Thomas, et al., 2012). In this sense, any review, whether numerical or narrative, is systematic as long as it follows the basic principles of all research: be rigorous and transparent (Gough et al., 2019).

Conclusions

This article aims to present a narrative review of the literature that emphasizes issues related to the epistemological foundations of the systematic review.

In this sense, the first aspect to highlight was the scarcity of texts that comprehensively and explicitly address the problem of the epistemological foundations of systematic reviews. However, it was possible to detect a set of efforts to address these issues and specific trends in the concerns and criticisms carried out by the community associated with SR.

The main interest when reflecting on the epistemology of the systematic review is related to the epistemological positions that the authors take when carrying out a review. In particular, the discussions on positivist positions stand out, highlighting the need to diversify the methods of assessment and synthesis of the literature. The greater relevance that qualitative methods have been acquiring in the field of SR is evident. However, there is still a particular propensity to ignore qualitative evidence, which can be explained by the solid experimental and statistical tradition to which the systematic review has been linked. This, of course, turns out to be particularly counterproductive for areas such as the social sciences, in which qualitative studies play a fundamental role in addressing social phenomena.

In this sense, it becomes necessary to recognize that a systematic review of the scientific literature is not inherently positivist, so it is possible to consider it a type of research adaptable to various problems. This seems to require, to a considerable extent, to reflect on the relevance and scope of the hegemonic model of EBM, particularly regarding how the different research designs have been hierarchized. Accepting (contrary to the hierarchical model of EBM) that various research designs can provide quality and relevant evidence on a phenomenon could have

positive consequences for the reconceptualization of the systematic review.

It should be noted that although some aspects have been outlined concerning the specific epistemological positions from which to start to carry out SR, a comprehensive analysis of the epistemological foundations of this type of research could benefit from the adoption of epistemological theories from which to begin to carry it out, especially those where knowledge has been characterized as a particular type of achievement. Specific emphasis has been placed on the subject's agency in achieving it, as is the case of certain post-Gettier epistemologies, for example, the various forms of the virtue epistemology (Sosa 2011, Zagzebski 1996), thus opening the possibility of a more detailed and in-depth examination, not only of the nature of the beliefs obtained through a systematic review but also of the criticism around the problem of reflexivity involved in this process.

Finally, it becomes essential to increase interest in critically discussing the issues mentioned, especially in a scenario where systematic reviews have become increasingly relevant in making informed decisions in various fields, especially in the social sciences.

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