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Impact of emotional competence on physicians’ clinical reasoning: a scoping review protocol.

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<td>Protocol</td>
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<td>Date Submitted by the Author:</td>
<td>02-Mar-2023</td>
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<tr>
<td>Complete List of Authors:</td>
<td>Joly, Louise; University of Liege Faculty of Medicine, Department of General Practice/Family Medicine; Research Unit Primary Care &amp; Health Bardiau, Marjorie; University of Liege Faculty of Medicine, ULiège Library Nunes de Sousa, Alexandra; University of Liege Faculty of Medicine, Department of General Practice/Family Medicine Bayot, Marie; University of Liege, Department of General Practice/Family Medicine; Université catholique de Louvain, Psychological Sciences Research Institute Dory, Valérie; University of Liege Faculty of Medicine, Department of General Practice/Family Medicine Lenoir, Anne-Laure; University of Liege Faculty of Medicine, Department of General Practice/Family Medicine</td>
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<td>Keywords:</td>
<td>Clinical Reasoning, Emotional Intelligence, Physicians, Clinical Decision-Making</td>
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</table>
Impact of emotional competence on physicians’ clinical reasoning: a scoping review protocol.

AUTHORS

Joly Louise (1), Bardiau Marjorie (2), Nunes de Sousa Alexandra (1), Bayot Marie (1,3), Dory Valérie (1), Lenoir Anne-Laure (1).

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ABSTRACT

Introduction: Clinical reasoning (CR) is a key competence for physicians and a major source of damaging medical errors. Many strategies have been explored to improve CR quality, most of them based on knowledge enhancement, cognitive debiasing, and the use of analytic reasoning. If increasing knowledge and fostering analytic reasoning have shown some positive results, the impact of debiasing is however mixed. Debiaising and promoting analytic reasoning have also been criticised for their lack of pragmatism. Alternative means of increasing CR quality are therefore still needed. Because emotions are known to influence the quality of reasoning in general, we hypothesized that emotional competence (EC) could improve physicians’ CR. EC refers to the ability to identify, understand, express, regulate, and use emotions. Little is known about the influence of EC on CR and the literature exploring this topic is heterogeneous. This article presents a scoping review protocol, the aim of which will be to describe the current state of knowledge concerning the influence of EC on physicians’ CR, the type of available literature and finally the different methods used to examine the link between EC and CR.

Method and analysis: The population of interest is physicians and medical students. EC will be explored according to the model of Mikolajczak et al, describing 5 major components of EC (identify, understand, express, regulate, and use emotions). The concept of CR will include terms related to its processes and outcomes. Context will include real or simulated clinical situations. The search for primary sources and reviews will be conducted in Medline (via Ovid), Scopus, and Psychinfo. The grey literature will be searched in the references of included articles and in OpenGrey. The data will be extracted using a dedicated tool. Search and inclusion results will be reported using the PRISMA-ScR model.

Ethics and dissemination: There are no ethical or safety concerns regarding this review.

Registration details: OSF Registration DOI: https://doi.org/10.17605/OSF.IO/GM7YD

Strength and limitations of the study:

- To our knowledge, this is the first review on the impact of EC on CR.
- The research team is multidisciplinary and includes clinicians, experts on methodology, EC, and CR.
- Publications in other languages than English and French will be excluded.
- Clear circumscription of the CR concept will be challenging because of its multiple definitions.

KEYWORDS

Emotional intelligence, clinical reasoning, clinical decision making, physician
INTRODUCTION

Clinical reasoning (CR) is a core skill for physicians (1). The processes underlying CR have been previously described and are similar to those of reasoning in general (1). Our current understanding of CR is based on dual-process theory (1,2). This theory distinguishes a rapid, intuitive reasoning process (type 1 process), involving pattern recognition and gut feeling, and a slower, analytic process (type 2 process), based on hypothetico-deductive reasoning (1,3). Like reasoning in general, CR is influenced by context, environment, emotions and interactions with others (1).

CR is prone to numerous affective and/or cognitive biases that can affect patient management (1,4–8). Although medical errors are often related to a chain of adverse events, reasoning mistakes are a major cause of damaging medical errors (9–11). Many strategies based on bias reduction (debiasing) have been proposed to improve reasoning quality, with inconsistent results. The only strategies that have demonstrated consistent positive results consist in improving physicians’ knowledge base, or promoting the use of an analytic reasoning process (1,4,7,12–16).

Debiaising and the promotion of analytic reasoning have nevertheless been criticized, on the basis that intuitive reasoning processes are pragmatic, ergonomic, and may capture information beyond the scope of analytic reasoning (15,17). Experts mainly use intuitive processes and gut feelings have been shown to have diagnostic value (2,18–21). There is thus a need to develop alternative strategies to improve the quality of CR.

Among factors affecting human reasoning, emotions play an important role (3,22,23). Because emotions inform individuals on their personal needs, values and goals, they support decision-making and influence individuals’ action tendency. Previous studies have found that individuals with cerebral damage in subcortical areas – involved in processing emotions - were unable to decide between rationally equivalent options (24).

Emotions have an impact on reasoning at several levels. They play a significant role in cognitive load, memory and attention modulation, reasoning quality, and decision-making (3,4,12,13,23,25–31). For example, incidental emotions (emotions not related to the reasoning content) can negatively affect reasoning by diverting attention and overloading working memory; whereas integral emotions (congruent with the reasoning content) can enhance reasoning processes (26,30,32). Emotions also influence memory during encoding, consolidation, and recall. Furthermore, they focus attention on items that are relevant to an individual’s goals and personal integrity (22,23). Finally, positive emotions promote heuristic processing of information while negative emotions promote analytic reasoning (23,25,26,28).

The ability of a subject to deal with emotions is called emotional competence (EC). Many frameworks have been developed to conceptualize it (23,28,33,34). In 2009, Mikolajczak et al proposed an updated framework integrating several existing models (35). It describes 5 emotional competences: identifying, understanding, expressing, regulating and using emotions. These competences can focus on one’s own emotions (intrapersonal dimension) or on others’ emotions (interpersonal dimension). Different levels of skills are described for each
competence: the first level refers to an individual’s knowledge about emotions, the second refers to their ability to use this knowledge in a given situation, and the third refers to the natural tendency (trait) of an individual to act in a particular way (28). EC is closely linked to emotional intelligence. Both terms are often used interchangeably, but EC refers more specifically to the second and third levels of the model, where individuals actually apply knowledge (23,35,36).

Regarding specifically the role of emotions in CR, it has been previously explored and reported in systematic reviews (29,31). Positive emotions are associated with creative and thorough management of patients and better information integration (31). Stress is associated with uncertainty in decision making (29,31). However, the authors of these reviews underline the need for more research on the influence of emotions on physicians’ CR (29,31,37).

Because CR is similar to reasoning in general, and because emotions play an important role in reasoning quality, we hypothesized that improving physicians' ability to manage their emotions, i.e. their emotional competence, could potentially improve the quality of their CR. (1). A better understanding of the link between EC and CR could also inform physicians’ initial and continuing education.

While we know that emotions influence CR, the role of EC in CR remains unclear. This review aims to map the existing literature on the relationship between EC and its different components, and CR, and to identify the remaining gaps in the literature.

METHODS AND ANALYSIS

The present protocol follows the SUMARI template for scoping reviews proposed by the Johanna Briggs Institute (38,39).

We first searched for an existing scoping or systematic review on this topic in the following databases (last search 19th July 2022): Cochrane library, Prospero, OSF, MEDLINE (via Pubmed) and JBI Evidence synthesis. None was found. One ongoing scoping review is exploring the role of EC on reasoning in general; the findings of this review might subsequently complement ours, but the review does not target the same population. Because CR involves specific knowledge and the decisions it supports carry high risks, some findings from this review may not be transferable to physicians’ clinical reasoning.

Review question

The primary objective of the review is to describe the current state of knowledge concerning the influence of EC on CR in physicians and medical students. Secondary objectives include an assessment of the type of existing literature on the topic and a description of the evolution of the number of publications over time. To support future research on the topic, we will also report on how the link between EC and CR is operationalized in existing publications.
Eligibility criteria

Participants:

All physicians will be included in this review. A preliminary literature search conducted prior to the scoping review protocol yielded some interesting research on EC and CR involving medical students or residents (40,41). Moreover, as mentioned above, physicians may need to be better trained in EC (42). For these reasons, we decided to also include medical students and residents in our search strategy. However, because CR is developed in close contact with patients and/or virtual clinical situations, we will only include articles involving learners actually engaged in a medical encounter (real or simulated).

Concept:

Our search will focus on two main concepts, i.e. EC and CR.

Emotional Competence

As previously mentioned, EC is a concept derived from emotional intelligence (EI). EI covers several skills and has different definitions, depending on whether it is considered to be related to personality (“trait EI”), cognition (“ability EI”), or both. Various models of EI have therefore been developed (28,33,34). However, despite discrepancies between these models, they are structured around 5 consensual core skills (28,33,34). The first major descriptive model of EI was proposed by Salovey and Mayer in 1990, and distinguishes 3 major skills: expression, regulation, and use of emotions. In 1997, they refined this model and added the ability to understand emotions. Recently, Mikolajczak et al added emotion identification as a fifth skill, distinct from emotion expression, and proposed a synthetic framework based on these 5 EI components (see figure 1) (28,34). For Mikolajczak et al, each component entails 3 competence levels (see figure 2). The levels “ability” and “trait” define EC. Because of its broad and condensed nature, we chose this model to operationalize our search strategy.

Figure 1 : EI as described by Mikolajczak et al. (35) (see separate file)

Figure 2 : 3 model level of EI, described by Mikolajczak et al. (35) (see separate file)

Clinical reasoning

CR is defined as the cognitive process through which a health professional consciously or unconsciously interacts with a patient and their environment in order to develop a diagnosis or a therapeutic strategy (1). However, the boundaries of this definition vary in the literature and the terminology used to describe CR is diverse (43,44). A previous scoping review mapped the terms used in the literature on CR. The authors identified 6 general categories of terms reflecting different research areas on CR (see table 1). In order to be exhaustive in exploring the impact of EC on CR in our scoping review, keywords from all six categories will be used, ranging from the processes of CR to its outcomes and potential deviations (bias, errors, etc).
Table 1: Categories of terms used to describe CR (based on Young et al., 2020)

<table>
<thead>
<tr>
<th>Categories</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reasoning skills</td>
<td>Abilities needed to reason</td>
</tr>
<tr>
<td>Reasoning performance</td>
<td>Goals to be achieved through reasoning</td>
</tr>
<tr>
<td>Reasoning process</td>
<td>Process of reasoning itself</td>
</tr>
<tr>
<td>Outcome of reasoning</td>
<td>Results of the reasoning, including its quality and committed errors</td>
</tr>
<tr>
<td>Context of reasoning</td>
<td>Environment in which reasoning occurs, including external influences on reasoning</td>
</tr>
<tr>
<td>Goal of reasoning</td>
<td>Final objective of reasoning (diagnosis, treatment, management plan).</td>
</tr>
</tbody>
</table>

Context:

All contexts will be considered if they involve a real or virtual patient encounter, with no limits in terms of geographic location or time.

Type of resources:

Our scoping review will be focused on research articles in French and English. All primary and secondary research papers will be included. Narrative reviews, expert opinions, comment or editorial articles will be excluded.

Search strategy

Our search strategy was developed with a trained librarian (M. Bardiau). Three bibliographic databases (MEDLINE (via Ovid), PsychInfo (via Ovid) and Scopus (via Elsevier)) will be searched for relevant articles. The reference list of included articles will also be examined for additional references. The search strategy consists of three key concepts: (1) emotional competence and (2) physicians or medical learners and (3) clinical reasoning. Terms based on our delineation of EC and CR have been selected. Search terms referring to EC are derived as follows from the 5-abilities framework developed by Mikolajczak et al. Keywords regarding CR are derived from the six categories of the definition of CR (from processes to outcomes and deviations) (45). The full search strategy developed for Medline can be found in the supplement.

Source of evidence selection:

The resulting articles will be uploaded in the Covidence software and duplicates will be removed. Inclusion will be based on the pre-defined criteria for participants, concepts, context and publication type (see above). Titles and abstracts will be independently screened for eligibility by two reviewers (LI and AS). The full texts of selected abstracts will be screened. Reasons for excluding articles will be recorded. The results of the search and screening process will be reported according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for scoping review (PRISMA-ScR) flow diagram (46).

To optimise agreement between reviewers, a calibration phase will be carried out during which the first 25 articles located by the search strategy will be screened independently by...
the reviewers. The results of this selection process will be compared and discussed, and the inclusion criteria will be refined accordingly. A Cohen’s κ-coefficient will be calculated; inclusion criteria will be revised and tests phases carried out until κ-value reaches at least 75% (38). Residual conflicts in article selection will be resolved by a third reviewer (VD).

Data extraction, analysis and presentation:

A data extraction tool will be developed to collect the following information: authors, publication date, country where the study took place, study setting, objective, population, sample size, methodology, intervention, outcomes measured (diagnosis, prognosis, errors, case management, bias etc), how the link between EC and CR is operationalized, type of EC ability measured. If necessary, missing data will be requested from the authors.

A similar process as the one used to refine the inclusion criteria will be used to improve the extraction tool. The same two authors will extract data from a small sample of full texts, discuss any discrepancies, and refine the extraction tool accordingly (47). The extraction tool may be further refined as extraction proceeds. Potential conflicts will be resolved by the third reviewer.

A detailed description of the results will be provided in a graphical or tabular form.

PATIENT AND PUBLIC INVOLVEMENT

Due to the nature of our research, patients or public involvement was not appropriate and not required.

ETHICS AND DISSEMINATION

This review does not require ethical approval.

REFERENCES


AKNOWLEDGMENTS

The authors would like to thank Dr. Meredith Young (Associate Professor, Institute of Health Sciences Education, Faculty of Medicine, McGill University) and Ms. Nazi Torabi (Collections Coordinator, Sciences, University of Toronto Libraries) for sharing their search strategies on clinical reasoning. They also thank Beatrice Scholtes (PHD, research fellow, Department of General Practice/Family Medicine, Research Unit Primary Care & Health of the University of Liège) for article reviewing.

AUTHORS CONTRIBUTION

L. Joly drawn up the project, wrote the initial protocol, co-developed the search strategy with A. Nunes de Sousa and M. Bardiau and wrote the article.

M. Bardiau established the search strategy based on concepts provided by LJ and AS. She also revised the article and made major changes.

A. Nunes de Sousa revised the initial protocol and made major changes. She co-developed the search strategy with LJ and M. Bardiau and revised the entire article.

M. Bayot, V. Dory and AL. Lenoir supervised the project, provided important guidance on background and methodology and revised the article.

FUNDING STATEMENT

The present protocol was not funded. All authors except Alexandra Nunes de Sousa are paid as part of their academic duty by their respective university. Alexandra Nunes de Sousa received fees from the association of teaching GPs (Association des Généralistes Enseignants), dependent of the Department of General Practice/Family Medicine, Research Unit Primary Care & Health of the University of Liège for her participation in the scoping review protocol.

CONFLICTS OF INTERESTS STATEMENT

All authors have completed the Unified Competing Interest form (available on request from the corresponding author) and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years, no other relationships or activities that could appear to have influenced the submitted work.

WORD COUNT

3914 words.
Emotional intelligence

emotion identification  emotion understanding  emotion expression  emotion regulation  emotion use

Figure 1: EI as described by Mikolajczak et al. (35)
Figure 2: 3 model level of EI, described by Mikolajczak et al. (35)

Level 1: Knowledge
- complexity and breadth of knowledge about emotions

Level 2: Ability
- ability to use the knowledge about emotions

Level 3: Trait
- propensity to put abilities into practice

Emotional Competence
Search strategy for Medline/Ovid

1. Students, Medical/
2. exp Physicians/
3. Family practice/
4. General practice/
5. medical student*.ti,ab,kf.
6. clerkship*.ti,ab,kf.
7. undergraduate medic*.ti,ab,kf.
8. graduate medic*.ti,ab,kf.
10. (Intern or Interns or Internship).ti,ab,kf.
11. residency.ti,ab,kf.
12. junior doctor*.ti,ab,kf.
13. (surgical or medical or clinical) adj2 (teach* or instruct* or pedagog* or curriculum or curricula or student* or undergraduate* or graduate*).ti,ab,kf.
14. physician*.ti,ab,kf.
15. (allergist* or Anesthesiologist* or Cardiologist* or Dermatologist* or Endocrinologist* or Gastroenterologist* or General Practitioner* or Geriatrician* or hospitalist* or Nephrologist* or Neurologist* or Oncologist* or Ophthalmologist* or Otolaryngologist* or pathologist* or Pediatrician* or physiatrist* or Pediatrician* or pulmonologist* or Radiologist* or Rheumatologist* or Surgeon* or Urologist* or gynecologist* or obstetrician*).ab,kf,ti.
16. (family or medical) adj1 doctor*.ab,kf,ti.
17. medical adj1 profession*.ab,kf,ti.
18. (family or clinical or general) adj1 practice*.ti,ab,kf.
19. 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18

20. exp Emotional Intelligence/
21. Metacognition/
22. Emotional regulation/
23. Adaptation, psychological/
24. Emotions/
25. exp Self-control/
26. Mindfulness/
27. emotional adj1 (intelligence* or adjustment* or adaptation* or regulation* or self-regulation* or competence* or skill*).ti,ab,kf.
28. social adj1 (intelligence* or comparison*).ti,ab,kf.
29. empathy.ti,ab,kf
30. psychological adj1 (adjustment* or adaptation*).ti,ab,kf.
31. meta-cognition* or metacognition* or metaemotion* or meta-emotion* or metamemor* or meta-memor*.ti,ab,kf.
32. (metacognitive or meta-cognitive) adj1 (knowledge* or control* or awareness*).ti,ab,kf.
33. coping adj1 (skill* or behavior* or strateg*).ti,ab,kf.
34. adaptative adj1 behavio*.ti,ab,kf.
35. self adj1 (control* or regulation* or perception* or confidence* or esteem* or evaluation* or appraisal* or assessment* or disclosure* or efficac* or compassion* or criticism* or forgiveness* or awareness* or consciousness* or knowledge* or criticism*).ti,ab,kf.
36. sense adj1 coherence.ti,ab,kf.
37. salutogenes*.ti,ab,kf.
38. mindfulness.ti,ab,kf.
39. (mental or compassion or "health professional alert") adj1 fatigue*.ti,ab,kf.
40. 20 OR 21 OR 22 OR 23 OR 24 OR 25 OR 26 OR 27 OR 28 OR 29 OR 30 OR 31 OR 32 OR 33 OR 34 OR 35 OR 36 OR 37 OR 38 OR 39
41. Clinical Competence/
42. Diagnosis, Differential/
43. Clinical Decision-Making/
44. exp Diagnostic Errors/
45. Delayed Diagnosis/
46. exp Medical error/
47. patient harm/
48. Disease, Iatrogenic/
49. Thinking/
50. Decision Making/
51. avoidance learning/
52. choice behavior/
53. decision making, shared/
54. exp problem solving/
55. intuition/
56. clinical adj1 (competenc* or skill* or reasoning* or judgment* or decision-making or "decision making").ti,ab,kf.
57. (differential or missed or missing or error* or "blind spot" or delayed or late) adj1 diagnos*.ti,ab,kf.
58. misdiagnos*.ti,ab,kf.
59. "false negative reaction".ti,ab,kf.
60. "false positive reaction".ti,ab,kf.
61. observer variation*.ti,ab,kf.
62. treatment outcome*.ti,ab,kf.
63. medical adj1 mistake*.ti,ab,kf.
64. (wrong-procedure or surgical or medication or medical or "drug use" or "high-alert drug" or "LASA medication") adj1 error*.ti,ab,kf.
65. (wrong-site or wrong-patient) adj1 surgery.ti,ab,kf.
66. "critical medical incidents".ti,ab,kf.
67. ("look alike sound alike" or "lookalike soundalike") adj2 error*.ti,ab,kf.
68. inappropriate adj1 (prescribing* or prescription*).ti,ab,kf.
69. over-prescribing* or overprescribing.ti,ab,kf.
70. over-testing* or overtesting.ti,ab,kf.
71. ("near miss healthcare" or "close calls") adj1 healthcare.ti,ab,kf.
72. patient adj1 harm*.ti,ab,kf.
73. iatrogenic adj1 disease*.ti,ab,kf.
74. hospital-acquired adj1 condition*.ti,ab,kf.
75. thinking adj1 (skill* or critical).ti,ab,kf.
76. decision adj1 making*.ti,ab,kf.
77. avoidance adj1 (behaviour or behavior or learning).ti,ab,kf.
78. choice adj1 (behavior or behaviour).ti,ab,kf.
79. decision adj1 making adj1 shared.ti,ab,kf.
80. problem solving*.ti,ab,kf.
81. heuristic.ti,ab,kf.
82. "rule of thumb".ti,ab,kf.
83. gut feeling*.ti,ab,kf.
84. intuition*.ti,ab,kf.
85. health adj1 service* adj1 (misuse* or abuse* or underutilization* or underuse* or overuse* or overutilization*).ti,ab,kf.
86. medical adj1 overuse*.ti,ab,kf.
87. "unnecessary health care".ti,ab,kf.
88. preference adj1 misdiagnos*.ti,ab,kf.
89. "unwanted medical care".ti,ab,kf.
90. overtreatment* or over-treatment*.ti,ab,kf.
91. polypharmacy* or polymedication*.ti,ab,kf.
92. unnecessary adj1 (procedure* or surger*).ti,ab,kf.
93. 41 OR 42 OR 43 OR 44 OR 45 OR 46 OR 47 OR 48 OR 49 OR 50 OR 51 OR 52 OR 53 OR 54 OR 55 OR 56 OR 57 OR 58 OR 59 OR 60 OR 61 OR 62 OR 63 OR 64 OR 65 OR 66 OR 67 OR 68 OR 69 OR 70 OR 71 OR 72 OR 73 OR 74 OR 75 OR 76 OR 77 OR 78 OR 79 OR 80 OR 81 OR 82 OR 83 OR 84 OR 85 OR 86 OR 87 OR 88 OR 89 OR 90 OR 91 OR 92
94. 19 AND 40 AND 93
95. limit 94 to (English or French)
96. (comment or editorial).pt
97. 95 not 96
### Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

<table>
<thead>
<tr>
<th>SECTION</th>
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<th>PRISMA-ScR CHECKLIST ITEM</th>
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<tr>
<td>Title</td>
<td>1</td>
<td>Identify the report as a scoping review.</td>
<td>1</td>
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<tr>
<td><strong>ABSTRACT</strong></td>
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</tr>
<tr>
<td>Structured summary</td>
<td>2</td>
<td>Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.</td>
<td>2</td>
</tr>
<tr>
<td><strong>INTRODUCTION</strong></td>
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<tr>
<td>Rationale</td>
<td>3</td>
<td>Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.</td>
<td>2-4</td>
</tr>
<tr>
<td>Objectives</td>
<td>4</td>
<td>Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.</td>
<td>4</td>
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<tr>
<td><strong>METHODS</strong></td>
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<tr>
<td>Protocol and registration</td>
<td>5</td>
<td>Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.</td>
<td>2</td>
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<tr>
<td>Eligibility criteria</td>
<td>6</td>
<td>Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.</td>
<td>5-6</td>
</tr>
<tr>
<td>Information sources*</td>
<td>7</td>
<td>Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.</td>
<td>6</td>
</tr>
<tr>
<td>Search</td>
<td>8</td>
<td>Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.</td>
<td>Supplement</td>
</tr>
<tr>
<td>Selection of sources of evidence†</td>
<td>9</td>
<td>State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.</td>
<td>6</td>
</tr>
<tr>
<td>Data charting process‡</td>
<td>10</td>
<td>Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.</td>
<td>7</td>
</tr>
<tr>
<td>Data items</td>
<td>11</td>
<td>List and define all variables for which data were sought and any assumptions and simplifications made.</td>
<td>7</td>
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<tr>
<td>Critical appraisal of individual sources of evidence§</td>
<td>12</td>
<td>If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).</td>
<td>N/A</td>
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<tr>
<td>SECTION</td>
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<tr>
<td>Synthesis of results</td>
<td>13</td>
<td>Describe the methods of handling and summarizing the data that were charted.</td>
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<tr>
<td>RESULTS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selection of sources of evidence</td>
<td>14</td>
<td>Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.</td>
<td>N/A</td>
</tr>
<tr>
<td>Characteristics of sources of evidence</td>
<td>15</td>
<td>For each source of evidence, present characteristics for which data were charted and provide the citations.</td>
<td>N/A</td>
</tr>
<tr>
<td>Critical appraisal within sources of evidence</td>
<td>16</td>
<td>If done, present data on critical appraisal of included sources of evidence (see item 12).</td>
<td>N/A</td>
</tr>
<tr>
<td>Results of individual sources of evidence</td>
<td>17</td>
<td>For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.</td>
<td>N/A</td>
</tr>
<tr>
<td>Synthesis of results</td>
<td>18</td>
<td>Summarize and/or present the charting results as they relate to the review questions and objectives.</td>
<td>N/A</td>
</tr>
<tr>
<td>DISCUSSION</td>
<td></td>
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</tr>
<tr>
<td>Summary of evidence</td>
<td>19</td>
<td>Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.</td>
<td>N/A</td>
</tr>
<tr>
<td>Limitations</td>
<td>20</td>
<td>Discuss the limitations of the scoping review process.</td>
<td>N/A</td>
</tr>
<tr>
<td>Conclusions</td>
<td>21</td>
<td>Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.</td>
<td>N/A</td>
</tr>
<tr>
<td>FUNDING</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Funding</td>
<td>22</td>
<td>Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.</td>
<td>11</td>
</tr>
</tbody>
</table>

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

* Where sources of evidence (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.
† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with information sources (see first footnote).
‡ The frameworks by Arksey and O’Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of “risk of bias” (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

Impact of emotional competence on physicians’ clinical reasoning: a scoping review protocol.

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<td>Protocol</td>
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<tr>
<td>Date Submitted by the Author</td>
<td>17-May-2023</td>
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<td>Complete List of Authors:</td>
<td>Joly, Louise; University of Liege Faculty of Medicine, Department of General Practice/Family Medicine; Research Unit Primary Care &amp; Health Bardiau, Marjorie; University of Liege Faculty of Medicine, ULiège Library Nunes de Sousa, Alexandra; University of Liege Faculty of Medicine, Department of General Practice/Family Medicine Bayot, Marie; University of Liege, Department of General Practice/Family Medicine; Université catholique de Louvain, Psychological Sciences Research Institute Dory, Valérie; University of Liege Faculty of Medicine, Department of General Practice/Family Medicine Lenoir, Anne-Laure; University of Liege Faculty of Medicine, Department of General Practice/Family Medicine</td>
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</tr>
<tr>
<td>Keywords:</td>
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Impact of emotional competence on physicians’ clinical reasoning: a scoping review protocol.

AUTHORS

Joly Louise (1), Bardiau Marjorie (2), Nunes de Sousa Alexandra (1), Bayot Marie (1,3), Dory Valérie (1), Lenoir Anne-Laure (1).

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ABSTRACT

Introduction: Clinical reasoning (CR) is a key competence for physicians and a major source of damaging medical errors. Many strategies have been explored to improve CR quality, most of them based on knowledge enhancement, cognitive debiasing, and the use of analytic reasoning. If increasing knowledge and fostering analytic reasoning have shown some positive results, the impact of debiasing is however mixed. Debiasing and promoting analytic reasoning have also been criticised for their lack of pragmatism. Alternative means of increasing CR quality are therefore still needed. Because emotions are known to influence the quality of reasoning in general, we hypothesized that emotional competence (EC) could improve physicians’ CR. EC refers to the ability to identify, understand, express, regulate, and use emotions. The influence of EC on CR remains unclear. This article presents a scoping review protocol, the aim of which will be to describe the current state of knowledge concerning the influence of EC on physicians’ CR, the type of available literature and finally the different methods used to examine the link between EC and CR.

Method and analysis: The population of interest is physicians and medical students. EC will be explored according to the model of Mikolajczak et al, describing 5 major components of EC (identify, understand, express, regulate, and use emotions). The concept of CR will include terms related to its processes and outcomes. Context will include real or simulated clinical situations. The search for primary sources and reviews will be conducted in Medline (via Ovid), Scopus, and Psychinfo. The grey literature will be searched in the references of included articles and in OpenGrey. Study selection and data extraction will be conducted using the Covidence software. Search and inclusion results will be reported using the PRISMA-ScR model.

Ethics and dissemination: There are no ethical or safety concerns regarding this review.

Registration details: OSF Registration DOI: https://doi.org/10.17605/OSF.IO/GM7YD

Strength and limitations of the study:

- To our knowledge, this is the first review on the impact of EC on CR.
- The research team is multidisciplinary and includes clinicians, experts on methodology, EC, and CR.
- Publications in other languages than English and French will be excluded.
- Clear circumscription of the CR concept will be challenging because of its multiple definitions.

KEYWORDS

Emotional intelligence, clinical reasoning, clinical decision making, physician
INTRODUCTION

Clinical reasoning (CR) is a core skill for physicians (1). The processes underlying CR have been previously described and are similar to those of reasoning in general (1). Our current understanding of CR is based on dual-process theory (1,2). This theory distinguishes a rapid, intuitive reasoning process (type 1 process), involving pattern recognition, heuristics and gut feeling, and a slower, analytic process (type 2 process), based on hypothetico-deductive reasoning (1,3). Like reasoning in general, CR is influenced by context, environment, emotions and interactions with others (1).

CR is prone to numerous affective and/or cognitive biases that can affect patient management (1,4–8). Although medical errors are not always linked to reasoning issues, this represents one of the most damaging sources of medical errors, due to its impact on diagnostic and/or therapeutic and/or prognostic accuracy. (9–11). Many strategies based on bias reduction (debiasing) have been proposed to improve reasoning quality, with inconsistent results. The only strategies that have demonstrated consistent positive results consist in improving physicians’ knowledge base, or promoting the use of an analytic reasoning process (1,4,7,12–16).

Debiasing and the promotion of analytic reasoning have nevertheless been criticized, on the basis that intuitive reasoning processes are pragmatic, ergonomic, and may capture information beyond the scope of analytic reasoning (15,17). Experts who mainly use intuitive processes and gut feelings have been shown to have diagnostic value (2,18–21). There is thus a need to develop alternative strategies to improve the quality of CR.

Among factors affecting human reasoning, emotions play an important role (3,22,23). Because emotions inform individuals on their personal needs, values and goals, they support decision-making and influence individuals’ action tendency. Previous data have shown that individuals with cerebral damage in subcortical areas – involved in processing emotions - were unable to decide between rationally equivalent options (24).

Emotions have an impact on reasoning at several levels. They play a significant role in cognitive load, memory and attention modulation, reasoning quality, and decision-making (3,4,12,13,23,25–31). For example, incidental emotions (emotions not related to the reasoning content) can negatively affect reasoning by diverting attention and overloading working memory; whereas integral emotions (congruent with the reasoning content) can enhance reasoning processes (26,30,32). Emotions also influence memory during encoding, consolidation, and recall. Furthermore, they focus attention on items that are relevant to an individual’s goals and personal integrity (22,23). Finally, positive emotions promote heuristic processing of information while negative emotions promote analytic reasoning (23,25,26,28).

The ability of an individual to deal with emotions is called emotional competence (EC). Many frameworks have been developed to conceptualize it (23,28,33,34). In 2009, Mikolajczak et al proposed an updated framework integrating several existing models (35). It describes 5 emotional competences: identifying, understanding, expressing, regulating and using emotions. These competences can focus on one’s own emotions (intrapersonal dimension) or on others’ emotions (interpersonal dimension). Different levels of skills are described for each
competence: the first level refers to an individual’s knowledge about emotions, the second refers to their ability to use this knowledge in a given situation, and the third refers to the natural tendency (trait) of an individual to act in a particular way (28). EC is closely linked to emotional intelligence. Both terms are often used interchangeably, but EC refers more specifically to the second and third levels of the model, where individuals actually apply knowledge (23,35,36).

Regarding specifically the role of emotions in CR, it has been previously explored and reported in systematic reviews (29,31). Positive emotions are associated with creative and thorough management of patients and better information integration (31). Stress is associated with uncertainty in decision making (29,31). However, the authors of these reviews underline the need for more research on the influence of emotions on physicians’ CR (29,31,37).

Because CR is similar to reasoning in general, and because emotions play an important role in reasoning quality, we hypothesized that improving physicians’ ability to manage their emotions, i.e. their emotional competence, could potentially improve the quality of their CR. (1). A better understanding of the link between EC and CR could also inform physicians’ initial and continuing education.

While we know that emotions influence CR, the role of EC in physicians’ CR remains unclear. This review aims to map the existing literature on the relationship between EC and its different components, and physicians’ CR, and to identify the remaining gaps in the literature.

METHODS AND ANALYSIS

The present protocol follows the SUMARI template for scoping reviews proposed by the Johanna Briggs Institute (38,39).

We first searched for an existing scoping or systematic review on this topic in the following databases (last search 19th July 2022): Cochrane library, Prospero, OSF, MEDLINE (via Pubmed) and JBI Evidence synthesis. None was found. One ongoing scoping review is exploring the role of EC on reasoning in general; the findings of this review might subsequently complement ours, but the review does not target the same population. Because CR involves specific knowledge and the decisions it supports carry high risks, some findings from this review may not be transferable to physicians’ clinical reasoning.

Review question

The primary objective of the review is to describe the current state of knowledge concerning the influence of EC on CR in physicians and medical students. Secondary objectives include an assessment of the type of existing literature on the topic and a description of the evolution of the number of publications over time. To support future research on the topic, we will also report on how the link between EC and CR is operationalized in existing publications.
Eligibility criteria

Participants:

All physicians, regardless of their specialty or working environment, will be included in this review. A preliminary literature search conducted prior to the scoping review protocol yielded some interesting research on EC and CR involving medical students or residents (40,41). Moreover, as mentioned above, physicians may need to be better trained in EC (42). For these reasons, we decided to also include medical students and residents in our search strategy. However, because CR is developed in close contact with patients and/or virtual clinical situations, we will only include articles involving learners actually engaged in a medical encounter (real or simulated).

Concept:

Our search will focus on two main concepts, i.e. EC and CR.

Emotional Competence

As previously mentioned, EC is a concept derived from emotional intelligence (EI). EI covers several skills and has different definitions, depending on whether it is considered to be related to personality (“trait EI”), cognition (“ability EI”), or both. Various models of EI have therefore been developed (28,33,34). However, despite discrepancies between these models, they are structured around 5 consensual core skills (28,33,34). The first major descriptive model of EI was proposed by Salovey and Mayer in 1990, and distinguishes 3 major skills: expression, regulation, and use of emotions. In 1997, they refined this model and added the ability to understand emotions. Recently, Mikolajczak et al added emotion identification as a fifth skill, distinct from emotion expression, and proposed a synthetic framework based on these 5 EI components (see figure 1) (28,34). For Mikolajczak et al, each component entails 3 competence levels (see figure 2). The levels “ability” and “trait” define EC. Because of its broad and condensed nature, we chose this model to operationalize our search strategy.

Clinical reasoning

CR is defined as the cognitive process through which a health professional consciously or unconsciously interacts with a patient and their environment in order to develop a diagnosis or a therapeutic strategy (1). However, the boundaries of this definition vary in the literature and the terminology used to describe CR is diverse (43,44). A previous scoping review mapped the terms used in the literature on CR. The authors identified 6 general categories of terms reflecting different research areas on CR (see table 1). In order to be exhaustive in exploring the impact of EC on CR in our scoping review, keywords from all six categories will be used, ranging from the processes of CR to its outcomes and potential deviations (bias, errors, etc).
Table 1: Categories of terms used to describe CR (based on Young et al., 2020)

<table>
<thead>
<tr>
<th>Categories</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reasoning skills</td>
<td>Abilities needed to reason</td>
</tr>
<tr>
<td>Reasoning performance</td>
<td>Goals to be achieved through reasoning</td>
</tr>
<tr>
<td>Reasoning process</td>
<td>Process of reasoning itself</td>
</tr>
<tr>
<td>Outcome of reasoning</td>
<td>Results of the reasoning, including its quality and committed errors</td>
</tr>
<tr>
<td>Context of reasoning</td>
<td>Environment in which reasoning occurs, including external influences on reasoning</td>
</tr>
<tr>
<td>Goal of reasoning</td>
<td>Final objective of reasoning (diagnosis, treatment, management plan).</td>
</tr>
</tbody>
</table>

Context:
All contexts will be considered if they involve a real or virtual patient encounter, with no limits in terms of geographic location or time.

Type of resources:
Our scoping review will be focused on research articles in French and English. All primary and secondary research papers will be included.

Exclusion criteria

Participants:
Studies that include simultaneously physicians as well as other healthcare professionals will be excluded if the results are merged across professions.

Concept:
Articles examining the influence of emotions on wellbeing or learning will be excluded.

Context:
Articles where CR is explored without real or simulated human contact (e.g., using written clinical vignettes) will be excluded.

Type of resources:
Narrative reviews, expert opinions, commentaries or editorial articles will be excluded.

Search strategy

Our search strategy was developed with a trained librarian (M. Bardiau). Three bibliographic databases (MEDLINE (via Ovid), PsychInfo (via Ovid) and Scopus (via Elsevier)) will be searched for relevant articles. The reference list of included articles will also be examined for additional references. The search strategy consists of three key concepts: (1) emotional competence and (2) physicians or residents and fellows or medical students and (3) clinical reasoning. Terms
based on our delineation of EC and CR have been selected. Search terms referring to EC are derived as follows from the 5-abilities framework developed by Mikolajczak et al. Keywords regarding CR are derived from the six categories of the definition of CR (from processes to outcomes and deviations) (45). The full search strategy developed for Medline can be found in the Supplement.

Source of evidence selection:

The resulting articles will be uploaded in the Covidence software and duplicates will be removed. Inclusion will be based on the pre-defined criteria for participants, concepts, context and publication type (see above). Titles and abstracts will be independently screened for eligibility by two reviewers (LJ and AS). The full texts of selected abstracts will be screened. Reasons for excluding articles will be recorded. The results of the search and screening process will be reported according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses extension for scoping review (PRISMA-ScR) flow diagram (46).

To optimise agreement between reviewers, a calibration phase will be carried out during which the first 25 articles located by the search strategy will be screened independently by the reviewers. The results of this selection process will be compared and discussed, and the inclusion criteria will be refined accordingly. A Cohen’s k-coefficient will be calculated; inclusion criteria will be revised and tests phases carried out until k-value reaches at least 75% (38). Residual conflicts in article selection will be resolved by a third reviewer (VD).

Data extraction, analysis and presentation:

A data extraction tool will be developed to collect the following information in the Covidence software: authors, publication date, country where the study took place, study setting, objective, population, sample size, methodology, intervention, outcomes measured (diagnosis, prognosis, errors, case management, bias etc), how the link between EC and CR is operationalized, type of EC ability measured. If necessary, missing data will be requested from the authors. For articles considering CR and/or EC as a whole, the definition used for those concepts will be recorded; for articles focusing on specific aspects of CR and/or EC, the particular aspects considered will be recorded.

A similar process as the one used to refine the inclusion criteria will be used to improve the extraction tool. The same two authors will extract data from a small sample of full texts, discuss any discrepancies, and refine the extraction tool accordingly (47). The extraction tool may be further refined as extraction proceeds. Potential conflicts will be resolved by the third reviewer.

Critical appraisal of individual studies will not be performed, since our objective is to identify the type of available literature and map the knowledge gaps to inform future research. The design of the selected studies will nonetheless be recorded to describe the range of study types.

A detailed description of the results will be provided in a graphical or tabular form.
PATIENT AND PUBLIC INVOLVEMENT

None.

ETHICS AND DISSEMINATION

This review does not require ethical approval.

REFERENCES


AKNOWLEDGMENTS

The authors would like to thank Dr. Meredith Young (Associate Professor, Institute of Health Sciences Education, Faculty of Medicine, McGill University) and Ms. Nazi Torabi (Collections Coordinator, Sciences, University of Toronto Libraries) for sharing their search strategies on clinical reasoning. They also thank Beatrice Scholtes (PHD, research fellow, Department of General Practice/Family Medicine, Research Unit Primary Care & Health of the University of Liège) for article reviewing.

AUTHORS CONTRIBUTION

L. Joly drawn up the project, wrote the initial protocol, co-developed the search strategy with A. Nunes de Sousa and M. Bardiau and wrote the article.

M. Bardiau established the search strategy based on concepts provided by LJ and AS. She also revised the article and made major changes.

A. Nunes de Sousa revised the initial protocol and made major changes. She co-developed the search strategy with LJ and M. Bardiau and revised the entire article.

M. Bayot, V. Dory and AL. Lenoir supervised the project, provided important guidance on background and methodology and revised the article.

FUNDING STATEMENT

The present protocol was not funded. All authors except Alexandra Nunes de Sousa are paid as part of their academic duty by their respective university. Alexandra Nunes de Sousa
received fees from the association of teaching GPs (Association des Généralistes Enseignants), dependent of the Department of General Practice/Family Medicine, Research Unit Primary Care & Health of the University of Liège for her participation in the scoping review protocol.

CONFLICTS OF INTERESTS STATEMENT

All authors have completed the Unified Competing Interest form (available on request from the corresponding author) and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years, no other relationships or activities that could appear to have influenced the submitted work.

WORD COUNT

4053 words.
Figure 1: EI as described by Mikolajczak et al. (35)
Level 1: Knowledge
• complexity and breadth of knowledge about emotions

Level 2: Ability
• ability to use the knowledge about emotions

Level 3: Trait
• propensity to put abilities into practice

Emotional Competence

Figure 2: 3 model level of EI, described by Mikolajczak et al. (35)
Search strategy for Medline/Ovid

1. Students, Medical/
2. exp Physicians/
3. Family practice/
4. General practice/
5. medical student*.ti,ab,kf.
6. clerkship*.ti,ab,kf.
7. undergraduate medic*.ti,ab,kf.
8. graduate medic*.ti,ab,kf.
10. (Intern or Interns or Internship).ti,ab,kf.
11. residency.ti,ab,kf.
12. junior doctor*.ti,ab,kf.
13. (surgical or medical or clinical) adj2 (teach* or instruct* or pedagog* or curriculum or curricula or student* or undergraduate* or graduate*).ti,ab,kf.
14. physician*.ti,ab,kf.
15. (allergist* or Anesthesiologist* or Cardiologist* or Dermatologist* or Endocrinologist* or Gastroenterologist* or General Practitioner* or Geriatrician* or hospitalist* or Nephrologist* or Neurologist* or Oncologist* or Ophthalmologist* or Otolaryngologist* or pathologist* or Pediatrician* or phsiatrist* or Pediatrician* or pulmonologist* or Radiologist* or Rheumatologist* or Surgeon* or Urologist* or gynecologist* or obstetrician*).ab,kf,ti.
16. (family or medical) adj1 doctor*.ab,kf,ti.
17. medical adj1 profession*.ab,kf,ti.
18. (family or clinical or general) adj1 practice*.ti,ab,kf.
19. 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18
20. exp Emotional Intelligence/
21. Metacognition/
22. Emotional regulation/
23. Adaptation, psychological/
24. Emotions/
25. exp Self-control/
26. Mindfulness/
27. emotional adj1 (intelligence* or adjustment* or adaptation* or regulation* or self-regulation* or competence* or skill*).ti,ab,kf.
28. social adj1 (intelligence* or comparison*).ti,ab,kf.
29. empathy.ti,ab,kf
30. psychological adj1 (adjustment* or adaptation*).ti,ab,kf.
31. meta-cognition* or metacognition* or metaemotion* or meta-emotion* or metamemor* or meta-memor*.ti,ab,kf.
32. (metacognitive or meta-cognitive) adj1 (knowledge* or control* or awareness*).ti,ab,kf.
33. coping adj1 (skill* or behavior* or stratag*).ti,ab,kf.
34. adaptative adj1 behavio*.ti,ab,kf.
35. self adj1 (control* or regulation* or perception* or confidence* or esteem* or evaluation* or appraisal* or assessment* or disclosure* or efficac* or compassion* or criticism* or forgiveness* or awareness* or consciousness* or knowledge* or criticism*).ti,ab,kf.
36. sense adj1 coherence.ti,ab,kf.
37. salutogenes*.ti,ab,kf.
38. mindfulness.ti,ab,kf.
39. (mental or compassion or "health professional alert") adj1 fatigue*.ti,ab,kf.
40. 20 OR 21 OR 22 OR 23 OR 24 OR 25 OR 26 OR 27 OR 28 OR 29 OR 30 OR 31 OR 32 OR 33 OR 34 OR 35 OR 36 OR 37 OR 38 OR 39
41. Clinical Competence/
42. Diagnosis, Differential/
43. Clinical Decision-Making/
44. exp Diagnostic Errors/
45. Delayed Diagnosis/
46. exp Medical error/
47. patient harm/
48. Disease, iatrogenic/
49. Thinking/
50. Decision Making/
51. avoidance learning/
52. choice behavior/
53. decision making, shared/
54. exp problem solving/
55. intuition/
56. clinical adj1 (competenc* or skill* or reasoning* or judgment* or decision-making or "decision making").ti,ab,kf.
57. (differential or missed or missing or error* or "blind spot" or delayed or late) adj1 diagnos*.ti,ab,kf.
58. misdiagnos*.ti,ab,kf.
59. "false negative reaction".ti,ab,kf.
60. "false positive reaction".ti,ab,kf.
61. observer variation*.ti,ab,kf.
62. treatment outcome*.ti,ab,kf.
63. medical adj1 mistake*.ti,ab,kf.
64. (wrong-procedure or surgical or medication or medical or "drug use" or "high-alert drug" or "LSA medication") adj1 error*.ti,ab,kf.
65. (wrong-site or wrong-patient) adj1 surgery.ti,ab,kf.
66. "critical medical incidents".ti,ab,kf.
67. ("look alike sound alike" or "lookalike soundalike") adj2 error*.ti,ab,kf.
68. inappropriate adj1 (prescribing* or prescription*).ti,ab,kf.
69. over-prescribing* or overprescribing.ti,ab,kf.
70. over-testing* or overtesting.ti,ab,kf.
71. ("near miss healthcare" or "close calls") adj1 healthcare.ti,ab,kf.
72. patient adj1 harm*.ti,ab,kf.
73. iatrogenic adj1 disease*.ti,ab,kf.
74. hospital-acquired adj1 condition*.ti,ab,kf.
75. thinking adj1 (skill* or critical).ti,ab,kf.
76. decision adj1 making*.ti,ab,kf.
77. avoidance adj1 (behaviour or behavior or learning).ti,ab,kf.
78. choice adj1 (behavior or behaviour).ti,ab,kf.
79. decision adj1 making adj1 shared.ti,ab,kf.
80. problem solving*.ti,ab,kf.
81. heuristic.ti,ab,kf.
82. "rule of thumb".ti,ab,kf.
83. gut feeling*.ti,ab,kf.
84. intuition*.ti,ab,kf.
85. health adj1 service* adj1 (misuse* or abuse* or underutilization* or underuse* or overuse* or overutilization*).ti,ab,kf.
86. medical adj1 overuse*.ti,ab,kf.
87. "unnecessary health care".ti,ab,kf.
88. preference adj1 misdiagnos*.ti,ab,kf.
89. "unwanted medical care".ti,ab,kf.
90. overtreatment* or over-treatment*.ti,ab,kf.
91. polypharmacy* or polymedication*.ti,ab,kf.
92. unnecessary adj1 (procedure* or surger*).ti,ab,kf.
93. 41 OR 42 OR 43 OR 44 OR 45 OR 46 OR 47 OR 48 OR 49 OR 50 OR 51 OR 52 OR 53 OR 54 OR 55 OR 56 OR 57 OR 58 OR 59 OR 60 OR 61 OR 62 OR 63 OR 64 OR 65 OR 66 OR 67 OR 68 OR 69 OR 70 OR 71 OR 72 OR 73 OR 74 OR 75 OR 76 OR 77 OR 78 OR 79 OR 80 OR 81 OR 82 OR 83 OR 84 OR 85 OR 86 OR 87 OR 88 OR 89 OR 90 OR 91 OR 92
94. 19 AND 40 AND 93
95. limit 94 to (English or French)
96. (comment or editorial).pt
97. 95 not 96
Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

<table>
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<th>SECTION</th>
<th>ITEM</th>
<th>PRISMA-ScR CHECKLIST ITEM</th>
<th>REPORTED ON PAGE #</th>
</tr>
</thead>
<tbody>
<tr>
<td>TITLE</td>
<td>Title</td>
<td>Identify the report as a scoping review.</td>
<td>1</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>Structured summary</td>
<td>Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.</td>
<td>2</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>Rationale</td>
<td>Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.</td>
<td>2-4</td>
</tr>
<tr>
<td></td>
<td>Objectives</td>
<td>Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.</td>
<td>4</td>
</tr>
<tr>
<td>METHODS</td>
<td>Protocol and registration</td>
<td>Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Eligibility criteria</td>
<td>Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.</td>
<td>5-6</td>
</tr>
<tr>
<td></td>
<td>Information sources*</td>
<td>Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Search</td>
<td>Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.</td>
<td>Supplement</td>
</tr>
<tr>
<td></td>
<td>Selection of sources of evidence†</td>
<td>State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Data charting process‡</td>
<td>Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Data items</td>
<td>List and define all variables for which data were sought and any assumptions and simplifications made.</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Critical appraisal of individual sources of evidence§</td>
<td>If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).</td>
<td>N/A</td>
</tr>
<tr>
<td>SECTION</td>
<td>ITEM</td>
<td>PRISMA-ScR CHECKLIST ITEM</td>
<td>REPORTED ON PAGE #</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------</td>
<td>---------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Synthesis of results</td>
<td>13</td>
<td>Describe the methods of handling and summarizing the data that were charted.</td>
<td>NA</td>
</tr>
<tr>
<td>RESULTS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selection of sources of evidence</td>
<td>14</td>
<td>Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.</td>
<td>N/A</td>
</tr>
<tr>
<td>Characteristics of sources of evidence</td>
<td>15</td>
<td>For each source of evidence, present characteristics for which data were charted and provide the citations.</td>
<td>N/A</td>
</tr>
<tr>
<td>Critical appraisal within sources of evidence</td>
<td>16</td>
<td>If done, present data on critical appraisal of included sources of evidence (see item 12).</td>
<td>N/A</td>
</tr>
<tr>
<td>Results of individual sources of evidence</td>
<td>17</td>
<td>For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.</td>
<td>N/A</td>
</tr>
<tr>
<td>Synthesis of results</td>
<td>18</td>
<td>Summarize and/or present the charting results as they relate to the review questions and objectives.</td>
<td>N/A</td>
</tr>
<tr>
<td>DISCUSSION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summary of evidence</td>
<td>19</td>
<td>Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.</td>
<td>N/A</td>
</tr>
<tr>
<td>Limitations</td>
<td>20</td>
<td>Discuss the limitations of the scoping review process.</td>
<td>N/A</td>
</tr>
<tr>
<td>Conclusions</td>
<td>21</td>
<td>Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.</td>
<td>N/A</td>
</tr>
<tr>
<td>FUNDING</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Funding</td>
<td>22</td>
<td>Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.</td>
<td>11</td>
</tr>
</tbody>
</table>

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

* Where sources of evidence (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.
† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with information sources (see first footnote).
‡ The frameworks by Arksey and O’Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of “risk of bias” (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy documents).