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## Title registration for a systematic review: Interventions to counter cognitive biases and thinking errors in the decision-making of healthcare professionals: a systematic review

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*Submitted to the Coordinating Group of:*

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- No
- Yes  Cochrane  Other
- Maybe

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## Title of the review

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Interventions to counter cognitive biases and thinking errors in healthcare decision making: a systematic review

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## Background

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**Briefly describe the problem that the interventions under review are aiming to address, the relevance to policy and practice, and the objective(s) of the review.**

Decision-making is a fundamental aspect of health service delivery, for both healthcare consumers and professionals. It is well established that individuals have finite cognitive resources, affecting the ways in which information is attended to, processed, stored and retrieved (Anderson, 1990). When information is used to make decisions, cognitive shortcuts known as ‘heuristics’ can decrease the cognitive burden of decision-making by using minimal amounts of information and time (Kahneman, Slovic & Tversky, 1982). However, while these thought processing shortcuts often result in accurate decision outcomes, they can also give rise to what have been termed in decision-making literature as ‘cognitive biases’ or ‘cognitive errors’ (Tversky & Kahneman, 1974; Kahneman, Slovic & Tversky, 1982). For example, the ‘availability heuristic’ is a mental shortcut that relies on the information most readily retrieved from a person’s mind (Tversky & Kahneman, 1973). This can produce a number of biases when making decisions due to the fact that information that is immediately available can be influenced by multiple factors, such as how recently it was gained (recency bias) or how frequently it is encountered (frequency bias) (Tversky & Kahneman, 1974). There are well over a hundred documented cognitive biases that have been shown to affect decision-making. Moreover, there is significant evidence suggesting that these biases can produce suboptimal decision-making outcomes in widespread professional scenarios, including the delivery of health services. For example, multiple biases have been shown to affect accurate medical diagnosis (see Saposnik, Redelmeier, Ruff & Tobler, 2016; Blumenthal-Barby & Krieger, 2015). Importantly, cognitive biases can affect how both healthcare practitioners and consumers make decisions at important stages of the practitioner-consumer relationship (Blumenthal-Barby & Krieger, 2015). This includes, for example, the points at which an assessment or diagnosis is made or the subsequent choice of treatment or intervention, two essential decisions common across diverse healthcare scenarios.

Given that cognitive biases affect decision-making, there is significant interest in developing strategies that mitigate their negative effects. Research into cognitive bias mitigation or ‘debiasing’ has largely been restricted to the traditional areas of decision-making theory, such as cognitive psychology or behavioural and neuro economics. However, there is increasing acknowledgement within the healthcare decision-making field that mitigating the negative effects of cognitive biases during key decision points could play a significant role in gaining positive outcomes for health service consumers. However, to date, there has been no broad synthesis of research exploring the effectiveness of strategies designed to counter cognitive biases and thinking errors in healthcare decision-making.

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## Objectives

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The **primary** objective is to assess the effectiveness of interventions, strategies and procedures intended to counter cognitive bias or thinking errors associated with the decision-making of healthcare professionals.

The secondary objectives are to:

1. Assess the effectiveness of these interventions, strategies and procedures by provider type (e.g., specific discipline such as medicine, nursing, allied health).
2. Explore heterogeneity of effects to identify other possible reasons for differences in effects.

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## Existing reviews

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**List any existing systematic reviews on the topic, and justify the need for this review if existing reviews exist or are in progress.**

To date, no previous authors have attempted a broad synthesis of the existing evidence exploring interventions designed to counter the negative effects of cognitive biases and thinking errors relating to healthcare decision-making. However, there are several relevant narrative reviews discussing strategies that may mitigate cognitive bias or thinking errors during clinical decision-making, and these are primarily focussed on medical diagnosis (see Bornstein & Emler, 2001; Crosskerry & Nimmo, 2011; Crosskerry, Singhal & Mamede, 2013; Patel, Kannampallil & Shortliffe, 2015; Scott, Soon, Elshaug & Lindner, 2017). There is also one narrative review that uses a systematic approach which explores literature that outlines interventions designed to avoid diagnostic mistakes caused by cognitive errors in medical decision-making (Graber et al., 2012). Our proposed review differs from these previous publications in a number of ways. Rather than focusing on strategies that mitigate errors specifically at the point of medical diagnosis, this review will have a wider reach and will include clinical diagnosis and assessment across a broader range of healthcare disciplines. In addition to this, we will consider literature that explores strategies designed to mitigate cognitive bias and thinking errors relating to choice of treatment or intervention.

We have made an assumption that few studies have tested the effectiveness of the types of interventions of interest here. Indeed, comments within the aforementioned reviews (Graber et al., 2012) and preliminary database searches indicate that this area of research is relatively under-developed. For example, a preliminary MEDLINE search uncovered 43 potentially relevant titles among 733 hits. For this reason, we have opted to be more inclusive rather than narrowly focused in terms of included biases types and decision-making contexts in order to capture a greater number of potentially relevant studies.

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## **Intervention**

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**Describe the eligible intervention(s) and comparison(s) clearly, in plain language. What is given, by whom, to whom, and for how long? What are the comparison conditions (what is usually provided to control/comparison groups who don't receive the intervention)? Describe any similar interventions that will not be eligible and justify the exclusion.**

We intend to include any type of intervention or strategy where the primary or secondary aim is to mitigate cognitive biases or thinking errors in the decision-making of healthcare professionals. We will use a broad definition of 'intervention' to capture all interventions, strategies or procedures (e.g., administrative tools, behavioural/psychosocial interventions, professional training, education) designed to counter any cognitive bias or thinking error covered in the literature (e.g., confirmation bias, hindsight bias, order effects, etc.). This will include, but will not be limited to, the use of decision aids, metacognition or mindfulness interventions, education or training, affective debiasing interventions, group decision strategies, diagnostic rules, checklists, clinical guidelines and error recovery approaches. This review will consider interventions, strategies or procedures that are made available to assist healthcare practitioners within the context of health service delivery across multiple healthcare domains in which healthcare providers make decisions (e.g., medicine, nursing and allied health). It will consider any strategy that may assist decision-making related to clinical assessment or diagnosis and/or treatment or intervention choice, and will exclude strategies that are applied at other healthcare decision-making points (such as client intake or discharge). It will consider literature where the comparative condition is the implementation of no strategy or 'practice as usual'. In order for a study to be included, the tested intervention has to identify one or more cognitive biases or thinking errors that it is specifically addressing or countering.

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## **Population**

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**Specify the types of populations to be included and excluded, with thought given to aspects such as demographic factors and settings.**

Our search will not be restricted by population type in relation to demographic factors, issues, illnesses or diagnoses. Health service settings considered will include hospitals, clinics, community centres, schools, private homes, or any other settings where care can be administered by a provider.

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## **Outcomes**

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**List the primary and secondary outcomes for the review, including all outcomes important to those who will be affected by and those who will make decisions about the intervention(s). Give thought to the inclusion of adverse and unintended effects, resource use and outcomes along the causal chain.**

The review will examine outcomes relating to the mitigation of cognitive biases and thinking errors in the decision-making of healthcare professionals. Given the inclusion of a broad range of strategies, cognitive biases and thinking errors, as well as healthcare contexts, the list of potential specific outcomes is expansive. Therefore, our primary focus will be on outcome variables that report a measurable change in bias/error or decision made by a healthcare professional.

Specifically, we will focus on outcomes that report:

- (1) Reduction in bias/error
- (2) Changes in decisions made

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## Study designs

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**List the types of study designs to be included and excluded (please describe eligible study designs). Where the review aims to include quantitative and qualitative evidence, specify which of the objectives noted above will be addressed using each type of evidence.**

Studies will be eligible if the study design includes an intervention condition aimed at mitigating specific cognitive biases or thinking errors within a healthcare decision-making context, and this is compared to a control condition. We will only include studies comparing well-defined parallel cohort groups (i.e., both the treatment and control / comparison conditions are measured at the same time in order to decrease threats to internal validity such as maturation). Designs will include:

- (1) RCTs and cluster RCTs.
- (2) Quasi-RCTs and cluster quasi RCTs (e.g., step-wedge).
- (3) Regression discontinuity designs.
- (4) Difference of difference or other econometric designs.
- (5) Propensity score matching and other matching designs.

We will also include time series designs with multiple (3 or more) baseline measures.

Studies will only be included if they compare a strategy aimed at mitigating cognitive biases and thinking errors with no intervention or 'practice as usual'.

Study designs will include differences observed in hypothetical or constructed scenarios, as well as *in situ* healthcare settings.

Qualitative and mixed-method studies may also be included that are conducted as part of these other designs that either:

- a. Generate hypotheses;
- b. Explore the meaning or applicability of quantitative findings.

Qualitative studies will not be used to establish the efficacy or effectiveness of interventions for countering cognitive bias and thinking errors. Instead, such designs will provide contextual information regarding efforts to decrease their effect and that report on the state of implementation of the interventions.

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### Roles and responsibilities

**Give a brief description of content and methodological expertise within the review team. It is recommended to have at least one person on the review team who has content expertise, at least one person who has methodological expertise and at least one person who has statistical expertise. It is also recommended to have one person with information retrieval expertise.**

- Content: Aron Schlonsky, Rebecca Featherston, Bridget Hamilton, Laura Downie, Adam Vogel, Karyn Galvin, Catherine Granger
- Systematic review methods: Aron Schlonsky, Jason Wasiak, Rebecca Featherston
- Statistical analysis: Jason Wasiak, Rebecca Featherston
- Information retrieval: Frances Morrissey, Jason Wasiak, My-linh Nguyen Luong, Courtney Lewis, Rebecca Featherston
- Writing, Title, Protocol and Review: Rebecca Featherston, Jason Wasiak, My-linh Nguyen Luong, Courtney Lewis

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**Do you receive any financial support, and if so, from where? What are your deliverable deadlines for the review? If not, are you planning to apply for funding, and if so, from where?**

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## **Potential conflicts of interest**

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As far as the authors are aware, there are no known potential conflicts of interests.

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## **Preliminary timeframe**

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- Date you plan to submit a draft protocol: 1 August, 2017
- Date you plan to submit a draft review: 8 December, 2017