Author’s response to reviews

Title: Systematic Review of the Exploration, Preparation, Implementation, Sustainment (EPIS) Framework

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Reviewer #1:

*The EPIS framework description (page 4) - can you link readers to the visual in the introduction when explaining the EPIS framework. Currently the visual is referred to later in the manuscript.

The EPIS figure has been changed to Figure 1 and referred to in the introduction when then EPIS is explained as outlined below.

“As shown in Figure 1, EPIS has key components that include: four well-defined phases that describe the implementation process, identification of outer system and inner organizational contexts and their associated factors, innovation factors, that relate to the characteristics of the innovation/EBP being implemented, and bridging factors, the dynamics, complexity and interplay of the outer and inner context [31 ].”

*I support practitioners understand and apply implementation science models, theories and frameworks and this one in particular is harder for practitioners to follow. I think this might become a paper that people access to better understand the framework. The more examples the better in understanding aspects of this framework. It would go a long way to have an example of interconnectedness and relationships between outer and inner context entities (bridging factors)
and its significant to the implementation of an intervention - potentially elaborating on some of the brief examples provided already.

Thank you for this useful comment. We have provided an example of bridging factors and their interconnectedness and relationships that occur between the outer and inner context and elaborated the JJ trials example.

On Page 16:

“The model developed from the EPIS framework for the Interagency Collaborative Team (ICT) project provides an example of interconnectedness and relationships between and within outer and inner context entities [71] . In the ICT project a community-academic partnership was formed to bridge the outer and inner contexts. Furthermore, interagency collaborative relationships within and across the contextual levels were formed including between outer context policy makers with advocacy groups, and community based organizations contracted to provide home-based services with clients and families [72] . Outer context policies were instantiated through collaborative processes such as community stakeholder meetings, the use of negotiations, and procurement and contracting. Contracts, that clearly specifies the expectation to use EBPs, communicates a strong system level support (outer context) for a climate (inner context) where EBPs are expected, supported, and rewarded [73] .”

On page 19-20:

“For example, JJ-TRIALS is testing a bundled strategy that supports the implementation of data-driven decision making using two different facilitation approaches (core and enhanced). JJ-TRIALS moves beyond implementation of a single EBP to allow for implementation of evidence-based process improvement efforts. Activities to move through the EPIS phases were mapped out along with implementation factors and appropriate measures and strategies to assess and address the key multilevel system and organizational issues. Ways to document and evaluate the implementation factors, implementation strategies and movement through all of the EPIS phases were determined. In addition, there was a conceptual adaptation of EPIS itself based on input and perspectives of community partners, investigators, and NIH staff wherein the framework was represented in a more recursive and cyclical manner consistent with improvement processes and this resulted in the development of EPIS Wheel [83] . As shown in Figure 1, based on our current systematic review, we have also provided a depiction of the EPIS framework using a more cyclical perspective that also captures the key features of outer context, inner, context, bridging and innovation factors, as well as the nature of the practice(s) to be implemented and interaction with intervention developers and purveyors that may foster appropriate adaptations of context and practice.”

*I was asked recently whether implementation frameworks are building upon each other - or at least, demonstrating how they are better or different from other published frameworks that explain aspects of implementation. This is really helpful information that can guide a user to select the framework. The discussion mentions that frameworks might be better at different things (e.g., CFIR is good for qualitative measures) etc. without suggesting what this framework would be optimal for.
Again, we thank you for this insightful observation. EPIS is unique in that it includes or may be used to guide all the key components of implementation (i.e., implementation process, multilevel context, implementation factors, and evaluation) and therefore may be used on its own. This has been made clearer in paragraph 3 of the discussion and reinforced following the section you mention, as outlined below:

“It is also true that frameworks might have diverse strengths and might be more appropriate to use for certain purposes than others. There are five broad categories that frameworks have been classified into based on their primary purpose: process models, determinant frameworks, classic theories, implementation frameworks, and evaluation frameworks[60]. For example, the Reach, Effectiveness, Adoption, Implementation, and Maintenance Framework (RE-AIM) has historically been used as a planning and evaluation framework [61, 62] and the Consolidated Framework for Implementation Research (CFIR) is frequently used as a determinant to guide qualitative methods and analyses [63]. EPIS can be classified in many categories as it may be used for the purpose of understanding process, determinants, implementation, and evaluation. By guiding multiple components of implementation the EPIS framework may be used for several purposes, reducing the need for use of multiple frameworks.”

*The abstract may persuade practitioners (intervention developers and implementers) to read the article as it states there is a need to better understand how individual frameworks and models are applied in practice. I'd recommend a shift in language here to be more accurate - I don't think this manuscript is for practitioners looking for guidance on how to apply the framework better when making decisions about an intervention. There is a need to clarify what we mean by applied in practice (I think we mean applied in research/evaluation practice)....

This is a great point, you have made us aware that we were lacking a practitioner review the article. We have adjusted the wording of the abstract to avoid ambiguity and misinterpretation.

“However, there is a need to better understand how individual models and frameworks are applied in research projects, how they can support the implementation process, and how they might advance implementation science. This systematic review examines and describes the research application of a widely used implementation framework, the Exploration, Preparation, Implementation, Sustainment (EPIS) framework.”

*I'd also suggest that somewhere in this manuscript the authors acknowledge that there hasn't been a lot of prescriptive guidance on how to use this framework to inform decisions about implementation (or potentially there has been that I am not familiar with - have there been attempts to help translate and guide the use of the framework outside of manuscripts?). Based on the nature of the review I think what is meant is applied in the evaluation/research that examines the implementation of interventions (how to measure things) and not actual practice.

The second paragraph of the introduction has been amended to acknowledge the lack of published guidance on the use of the framework.

“Until recently, this comprehensive framework has had limited prescriptive guidance for its use.”
Reviewer #2:

General:

* Throughout the manuscript, use either 'and' or 'or'; avoid the use of "and/or". In some circumstances and/or is required for accuracy. Where possible and/or has been replaced with either ‘and’ or ‘or.

* Be consistent in referencing Dr. Aarons; suggest Aarons after initial mention. Also, drop "Dr."

Actioned.

* Check consistency of references to "constructs" - the Framework section labels them as "key components" and the Discussion section labels them as "key constructs."

Actioned.

* Why does the phrase "begin with sustainment in mind" need to be in quotes? Is a citation needed for this 'suggestion'? Or is it original to this manuscript?

It is original to this manuscript. It is something that Dr. Aarons has been strongly suggesting in his formal and informal presentations and interactions with researchers, systems, organizations, and providers. Quotations have been removed.

"The EPIS Framework"

* Opening explanation and definition of the four phases could be clearer, especially for readers unfamiliar with EPIS.

Thank you for this useful comment. Our opening explanation of EPIS and definitions of the four phases, paragraph 1 of page 5, has been expanded to improve the clarity of the four phases and transition among them.

We also note that EPIS includes key components, one of which is the phases of implementation.

“As shown in Figure 1, EPIS has key components that include: four well-defined phases that describe the implementation process, identification of outer system and inner organizational contexts and their associated factors, and “bridging and innovation factors” that have to do with the characteristics of the innovation/EBP being implemented, and the dynamics, complexity and interplay of the outer and inner contexts [31].”

* In this section, authors refer to "second key component," "third key component," etc. with no "first" key component.
The text has been amended to specify the first key component.

“The first key component of EPIS is the four phases of the implementation process, defined as Exploration, Preparation, Implementation, and Sustainment (EPIS).”

* Page 5, lines 28-32, the sentence beginning "However, it is essential…” is awkward and unclear

Actioned.

“It is essential that ongoing monitoring of the implementation process is incorporated to assess how implementation is proceeding and adjust implementation strategies to support efforts to accordingly.”

* Page 6, lines 38-42, the sentence beginning "Firstly, there is an emphasis…” - drop 'firstly' since there is no 'secondly'.

Actioned.

"Methods"

* Recommend adding a statement about the search strategy being based on 'cited reference searching' of the original Aarons' EPIS article versus the traditional keyword and subject term searching. Then go into the explanation of using the Title to locate all articles citing Aarons.

Actioned.

“The search strategy was based on cited reference searching of the original EPIS article titled “Advancing a Conceptual Model of Evidence-Based Practice Implementation in Public Service Sectors” [8 ]. The title was used as the TITLE search term in each database.”

* Page 9, lines 14-24 - the second paragraph under "Data extraction" seems out of place for the methods section; re-write or move to the discussion.

The paragraph has been reworded.

“An additional classification of implementation factors to the original 2011 paper was added to the data extraction and EPIS framework figure. There was a limited emphasis in the original 2011 paper but also a large presence of factors connecting the two contexts, which highlighted the need for an additional term to better represent particular factors that fall outside of the inner and outer context. As such, we refer to these as “Bridging and Innovation Factors”, or factors that span the inner and outer contexts.”
"Results"

*  Page 10, line 44 - "There is a reasonable division in the methodologies employed in the studies." Suggest changing 'studies' to 'articles' for consistency throughout the paragraph.

Studies has been replaced with projects. Projects is necessary in this case, as the projects were often reported in multiple articles.

*  Page 10, lines 52-56 - sentences beginning "The data collected..." and "Data analysis was..." - both need further clarification. What data? Who's data? Who's data analysis?

The paragraph is referring to the data extracted from the included projects and the data analyses the researchers’ conducted.

“The data collected in the projects included assessment…” “Data analyses conducted in the projects was usually multilevel.”

"Discussion"

*  Much of the first paragraph already covered in the Results section, not necessary to repeat. Suggest starting discussion with second paragraph "The promise of implementation science models..."

We have reviewed the paragraph and believe it provides a succinct overview of the results and links to the rest of the discussion. We moved the last two sentences as suggested in your next comment.

*  Page 12, lines 12-16 - the sentence beginning "For example our results demonstrate..." discuses information that has not been covered within the results section. Recommend adding concept of income-based settings to results and then discussing implications in discussion.

The countries in which the projects were conducted is presented in the results, including the concept of income-based settings. The discussion adds our interpretation of these results by summarizing that the countries represent different income settings.

*  Page 13, line 44 - drop the dashes and use commas

Actioned.

*  Page 14, first paragraph (lines 4-40) - suggest reorganizing the paragraph to incorporate the sentence beginning "The studies in this review..." to earlier in the paragraph to keep readers connected with purpose of the review versus getting into details of other frameworks and studies.
The sentence has been moved to the beginning of the paragraph.

* Page 14, lines 52-58, the sentence beginning "A number of recent publications…" references several publications, but there is only one citation for this sentence. Either add citations or reword the sentence.

Reworded in the singular.

“A recent publication in the journal Implementation Science highlighted the need to better define and develop well operationalized and pragmatic measures for the assessment of external implementation context and bridging factors [63].”

* Page 16, lines 4-45, the paragraph included duplications of statements and needs refining

The second line has been removed and the final sentence refined to remove any duplications of statements.

"Future directions"

* First paragraph - need parallel structure within three recommendations; also drop the italics.

Actioned.

* Recommendation headers - add parallel structure

Actioned.

* Page 17, line 35 - "…within the EBIS framework (see Figure 1 of Aarons et al., [2011] paper) [8]." Incorrectly numbered, should be #2 (PRISMA flowchart is #1). Also, just use "(see Figure 2)" within the text and then appropriately label Figure 2.

This refers to figure 1 of the original EPIS paper, not this manuscript. However, the figures have been switched and therefore now also matches figure 1 of the manuscript which is the revised EPIS illustration.

* Page 18, line 47, "…guidelines such as PRECIS-2." A citation needs to be added.

Actioned.

"Limitations"

* The sentence beginning "Our rating of the extent to which EPIS was used…” - what one item? Not sure this "one item" rating method was mentioned within the Methods section.
The “one item” rating method refers to depth of inclusion as described in the final line in table 1, data extraction. The wording has been changed from “extent” to “depth” for consistency with the table.

* Another limitation should be added, that regarding limitations of the search strategy approach. Specifically, since only cited reference searching was used, there is a possibility that articles not directly citing Aarons 2011 (only using the EPIS framework) or articles without searchable reference citations may not have been included in the initial search results.

Actioned.

“There are several limitations of this systematic review. We limited the review to peer-reviewed, empirical articles citing Aarons et al. 2011. Ongoing or completed grant-funded studies or contracts that applied EPIS are not included. In addition, unpublished applications of EPIS would not have been included nor articles that do not directly cite Aarons et al. 2011, or articles without searchable reference citations. As such, our results likely do not reflect all implementation efforts that used EPIS and in particular the search strategy may have limited the inclusion of practitioners’ application of the framework for implementation practice.”

"Conclusion"

* Abstract Conclusion not really matching statements within the Conclusion section.

The abstract conclusion has been amended to align with the main text.

“Conclusion: This systematic review enumerated multiple settings and ways the EPIS framework has been applied in implementation research projects, and summarized promising characteristics and strengths of the EPIS framework, illustrated with examples. Recommendations for future use include more precise operationalization of factors, increased depth and breadth of application, development of aligned measures, and broadening of user networks. Additional resources supporting the operationalization of EPIS are available and under development.”

"Tables"

* Consistently noted "original 2011 study" - since this is not how the Aarons article is referenced within the text of the manuscript, suggest changing the note to 'original EPIS 2011 article'.

Actioned.

"References"
* Eliminate use of bolded text within the references.

Actioned.