Benefits, Challenges and Lessons Learnt Using the Consolidated Framework for Implementation Research: A Reflection on Researcher Experiences in Brazil and the United Kingdom.

Abstract

Background: In healthcare implementation research, there is little discussion on researcher experiences using frameworks including the Consolidated Framework for Implementation Research (CFIR).

Aim: To identify and discuss the benefits, challenges and lessons learnt from researchers’ experiences using the CFIR in different contexts and phases of research.

Discussion: The article synthesised the reflections of nursing and public health researchers’ on their experiences using the CFIR across four separate healthcare-associated infection prevention and control implementation studies. Benefits, challenges, resolutions to these challenges and lessons learnt from the application of the framework were discussed.

Conclusions: Identified benefits included the framework’s adaptability and flexibility, provision of structure and shared language for research. Translation to another language, and differentiating between domains and constructs were challenges.

Implications for practice: Healthcare researchers may find this article useful when considering use of the CFIR, or to anticipate and prepare to overcome the challenges highlighted when using the framework.

Keywords: Researcher experience; reflection; Consolidated Framework for Implementation Research; CFIR, qualitative; lessons learnt; benefits; enablers; challenges; barriers
Introduction

The international requirement for nursing and public health research to have an impact on healthcare practice is escalating (WHO, 2012). The World Health Organization (WHO) state that healthcare practice should be on a path of continual development to keep in line with available technologies, treatment options and the needs of the population (WHO, 2012). Accordingly, appropriate nursing and public health research can contribute to this development by providing evidence on the effectiveness of healthcare interventions (Hartling, Vandermeer & Fernandes, 2014). Provision of the evidence alone however, does not facilitate the process of embedding evidence into practice. As a result, the field of implementation science has emerged to better understand and develop strategies for effective implementation of evidence into real world health systems (Peters et al., 2013).

Implementation science is a relatively new field of research within health that has increasingly applied theories, models and frameworks to enhance effective implementation practices and strategies for health interventions (Nilsen, 2015). One particular framework of note for its growing predominance in the literature is the Consolidated Framework for Implementation Research (CFIR). Developed by Damschroder et al. (2009), the CFIR is a meta-theoretical framework that synthesises 19 pre-existing and prominent implementation theories, models and frameworks into a single tool consisting of 39 constructs within five domains. A recent systematic review by Kirk et al. (2016) found 26 articles included in their review had applied the framework to research pre-, during and/or post implementation of an intervention in a variety of clinical settings. The discussions of the CFIR within these articles however, were predominately focused on its application as a method rather than the researchers' experience in utilising the framework. This type of
information is useful for future learning, though often lost between research projects. It is well established in healthcare that the exchange of and reflection upon experiences is instrumental to future practices. As such, this article explores and reflects on the experiences of researchers using the CFIR across different research phases in four separate studies in Brazil and the United Kingdom. The purpose of this reflection was to inform future use of the framework by nursing and public health researchers.

Aim, Context and Methods

This article aimed to identify and discuss the benefits, challenges, and lessons learnt from the application of the CFIR in four separate studies. To achieve this, four researchers individually undertook a process of reflection following a Gibbs’ Reflective Cycle process (1988) (Figure 1), recording their experiences using the framework in written form. These written reflections were shared among the researchers and discussed for clarification. The experiences of the researchers were tabulated into benefits, challenges or lessons learnt, following which further collaborative discussions were held to categorise experiences into the themes used to structure this article. The presented benefits, challenges and lessons learnt are those which were shared across research studies, and therefore were evidently applicable to different research contexts or those which were deemed as notably useful lessons by the researchers for future use of the CFIR.

This article presents a synthesis of the researchers’ experiences using the framework within their individual research studies which represent the conceptual design, planning, data collection, and analytic phases of research. Additionally, the experiences of the researchers’
in the development of this article are discussed in regards to the use of the CFIR in the dissemination phase of research. Three of the researchers had a background in nursing and one from public health but all four had a research focus on the implementation of infection prevention and control of healthcare associated infections. For all four researchers, it was their first time using the CFIR in research. Two studies were conducted in Brazil, one in the United Kingdom and one was undertaken in both Brazil and the United Kingdom. All four studies selected the CFIR because it is considered to be the most comprehensive evidence-based framework for implementation research that is currently available and has a proven broad applicability to different research contexts (Birken et al., 2017). Other frameworks such as the Theoretical Domains Framework (2012) and PARiHS (1998) were considered, however the studies focused on the identification of implementation factors rather than individuals’ behaviours, or the success or failure of implementation. As such, these frameworks were unsuitable for those respective reasons. The four studies are briefly outlined to provide context for the researchers’ reflections.
Research Study Descriptions

Research Study One:

Study one applied the CFIR to provide a framework for the analysis of studies included within a systematised literature review on the implementation of WHO Infection Prevention and Control guidance. Implementation process descriptions were categorised according to
the CFIR Process domain constructs, with the assistance of the inclusion and exclusion criteria specified in the CFIR codebook (2020), and a content analysis was produced.

Research Study Two:

In study two, the CFIR was used to guide the systematic development of a questionnaire evaluating the implementation process of a post-operative endophthalmitis surveillance system (SIVEN) in hospitals in the State of São Paulo, Brazil (Luz et al., 2019). Constructs from all of the CFIR domains were utilised in the development of the questionnaire. Questions were formulated based on the CFIR constructs and codebook (2020).

Research Study Three:

During the analytic phase of research, study three utilised the CFIR to assess contextual factors within a hospital in São Paulo, Brazil, in order to inform the implementation plan of a protocol for effective communication (ComEfe) with patients in transmission-based precautions. The constructs and codebook (2020) inclusion and exclusion criteria for the domains Inner Setting and Characteristics of Individuals were used to interpret and categorise the non-participant observation data recorded in the researchers’ field diaries.

Research Study Four:

Study four used the CFIR to structure the analysis of interview data from Brazil and the United Kingdom. A content analysis was performed according to Krippendorf (2013) methodology to first identify themes that emerged from the interview data. Following which, two CFIR domains, Outer Setting and Process, were applied to further organise and reduce the number of themes through matching these with corresponding constructs in the domains using the construct descriptions.
Benefits, Challenges and Lessons Learnt Through Experiences Using the CFIR

Despite the four research studies using the CFIR in different phases of research and utilising the domains or constructs in different ways, there were a number of benefits and challenges that were shared experiences across the studies. The benefits were that the framework provided structure for the design of a questionnaire or analysis of data, promoted a shared language, and was highly adaptable and flexible. The challenges were related to the application of the framework in contexts where translation of the guidance was required, and the potential difficulty of differentiating between domains and constructs. The lessons learnt included the need for consideration of the type and amount of data available for analysis, the CFIR’s ability to enhance the comprehensiveness of questionnaires while facilitating the consolidation of questions to reduce participant fatigue, and the usefulness of the framework’s constructs as a point of comparison between data sets. The benefits, challenges, as well as their resolutions, and lessons learnt are discussed below with examples to illustrate the points made.

Benefits

Provision of structure

Across all four studies, the CFIR was found to offer researchers a comprehensive and well-defined structure that could be applied to different phases of the research process to rationally and systematically develop a questionnaire or analyse data associated with the implementation of healthcare interventions. Additionally, with the complexity of health
systems, interventions and implementation, the CFIR acted to increase the researchers’ awareness of the range of aspects that could be potentially explored. It also provided an evidence-based structure to drive the focus of research to elements most relevant to implementation.

Promoted a shared language

Reflecting on the researchers' experiences, it became apparent the CFIR was also beneficial during the dissemination phase of research. It facilitated effective communication and increased the understanding of individuals’ research studies within and between teams. This benefit, in contrast to the others discussed, was not the product of any single study but instead was evident during the collaboration of the researchers on international seminars and the current article. The use of inconsistent terminology has regularly been acknowledged as a barrier for the dissemination and implementation of research (Colquhoun et al., 2014). For example, Bahadori et al.’s (2016) study demonstrated that 75.2% of nurse participants cited a lack of uniformity in research literature was a barrier to their implementation of research. As such, the CFIR and the terms within it were highly beneficial for the researchers because they acted as a shared language with standardised terminology to aid the communication of thoughts and ideas on implementation science, as well as the intricacies of individuals’ research when explaining, disseminating and translating evidence from their study. Finally, in addition to the main CFIR article (Damschroder et al, 2009), the accompanying codebook (2020) that outlines the inclusion and exclusion criteria for each construct was also acknowledged by the researchers as highly useful. It provided clear delineations between the majority of constructs which meant the framework was relatively easy to apply.
Adaptability and Flexibility

The CFIR was designed to be adapted and it is recommended researchers do so in order to meet the needs of their research (Damschroder et al., 2009). In accordance with this recommendation, the researchers of the four studies selected the domains and constructs that would be most applicable to their individual projects, experiencing the benefits of the flexibility the CFIR provided for the design of studies, and the collection or analysis of data. It was found the logic and utility of the framework was not lost if not all constructs or domains were used, or used in a different order to that listed in the CFIR. For example, study two’s questionnaire was designed based on specific constructs but the order of questions was changed for a more logical line of questioning and questions of a similar theme could be grouped together to assist the flow of respondents’ thoughts. Overall, the experience of the researchers in using the CFIR in different ways and to different extents demonstrates that the framework can be used flexibly without compromising the integrity of it.

While the absence of a domain or constructs was not found to be a challenge for the researchers, it is recognised that Damschroder et al. (2009) also encourage researchers to add domains and/or constructs as required. The benefits of the CFIR’s adaptability in this capacity is demonstrated in the literature by Ilott et al. (2013), Breimaier et al. (2015) and Bekelman et al. (2016). When evaluating the utility of the CFIR on healthcare innovations, Ilott et al. (2013) highlighted there was an absence of constructs related to strategies which posed a challenge to their analysis and hypothesis testing. Therefore, the addition of a sixth domain that addressed practical strategies for implementation was suggested. Furthermore, both Breimaier et al. (2015) and Bekelman et al. (2016) suggested the addition of multiple
constructs to the CFIR domains, with both articles discussing how the addition of constructs facilitated their research.

Challenges

Application in contexts where translation was required

When the studies were conducted, the CFIR was available in English and French, while the codebook was only available in English. As a result, using the CFIR and its accompanying resources posed challenges for the Brazilian researchers. Some of the terminology used for the constructs did not always have an equivalent word in Portuguese or the meaning of translated terminology did not completely match the meaning intended by the framework. This caused some ambiguity in the use of the framework and reliance on the researcher’s interpretation, introducing the potential for reduced comparability of findings to other research using the CFIR. A number of terms were found to not have a direct translation when using the CFIR in Portuguese for the Brazilian context in studies two, three and four. To select a few, translation of the words “framework” and Inner/Outer Setting into Portuguese did not reflect the same meaning as in English. Additionally, constructs that were similar, such as Champions and Opinion Leaders, required substantial interpretation of both the CFIR’s intended meaning and the meaning of the translated terms to find accurate wording that reflected the original framework. In resolving these challenges, researchers discussed the translations with colleagues, including English native speakers who provided detailed explanations of each terms’ meaning. Portuguese translations were compared to English using a back translation strategy, before the appropriate words or expressions in Portuguese were selected.
It is acknowledged the translation challenges experienced by the researchers were only representative of one language. Due to the nature of languages however, the researchers anticipate translation would be a challenge regardless of the language. Therefore, the interpretation of terminology for the most accurate reflection of the original meaning requires expert translation to reduce potential inconsistencies with the interpretation and application of the CFIR in different languages. The involvement of the authors and users of the framework would be valuable in this process.

Delineation of domains and constructs with overlapping scope

Across the four studies it was found that despite the construct inclusion and exclusion guidance provided in the CFIR codebook (2020), there are constructs which appear to overlap. Consequently, researchers experienced some difficulties identifying which constructs were the most appropriate to use. For example in study four, when matching emerged themes of the content analysis to the Outer Setting and Process domain constructs, no themes matched the Champions construct. This may reflect the blurred boundaries between Champions and Opinion Leaders. Briefly, Champions support implementation and help mitigate any resistance colleagues have towards an intervention, while Opinion Leaders can influence their colleagues’ attitudes in regards to the implementation of an intervention (Damschroder et al., 2009). As such, both Champions and Opinion Leaders can positively influence their colleagues’ attitudes and some overlap in their definition was observed. This however, could have also been an indication that additional enquiry was required to further explore these individuals’ roles and delineate between the two constructs.
Study four researchers also found *Cosmopolitanism* and *Peer Pressure* within the *Outer Setting* domain had a high degree of correspondence. Although the definitions vary; *Cosmopolitanism* being the extent to which an organisation is networked externally, and *Peer Pressure* being the external pressure to implement an intervention, in analysis, these two constructs were functionally difficult to delineate. Further investigation understood this to be the result of mimetic isomorphism, where-by one organisation imitates another based on their perception of the other’s success, and the fact inter-organisational networks can create peer pressure (Martínez-Ferrero & García-Sánchez, 2017). These challenges likely arose due to the complex contextual interactions related to health settings, however were resolvable by exploring the potential source of similarity between the constructs. In turn, the better understanding of why the overlap existed, and then further utilisation of the CFIR inclusion and exclusion criteria helped differentiate between the constructs and supported more accurate data analysis.

Challenges with domain delineation were experienced in study three when using the CFIR in different health settings. Researching across multiple hospitals and then wards or departments within these hospitals made the contextual boundaries of the *Inner* and *Outer Setting* domains difficult to determine. This necessitated researcher deliberation as to whether the *Inner Setting* was the individual wards or departments within a hospital, the hospital’s context within a State, or even broader, the state’s context within the country. Similarly, with *Outer Setting*, there were challenges with determining the upper bounds of context and how many levels external to the setting of interest should be explored. This contextual boundary challenge was overcome by decisions based on researcher judgement, and ensuring clear definitions for the contextual limits were developed and discussed in the
research. Although the difficulty of domain differentiation was not experienced in the other studies, it was agreed that this may be a challenge faced when research is across settings.

Similar challenges in regards to construct delineation were highlighted in the literature by Ilott et al. (2013) and Breimaier et al. (2015), although these two articles found different constructs difficult to delineate to that of each other and those in the current article. Ilott et al. (2013) suggested further detail in the construct definitions of Tension for Change, Relative Advantage, and Goals and Feedback would assist researchers in coding data, while Breimaier et al. (2015) found difficulties with the constructs, Engaging, and Reflecting and Evaluating. Taking the current and discussed articles together, collectively they suggest the definition of some constructs could require greater interpretation than others and this may be specific to the research and data being analysed.

Lessons Learnt

Lessons learnt through using the CFIR were more specific to how the framework was employed and therefore, both individual and shared lessons corresponding to its use emerged from the exploration of researchers’ experiences. These are presented according to the phases of research in Table 1, Table 2 and Table 3.

Conceptual phase of research: Analysis of literature

Table 1. Experiences and lessons learnt from the use of the CFIR during the conceptual phase of research for the analysis of literature.

<table>
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<th>Experience 1</th>
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<tr>
<td>Study one: the application of CFIR was dependent upon the amount of data available for analysis. There was insufficient detail within the implementation process descriptions of the literature to clearly delineate between some constructs such as Champions and Opinion Leaders.</td>
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<table>
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<tr>
<th>Lessons Learnt 1</th>
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<tr>
<td>The use of the CFIR when there is a lack of detail in the data or content available may not be</td>
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suitable.

This was acknowledged as a limitation of the data rather than the framework.

Design and planning research phase: Questionnaire development

Table 2. Experiences and lessons learnt from the use of the CFIR during the design and planning phase of research for the development of a questionnaire.

**Experience 1**

Study two: there was a notable difference between the questionnaire initially developed without the CFIR and a later version developed with the CFIR. Retrospective analysis of the initial questionnaire showed that the questions only addressed 13 of the 39 CFIR constructs across four of the five domains (Suppl 1). This potentially risked an invalid exploration of implementation.

**Lesson Learnt 1**

Using the CFIR’s constructs ensured the questionnaire developed thoroughly and holistically investigated the different aspects of implementation to inform the research.

**Experience 2**

Study two: applying the CFIR to ensure questions addressed each individual construct produced a comprehensive, however lengthy questionnaire which risked fatiguing participants and impairing their willingness to respond.

**Lesson Learnt 2**

Refinement of the questionnaire after using the CFIR was necessary.

Questions covering individual constructs could be mapped against one another and those with some similarity could be combined into a single question that triggered participants to provide information on multiple constructs.

E.g. The trigger question, “Would you point out any organisation, association or study group that may have influenced (positively or negatively) the implementation?”, encouraged participants to provide information that informed *Opinion Leaders, Champions* and *External Change Agents* constructs.

It was important for researchers to be pragmatic about the refinement of questions to ensure the data collection method was feasible and accuracy to the CFIR was maintained.
Analytic research phase: Analysis of collected data

Table 3. Experiences and lessons learnt from the use of the CFIR during the analytic phase of research for the analysis of collected data.

**Experience 1**

Study three: analysis with CFIR constructs may not be suitable in all research, dependent upon the methods used for data collection. Not all of the constructs within the *Characteristics of Individuals* domain were appropriate for the analysis of non-participant observation data.

E.g. Observational field diary analysis which was used in the study three.

**Lesson Learnt 1**

The method used for data analysis should be considered prior to method selection and complementary methods or an alternative analysis approach should be undertaken.

This is not a critique of the framework itself but rather important for other researchers’ awareness when considering the application of the CFIR to different types of data.

**Experience 2**

Study four: the CFIR provided a standardised set of terms that facilitated the comparison between two separate contexts which would have otherwise been less comparable.

E.g. Researchers noticed the large data set that emerged from content analyses in Brazil and the United Kingdom had themes that were highly context specific and represented terminology used by participants in each country.

**Lesson Learnt 2**

Applying the CFIR to re-categorise the emergent themes reduced the number of themes to a more manageable quantity for analysis and synthesis, and standardised the terminology.

Overall, the use of the framework aided comparisons in data that were not previously apparent to support the clear identification of similarities and dissimilarities between the two contexts.

**Discussion**

To the researchers’ knowledge, this is the first methodological article that reflects upon and presents the experiences of nursing and public health researchers using the CFIR for analysis in the conceptual, design and planning, and main analytic phases of research, and for the dissemination of research between the research teams in the development of this article.
Over the past decade, there has been a greater focus on introducing theory into nursing research in order to guide the conduct of research and more efficiently build a scientific knowledge base (Lor, Backonja & Lauver, 2017). This article brings together the individual and shared experiences of researchers in Brazil and the United Kingdom, and discusses the benefits and challenges of the CFIR, a theoretical framework, for research in the context of nursing and public health. It also suggests solutions to the challenges faced and lessons learnt to inform future application of the framework in nursing and public health research.

Although the four studies focused on a diverse range of infection prevention and control topics, selected the CFIR for different reasons and applied the framework in various ways, there were a number of shared experiences. As such, this suggests the benefits, challenges and lessons learnt by the researchers may be applicable to other research studies.

The main benefits of the CFIR found in these studies were identified in Kirk et al.’s (2016) systematic review. We expand on this however, by providing examples that demonstrate how and why the framework was specifically useful in each study. Consequently, the benefits presented help to inform researchers’ decisions regarding future use of the CFIR. Uniquely, we found that difficulties in interpretation of constructs were enhanced when translation was required. Future work for the CFIR could involve the translation and validation of translations, to increase its accessibility to more countries and consequently, accessibility to comparable implementation research outputs, globally. In accordance with this suggestion, the Portuguese translated framework that the Brazilian researchers of this paper contributed to is available on the official CFIR website (Padoveze et al., 2021).

Where the current article substantially contributes to the literature on the CFIR is the resolutions taken to overcome challenges and the lessons learnt. It was found that any
challenges faced were able to be mitigated with further investigation, discussion and thought on how the constructs and/or domains apply to the specific study, and any interpretations or decisions regarding the use of the CFIR were clearly recorded and defined for consistency across the research. Overall, lessons learnt suggest the CFIR may not be very suitable to research where the amount of data available for analysis is limited, and considerations of the type of data that will be analysed by the framework should be made during the conceptual and design phases of research. Furthermore, the flexibility the CFIR offers should be utilised to optimise the feasibility and practicality of applying it throughout a research project.

These resolutions and lessons learnt, together with the identification of the benefits and challenges, act to inform the decisions of researchers considering the framework at different phases of research, in different contexts and for different applications within research. Overall, the article demonstrated the application of the CFIR and presented resolutions to challenges faced for future application of the framework by nurse researchers. As such, implications of this article for nursing research include improved considerations of using the CFIR as a theoretical framework to guide research and the provision of support of nurse and public health researchers in applying it.

Conclusions

Exploration of researchers’ experiences using the CFIR in four different studies in Brazil and the United Kingdom demonstrated the framework, as Damschroder et al. (2009) intended,
can be used to comprehensively structure research during all phases of a study including dissemination, and can be adapted to suit the needs of specific research projects without compromising the logic or integrity of the evidence underlying the framework. In every aspect of research however, there are challenges that are met when using the CFIR. Despite these challenges, researchers were able to find suitable resolutions, and the benefits of the framework were perceived to far outweigh the challenges experienced. Finally, there were a number of lessons learnt from the research studies that act as informative examples for other nursing and public health research using the framework in the future.

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