

# The Updated Consolidated Framework for Implementation Research: CFIR 2.0

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## Research Article

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# Abstract

## Background

Many implementation efforts fail, even with highly developed plans for execution, because contextual factors can be powerful forces working against implementation in the real-world. The Consolidated Framework for Implementation Research (CFIR) is one of the most commonly used determinant frameworks to assess these contextual factors, however, it has been 10 years since publication and there is a need for updates. The purpose of this manuscript is to describe the updated CFIR 2.0, which addresses important user critiques of the framework.

## Methods

User feedback was obtained from two sources: 1) a literature review with a systematic search; and 2) a survey of authors who used the CFIR 2009 in a published study. Data were combined across both sources and reviewed to identify themes; a consensus approach was used to finalize all CFIR 2.0 updates. The VA Ann Arbor Healthcare System IRB declared this study exempt from the requirements of 38 CFR 16 based on category 2.

## Results

The systematic search yielded 376 articles and 334 unique authors with contact information; 59 articles included feedback on the CFIR. Forty percent (n=134/334) of authors responded to the survey. The CFIR received positive ratings on most framework sensibility items, e.g., applicability, usability, but respondents also provided recommendations for changes. Overall, updates to the CFIR 2.0 include revisions to existing constructs as well as the addition, removal, or relocation of constructs. These changes serve to facilitate use of the CFIR, address gaps in themes, and better center recipients.

## Conclusion

The updates in the CFIR 2.0 reflect feedback from the growing community of CFIR users; although there are many updates, constructs can be mapped back to the CFIR 2009 to ensure longitudinal consistency. We invite users to continuing critiquing the framework in order it continue to evolve.

# Contributions To The Literature

The CFIR 2.0 manuscript:

- Provides an update to the Consolidated Framework for Implementation Research (CFIR), one of the most highly cited frameworks in implementation science
- Addresses important user critiques of the CFIR based on the literature and a survey, including better centering recipients in the framework

- Demonstrates how determinant frameworks must evolve as implementation science matures to advance the science

## Background

Far too many efforts to implement evidence-based innovations (EBIs) fail, (1, 2) even with highly developed plans for execution (3). In randomized controlled trials, innovations are tested in an environment where many contextual factors are controlled. However, implementation science embraces the reality that contextual factors are active and dynamic forces working for and against implementation efforts in the real-world (4–7).

Theories that guide conceptualization of contextual factors are often encapsulated within determinant frameworks (8, 9); these frameworks delineate determinants (i.e., barriers or facilitators) that influence the outcome of implementation efforts. These frameworks are a key antidote against proliferating constructs that are poorly conceptualized, evaluated, and reported (10).

The CFIR is among the most highly operationalized determinant frameworks in implementation science (9). It is the most highly cited (11) and has been listed in the top five most accessed articles within *Implementation Science* since its publication in 2009 (hereafter referred to as the CFIR 2009). Findings using the CFIR 2009 can be used to inform implementation strategies, generate hypotheses, and explain outcomes (12–14). A technical assistance website provides guidance for applying the CFIR 2009 in projects (see [www.cfirguide.org](http://www.cfirguide.org))(15).

The CFIR 2009 article invited critique in recognition of the need for the framework to evolve along with implementation science (16). The aim of this article is to describe updates in the CFIR 2.0 with rationale for changes based on user feedback from a literature review and survey of users.

## Methods

### Data Collection

Feedback was obtained from two sources: 1) a literature review with a systematic search; and 2) a survey of authors who used the CFIR 2009 in a published study. The VA Ann Arbor Healthcare System IRB declared this study exempt from the requirements of 38 CFR 16 based on category 2.

### Literature Review

We completed a literature review to identify feedback in the published literature. See Additional File 1 for more detail. Briefly, we searched SCOPUS and Web of Science from 2009 (the year the CFIR was published) to July 6, 2020; we included all articles that mentioned the CFIR in the title and/or abstract.

### Author Survey

We surveyed unique corresponding authors of the articles included in the literature review to elicit in-depth feedback about their experience using the CFIR 2009. See Additional File 2 for the full survey. First, the survey elicited information about the author’s use of the CFIR 2009, e.g., the total number of projects completed using the CFIR 2009. See Table 1. Second, respondents were asked to rate the CFIR 2009 based on Flottorp et al.’s “sensibility” criteria for determinant frameworks (e.g., Applicability, Simplicity) (17). See Table 2. Third, respondents were asked for open-ended feedback about the framework overall as well as existing domains and constructs. Finally, respondents were asked for recommendations to add or remove domains and constructs. Survey invitations were sent via email with an embedded link to the survey.

Table 1  
Use of the CFIR 2009

<b>Use of the CFIR</b>	<b>N(%)</b>
Number of projects in which the CFIR was used:	N = 128
1	42 (32.8)
2	32 (25.0)
3	19 (14.8)
4	11 (8.6)
≥ 5	24 (18.8)
Settings in which the CFIR was used:	N = 130
Healthcare	108 (83.1)
Public Health	45 (34.6)
Education	10 (7.7)
Agriculture	1 (0.8)
Other	15 (11.5)
Use of the CFIR:	N = 130
Guide Data Collection	107 (82.3)
Guide Data Analysis	114 (87.7)
Guide Data Interpretation	109 (83.8)
Design Implementation Strategy	42 (32.3)
Other	4 (3.1)

Table 2  
User Ratings of Flottorp's Criteria for the CFIR 2009

Flottorp Criteria	Survey Item	Yes	Partially	No	Uncertain	N
		N (%)	N (%)	N (%)	N (%)	
Applicability	Applicable across different settings	86 (67.2)	19 (14.8)	2 (1.6)	21 (16.4)	128
Applicability	Applicable for different types of innovations	104 (81.3)	13 (10.2)	1 (0.8)	10 (7.8)	128
Simplicity	More complicated than necessary	20 (15.7)	54 (42.5)	50 (39.4)	3 (2.4)	127
Logic	Organized in a logical way that is easy to understand	73 (57.5)	50 (39.4)	3 (2.4)	1 (0.8)	127
Usability	Easy for implementation researchers to use	64 (50.4)	57 (44.8)	2 (1.6)	4 (3.1)	127
Usability	Easy for non-implementation researchers to use	20 (15.9)	46 (36.5)	37 (29.4)	23 (18.3)	126
Suitability	Suitable to identify and prioritize determinants	75 (59.1)	35 (27.6)	9 (7.1)	8 (6.3)	127
Usefulness	Useful for designing implementation strategies	83 (65.4)	33 (25.9)	4 (3.1)	7 (5.5)	127
Usefulness	Useful for reporting determinants	96 (76.8)	21 (16.8)	1 (0.8)	7 (5.6)	125
Clarity	Labeled/explained in a way that is easy to understand <sup>a</sup>	87 (76.9)	–	10 (8.8)	16 (14.2)	113
Comprehensiveness	Recommendations to add domains/constructs <sup>b</sup>	44 (41.5)	–	62 (58.5)	–	106
Relevance	Recommendations to remove domains constructs <sup>b</sup>	27 (28.1)	–	69 (71.8)	–	96
N/A	Helps compare findings across studies	74 (58.7)	29 (23.0)	4 (3.2)	19 (15.1)	126
N/A	Helps to advance or build theory	66 (52.4)	40 (31.7)	6 (4.8)	14 (11.1)	126
a. Responses included Yes, No, Uncertain						
b. Responses included Yes, No						

# Data Analysis

## Literature Review

Two reviewers (MOW, CMR) read 10% of the included articles and abstracted feedback on the CFIR 2009; discrepancies with abstraction were discussed until consensus was reached. One reviewer (MOW) then read the remaining articles and abstracted all relevant passages. The data were then organized at the framework, domain, and construct levels using Microsoft Excel, including recommendations to add or remove domains or constructs.

## Author Survey

Responses were analyzed using descriptive statistics. Open-ended responses were combined with abstracted feedback from our literature review using Microsoft Excel. The team (LJD, JCL, CMR) reviewed the combined data to identify issues and solutions; a consensus approach was used to finalize all CFIR 2.0 updates.

## Positionality

Our team has extensive experience applying the CFIR 2009 across a range of studies. We are researchers embedded within and employed by the United States (US) Veterans Health Administration (VHA), the largest integrated healthcare system in the US. VHA has over 1,000 medical centers, community-based outpatient clinics, and other entities, and serves 9.6 million enrolled US military Veterans. LJD was the lead developer of the CFIR 2009; she has collaborated extensively with research teams across healthcare settings, including dozens of studies outside VHA. With nearly 20 years of experience in management consulting and other non-research settings, LJD brings a practical lens to implementation research. CMR is a qualitative methodologist with 10 years of experience using the CFIR to collect, analyze, and interpret qualitative data from implementation evaluations within and outside healthcare settings. In addition, she has worked with and/or trained over 100 investigators and analysts in the US and abroad on use of the framework. JCL was the senior developer of the CFIR 2009; she has worked in implementation science in VHA's Quality Enhancement Research Initiative (QUERI) program since 2006.

# Results

## Overview

The systematic search yielded 376 articles and 334 unique authors with contact information; 59 articles included feedback and/or recommendations. Forty percent ( $n = 134/334$ ) of authors responded to the survey; Table 1 provides information on how the CFIR 2009 was used. Nearly 20% of authors reported use of the CFIR 2009 on five or more projects, and over 65% reported use in at least two projects. Over 80% of authors reported use of the CFIR 2009 in healthcare settings and to guide data collection, analysis, and/or interpretation.

[Insert Table 1]

All but two of Flottorp et al.'s framework criteria elicited positive ratings from most survey respondents; most respondents felt the CFIR 2009 was applicable across settings (67%) and innovations (81%), useful for reporting determinants (77%) and designing implementation strategies (65%), and that the domains and constructs were labeled in a way that was easy to understand (77%). While 50% of respondents felt the CFIR was easy to use for implementation science researchers, only 16% felt this was true for non-researchers. In addition, 58% felt the CFIR 2009 was more complicated than necessary, and we received many qualitative comments regarding complexity. One respondent stated: the "CFIR is far too complicated and difficult to use. I have been learning about and trying to use CFIR for more than 5 years and the more I use it the more difficult and uninterpretable I find it to be." However, another observed that, "Implementation research is challenging in itself, and I see that the complexity of CFIR gets blamed for the broader challenges." In addition, while the number of constructs was often cited as the reason the CFIR was too complicated, many users identified missing themes in the framework. Nearly all respondents provided qualitative feedback about revising existing domain(s)/construct(s) or adding or removing domain(s)/construct(s).

[Insert Table 2]

Proposed CFIR 2.0

Table 3 details the CFIR 2.0 domain and construct names and definitions.

Table 3  
CFIR 2.0 Domain and Construct Names and Definitions

<b>CFIR 2.0</b>	
<b>CFIR 2.0 Guidance</b>	
<p>The CFIR 2.0 is intended to capture the perceptions of those that have influence and/or power over the outcome of implementation efforts (see the CFIR Outcomes Addendum) (18). As a result, it is important to identify those individuals in order to collect and analyze relevant data.</p> <p>In addition, the CFIR 2.0 must be operationalized prior to use in a project; this includes defining the subject of each domain based on the project (see guidance for each domain below), replacing broad CFIR 2.0 terms with project specific terms if needed, and adding constructs to capture themes not included in the CFIR 2.0.</p>	
<b>I. INNOVATION DOMAIN</b>	<p>Perceptions of the Innovation itself, e.g., a new clinical treatment, educational program, or city service.</p> <p>Define the Innovation: [Insert description of the innovation being implemented, e.g., innovation type, innovation components (including core versus adaptable components), and distinguish the innovation (activities that continue when implementation is complete) from the implementation process (activities that end after implementation is complete).]</p>
<b>Construct Name</b>	<p><b>Construct Definition:</b></p> <p><i>Perceptions of the degree to which...</i></p>
A. Innovation Source	The group that developed and/or visibly sponsored use of the innovation is reputable, credible, and/or trustable.
B. Innovation Evidence-Base	The innovation has robust evidence supporting its effectiveness.
C. Innovation Relative Advantage	The innovation is better than other available innovations or current practice.
D. Innovation Adaptability	The innovation can be modified, tailored, or refined to fit local context or needs.
E. Innovation Trialability	The innovation can be tested or piloted on a small scale and undone.
F. Innovation Complexity	The innovation is complicated, which may be reflected by its scope and/or the nature and number of connections and steps.
G. Innovation Design	The innovation is well designed and packaged, including how it is assembled, bundled, and presented.
H. Innovation Cost	The innovation purchase and operating costs are expensive.

<b>CFIR 2.0</b>	
<b>II. OUTER SETTING DOMAIN</b>	<p>Perceptions of the Outer Setting, the setting in which the Inner Setting exists, e.g., hospital system, school district, state. There may be multiple Outer Settings and/or multiple levels within the Outer Setting (e.g., community, system, state).</p> <p>Define the Outer Setting(s): [Insert description of the actual Outer Setting in the project, e.g., type, location, and the boundary between the Outer Setting and the Inner Setting.]</p>
<b>Construct Name</b>	<p><b>Construct Definition:</b></p> <p><i>Perceptions of the degree to which...</i></p>
A. Critical Incidents	Large-scale and/or unanticipated events disrupt the Outer Setting during implementation and/or delivery of the innovation.
B. Local Attitudes	Sociocultural values (e.g., shared responsibility in helping recipients) and beliefs (e.g., convictions about the worthiness of recipients) encourage the Outer Setting to support implementation and/or delivery of the innovation.
C. Local Conditions	Economic, environmental, political, and/or technological conditions enable the Outer Setting to support implementation and/or delivery of the innovation.
D. Partnerships & Connections	The Inner Setting is networked with external entities, including referral networks, academic affiliations, and professional organization networks.
E. Policies & Laws	Legislation, regulations, professional group guidelines and recommendations, or accreditation standards support implementation and/or delivery of the innovation.
F. Financing	Funding from external entities (e.g., grants, reimbursement) is available to implement and/or deliver the innovation.
G. External Pressure	<i>Use this construct to capture themes related to External Pressure that are not included in subconstructs.</i>
1. Societal Pressure	Mass media campaigns, advocacy groups, or social movements or protests drive a need to implement and/or deliver the innovation.
2. Market Pressure	A need to compete with and/or imitate peer entities drives implementation and/or delivery of the innovation.
3. Performance-Measurement Pressure	Quality or benchmarking metrics or established service goals drive implementation and/or delivery of the innovation.
<b>III. INNER SETTING DOMAIN</b>	<p>Perceptions of the Inner Setting, the setting in which the innovation is implemented, e.g., hospital, school, city. There may be multiple Inner Settings and/or multiple levels within the Inner Setting, e.g., unit, classroom, team.</p> <p>Define the Inner Setting(s): [Insert description of the actual Inner Setting in the project, e.g., type, location, and the boundary between the Outer Setting and the Inner Setting.]</p>

<b>CFIR 2.0</b>	
<b>Construct Name</b>	<b>Construct Definition:</b>
	<i>Perceptions of the degree to which...</i>
<i>Note: Constructs A – D exist in the Inner Setting regardless of the implementation and/or delivery of the innovation, i.e., they are persistent general characteristics of the Inner Setting.</i>	
A. Structural Characteristics	<i>Use this construct to capture themes related to Structural Characteristics that are not included in subconstructs.</i>
1. Physical Infrastructure	Layout and configuration of space and other tangible material features supports implementation and/or delivery of the innovation.
2. Information Technology Infrastructure	Technological systems for tele-communication, electronic documentation, and data storage, management, reporting, and analysis supports implementation and/or delivery of the innovation.
3. Work Infrastructure	Organization of tasks and responsibilities, within and between individuals and teams, supports implementation and/or delivery of the innovation.
B. Relational Connections	Formal and informal relationships, networks, and teams within and across Inner Setting boundaries (e.g., structural, professional) support implementation and/or delivery of the innovation.
C. Communications	Formal and informal information sharing practices support implementation and/or delivery of the innovation.
D. Culture	<i>Use this construct to capture themes related to Culture that are not included in subconstructs.</i>
1. Human Equality-Centeredness	There are shared values, beliefs, and norms about the inherent equal worth and value of all human beings (19).
2. Recipient-Centeredness	There are shared values, beliefs, and norms around caring, supporting, and addressing the needs and welfare of recipients.
3. Deliverer-Centeredness	There are shared values, beliefs, and norms around caring, supporting, and addressing the needs and welfare of deliverers.
4. Learning-Centeredness	There are shared values, beliefs, and norms around psychological safety, continual improvement, and using data to inform practice (20–23).
<i>Note: Constructs E – K are specific to the implementation and/or delivery of the innovation.</i>	
E. Tension for Change	The current situation is intolerable and needs to change.
F. Compatibility	The innovation fits with workflows, systems, and processes.
G. Relative Priority	Implementing and delivering the innovation is important compared to other initiatives.
H. Incentive Systems	Tangible and/or intangible incentives and rewards and/or disincentives and punishments support implementation and delivery of the innovation.

<b>CFIR 2.0</b>	
I. Mission Alignment	Implementing and delivering the innovation is in line with the overarching commitment, purpose, or goals of the Inner Setting.
J. Available Resources	<i>Use this construct to capture themes related to Available Resources that are not included in subconstructs.</i>
1. Funding	Funding is available to implement and deliver the innovation.
2. Space	Physical space is available to implement and deliver the innovation.
3. Materials & Equipment	Supplies are available to implement and deliver the innovation.
K. Access to Knowledge & Information	Guidance and/or training is accessible to implement and deliver the innovation.
<b>IV. INDIVIDUALS DOMAIN</b>	Perceptions about Individuals, including their roles and characteristics. Note: These may be self-perceptions for some roles.
<b>ROLES SUBDOMAIN</b>	Define Roles: [Insert description of roles applicable to the project and their location in the Inner or Outer Setting.]
<b>Construct Name</b>	<b>Construct Definition:</b>  <i>Perceptions of...</i>
A. High-Level Leaders	Individuals with a high level of authority, including key decision-makers, executive leaders, or directors.
B. Mid-level Leaders	Individuals with a moderate level of authority, including leaders supervised by a high-level leader who supervise others.
C. Opinion Leaders	Individuals with informal influence on the attitudes and behaviors of others (24,25).
D. Implementation Facilitators	Individuals with subject matter expertise who assist, coach, or support implementation.
E. Implementation Leads	Individuals who lead efforts to implement the innovation.
F. Implementation Team Members	Individuals who collaborate with and support the Implementation Leads to implement the innovation, ideally including Innovation Deliverers and Recipients.
G. Other Implementation Support	Individuals who support the Implementation Leads and/or Implementation Team Members to implement the innovation.
H. Innovation Deliverers	Individuals who are directly or indirectly involved with delivering the innovation.
I. Innovation Recipients	Individuals who are directly or indirectly receiving the innovation.

<b>CFIR 2.0</b>	
<b>CHARACTERISTICS SUBDOMAIN</b>	Define Characteristics: [Use the list below based on the COM-B system, or insert other constructs based on role-specific theories].
<b>Construct Name</b>	<b>Construct Definition:</b>  <i>Perceptions of the degree to which...</i>
A. Need	The individual(s) has deficits related to survival, well-being, or personal fulfillment (26), which will be addressed by implementation and/or delivery of the innovation.
B. Capability	The individual(s) has interpersonal competence, knowledge, and skills to fulfill Role.
C. Opportunity	The individual(s) has availability, scope, and power to fulfill Role.
D. Motivation	The individual(s) is committed to fulfilling Role.
<b>V. IMPLEMENTATION PROCESS DOMAIN</b>	Perceptions of the Implementation Process, i.e., the activities and strategies used to implement the innovation.  Define the Implementation Process: [Insert description of the implementation process framework (8) and/or strategies (27) being used to implement the innovation, and distinguish the implementation process (activities that end after implementation is complete) from the innovation (activities that continue when implementation is complete).]
<b>Construct Name</b>	<b>Construct Definition</b>  <i>Perceptions of the degree to which individuals...</i>
A. Teaming	Join together, intentionally coordinating and collaborating on interdependent tasks, to implement the innovation (28).
B. Assessing Needs	<i>Use this construct to capture themes related to Assessing Needs that are not included in subconstructs.</i>
1. Innovation Deliverers	Collect information about the priorities, preferences, and needs of deliverers to guide implementation and delivery of the innovation.
2. innovation Recipients	Collect information about the priorities, preferences, and needs of recipients to guide implementation and delivery of the innovation.
C. Assessing Context	Collect information to identify and appraise barriers and facilitators to implementation and delivery of the innovation.
D. Planning	Identify roles and responsibilities, outline specific steps and milestones, and define goals and measures for implementation success in advance.
E. Tailoring Strategies	Choose and operationalize implementation strategies to address barriers, leverage facilitators, and fit context (27,29).
F. Engaging	<i>Use this construct to capture themes related to Engaging that are not included in subconstructs.</i>

CFIR 2.0	
1. Innovation Deliverers	Attract and encourage deliverers to serve on the implementation team and/or to deliver the innovation.
2. Innovation Recipients	Attract and encourage recipients to serve on the implementation team and/or participate in the innovation.
G. Doing	Implement in small steps, tests, or cycles of change to trial and cumulatively optimize delivery of the innovation.
H. Reflecting & Evaluating	<i>Use this construct to capture themes related to Reflecting &amp; Evaluating that are not included in subconstructs.</i>
1. Implementation	Collect and discuss quantitative and qualitative information that indicates the degree to which implementation outcomes are achieved.
2. Innovation	Collect and discuss quantitative and qualitative information that indicates the degree to which innovation outcomes are achieved.
I. Adapting	Modify the innovation and/or the Inner Setting for optimal fit and integration into delivery routines (30).

[Insert Table 3]

Additional File 3 contains a mapping of the CFIR 2009 to the CFIR 2.0, and Additional File 4 provides this mapping as well as the rationale for each update based on user feedback.

## Discussion

The sections below provide a high-level discussion of some of the changes made to the CFIR 2.0; for a detailed list of changes based on user feedback, see Additional File 4.

### Framework-Level Updates

#### Addition of Framework and Domain-Level Guidance: Perceptions vs. Reality

The CFIR is a determinant framework: constellations of CFIR constructs help predict and/or explain implementation outcomes. In recognition that socially constructed perceptions, interpretations, and meaning lead to intentions or enacted behaviors (31), constructs are designed to capture the *perceptions* of individuals that have influence and/or power over the outcome of implementation efforts. This is now highlighted in response to user feedback asking whether constructs were intended to capture perceptions versus reality; however, the CFIR 2.0 also advises users to develop an a priori factual definition of the subject of each domain (see domain sections below). In addition, detailed guidance on applying and operationalizing the CFIR will be provided in a forthcoming manuscript.

#### Addition of New Constructs and Subconstructs

Constructs and subconstructs were added to address missing themes and further develop domains; the number of constructs and subconstructs increased in all domains except the *Innovation Domain*. For example, several constructs were added to better center *Innovation Recipients* in the CFIR 2.0, including in the *Inner Setting Domain (Culture: Recipient-Centeredness)*, *Individuals Domain (Roles: Innovation Recipients)*, and *Implementation Process Domain (Assessing Needs: Innovation Recipients and Engaging: Innovation Recipients)*.

The addition of constructs better aligns the CFIR 2.0 with other published frameworks. For example, Nilsen and Bernhardsson evaluated 17 determinant frameworks with clearly distinguishable dimensions. They concluded that CFIR 2009 only addressed 10 of 12 identified dimensions; the framework now addresses all 12 dimensions with the addition of the *Characteristic: Opportunity* construct in the *Individuals Domain*, which captures dedicated time to implement and deliver the innovation, and the *Structural Characteristics: Physical Infrastructure* subconstruct in the *Inner Setting Domain*, which captures the physical environment (32). Although constructs were added to fill perceived gaps in the CFIR, framework-level guidance also encourages users to operationalize the CFIR for their project, including adding constructs as needed.

## Revisions to Domain and Construct Names and Definitions

The names of constructs and definitions were updated in response to recommendations to make the framework more applicable across a range of innovations and settings. For example, we use the term *innovation* rather than *intervention* and *recipient* rather than *patient* in the CFIR 2.0. Additional minor revisions were made to clarify information that was confusing to users in the CFIR 2009. For example, *Evidence Strength & Quality* was renamed *Innovation Evidence-Base* to clarify that the construct is intended to assess perceptions of the existing evidence-base, not the effectiveness of the innovation after implementation. Major revisions were made to correct inconsistencies in the CFIR 2009. For example, the definition of *Innovation Complexity* was updated to replace the text “complexity of implementation” with “complexity of the innovation.” Overall, every domain and construct had at least a minor revision. Domain-level updates are described below.

## Innovation Domain Updates

### Addition of Domain-Level Guidance: Innovation vs. Implementation Strategy

Users questioned whether the CFIR was intended to evaluate the innovation and/or the strategy being used to implement the innovation, and they found it difficult to differentiate between them. The literature has recognized that the lack of a clean boundary between the innovation and implementation strategies is a contributor to implementation complexity (33); differentiating the two helps ensure accurate attribution of constructs in each domain to implementation outcomes. As a result, the CFIR 2.0 guides users to define the innovation (aka “the thing” (34, 35) being implemented), including the boundary between the innovation and implementation strategies. We encourage use of a reporting framework to document the innovation, such as the Workgroup for Intervention Development and Evaluation Research

(WIDER) (36), PICOT/PICOTS (33, 37), or the Simplified Framework for Interventions (AIMD) (38). These frameworks facilitate defining the type of innovation, the core versus adaptable components of the innovation, and the intended recipients of the innovation. In addition, the word *Innovation* was added to the name of each construct in the *Innovation Domain* to help orient users to the focus of this domain: the *Innovation itself*, independent of the implementation strategy.

## Outer Setting Domain Updates

### Addition of Domain-Level Guidance: Outer vs. Inner Setting

Many users described difficulty understanding boundaries between the *Inner and Outer Settings*. In Additional File 1 from the CFIR 2009, the boundary between *Inner and Outer Settings* was visually depicted using “overlapping, irregular, and thick grayed lines” to highlight that the line between them is not always clear (16). Lengnick-Hall et al. expand on this reality and call for researchers to take an “open-systems” perspective “to highlight interdependence between outer and inner contexts and [to] view organizations as part of a broader interdependent system that may range from simple to complex, rigid to flexible, and loosely to tightly coupled” (39).

Although it may be challenging, differentiation of internal and external influences on the performance of organizations has been a central tenet of organization science (40), and highlights the level at which to target any interventions. As a result, the CFIR 2.0 guides users to define the *Outer vs. Inner Settings* in a way that brings clarity to their project.

### Addition of New Constructs & Subconstructs

Several constructs were added to the *Outer Setting* in response to critiques that the domain was underdeveloped (32, 41). The CFIR 2.0 adds constructs to capture the potential impact of *Local Attitudes*, e.g., community-level values and beliefs, and *Local Conditions*, e.g., community-level of affluence, on the willingness and ability of entities within the *Outer Setting* to support implementation and delivery of the innovation. These constructs are especially important for innovations that require support by community entities, such as Housing First models of care (42), and to capture common resource constraints in low income contexts (43).

The CFIR 2.0 also better captures diverse sources of *External Pressures*, including *Societal Pressure* (e.g., pressure from social movements and protests), *Market Pressures* (e.g., pressure to compete with and/or imitate peer entities), and *Performance Measurement Pressure* (e.g., pressure to meet publicly reported goals). This expansion of the *Outer Setting* brings the CFIR 2.0 into closer alignment with other implementation and policy frameworks (17, 44–46).

## Inner Setting Domain Updates

### Addition of New Constructs & Subconstructs

Constructs and subconstructs were added to the *Inner Setting* to address several critiques. For example, four subconstructs were added to *Culture: Human Equality-Centeredness, Recipient-Centeredness, Deliverer-Centeredness, and Learning-Centeredness*. These constructs were added to reinforce the importance of identifying and amplifying key voices (i.e., *Innovation Recipients* and *Innovation Deliverers*) and address issues related to oppression and equality at both a cultural and system-level. In addition, the inclusion of *Recipient-Centeredness* helps to more explicitly center *Innovation Recipients* in the CFIR.

## Individuals Domain

### Reorganization of Domain

Users were unclear which individuals were included in this domain and felt that the existing constructs overlapped with constructs in other domains and failed to capture more relevant characteristics. One user summarized this feedback well: “[The CFIR needs to focus] more on who the individuals are and their underlying characteristics.” As a result, the *Individuals Domain* was significantly restructured to include two subdomains: *Roles and Characteristics*.

### Roles Subdomain

In the CFIR 2009, roles were spread across three different domains: *Patient Needs and Resources* was listed in the *Outer Setting*, *Leadership Engagement* was listed in the *Inner Setting*, and multiple implementation-specific roles were listed in the *Process Domain* (e.g., *Formally Appointed Internal Implementation Leaders*). These roles have been relocated to this new subdomain, and additional roles were added, including *Implementation Team Member* (47). In addition, the *Formally Appointed Internal Implementation Leader* and *Champion* constructs were combined into the *Implementation Leads* construct.

### Characteristics Subdomain

The CFIR 2009 characteristics constructs were replaced with constructs based on Michie et al.’s COM-B system (48). The COM-B posits broad categories of *Capability, Opportunity, and Motivation* that shape behavior. We also added the *Need* construct, given that the needs of all constituencies are important determinants of implementation outcomes. We encourage users to replace or extend *Characteristics* constructs based on role-specific theories. For example, theories, models, and frameworks can be combined with CFIR 2.0 related to:

- Behavior change, e.g., the Theoretical Domains Framework (49, 50), the Theory of Planned Behavior theories (51), or the Social Ecological Theory (52), which may provide constructs relevant for *Innovation Recipients* and *Innovation Deliverers*
- Facilitation (53, 54) and project management (55, 56), which may provide constructs relevant for *Implementation Facilitators* or *Implementation Leads*
- Leadership (53, 54), which may provide constructs relevant *High- and Mid-Level Leaders*

These role-specific constructs may be mapped to the broader COM-B constructs; for example, all 14 domains and constructs in the Theoretical Domain Framework (TDF) are mapped to the COM-B (57).

## Implementation Process

### Addition of Domain-Level Guidance: Innovation vs. Implementation Strategy

CFIR 2.0 encourages users to describe their overall approach or implementation process framework guiding implementation, e.g., the Interactive Systems Framework (58) or the Knowledge to Action Framework (59). This helps distinguish the *Innovation* from the *Implementation Process* (see *Innovation Domain* above) as well as to prioritize or identify additional relevant constructs or subconstructs based on the specific strategies included in the implementation process.

Some users questioned the inclusion of the *Implementation Process Domain* in the CFIR 2009 because it includes strategies not contextual factors. As a determinant framework, the CFIR includes determinants related to several spheres of influence: the innovation being implemented, the individuals involved, the settings, and the implementation process. The goal of this domain is to capture the use and quality of these implementation processes as implementation determinants common across many process frameworks (32) and implementation science theories. However, as noted in the preceding paragraph, depending on the process framework used for a particular project, there may be other important components of the implementation process that should also be examined as determinants.

### Addition of Constructs & Subconstructs

The CFIR 2.0 has expanded the number of constructs within the *Implementation Process Domain* in response to critiques that key processes and strategies were missing. Though it is outside the scope of the CFIR to include all 73 implementation strategies from the Expert Recommendations for Implementing Change (ERIC) (27), a few best practices have been added in the CFIR 2.0: *Teaming*, *Assessing Needs*, *Assessing Context*, *Tailoring Strategies*, and *Adapting*. The addition of the *Assessing Needs: Innovation Recipients* and *Engaging: Innovation Recipients* constructs also serve to better center *Innovation Recipients* in the CFIR 2.0.

### Recommendation for Users: Center Equity as a Determinant and Outcome

Researchers have produced decades of findings focused on the role of individual (e.g., race) and structural (e.g., access to care) determinants of health in highlighting inequities in services and outcomes (60). However, we must move upstream, past spurious individual-level determinants (61) to recognize racism and other systems of oppression as the source of these outcomes (62–64). Lett et. al. challenge us all to center equity by asking ourselves: Who is represented in the study? How can this work cause harm (61)? This requires understanding our own positionality, i.e., who we are relative to who *should* have influence and/or power over implementation, being deliberate in collaborating with communities and deeply knowledgeable equity researchers, and prioritizing sustainability over urgency in research (61).

Implementation researchers are uniquely positioned to address oppression by seeking to understand how it manifests across all domains as a determinant to outcomes related to equity. Individuals using the CFIR (or other framework) have opportunities to subvert established systems of oppression by including and sharing power with members of historically excluded groups in implementation and evaluation. When first planning implementation of an innovation, researchers should use a multi-level approach to identify implementation strategies that will address health equity (65), e.g., including recipients and other community members in choosing and adapting the innovation and implementation strategies. When evaluating implementation, researchers should combine use of an equity-focused framework (e.g., the HEIF (66)) or broader theoretical lens (e.g., critical race theory (67)) to identify potential determinants and implementation outcomes (68), and be deliberate about including recipients and deliverers in identifying relevant measures and outcomes.

Although the CFIR 2.0 includes new constructs to better assess themes related to racism and oppression, the CFIR is a generalized framework and we urge users to use equity, justice, or non-discrimination theories with the CFIR 2.0 as a lens through which to view *all* facets of implementation (65) and to collaborate with experts in equity (61).

## Limitations

A limitation of this work is that we only collected feedback from CFIR users (via the published literature and a survey). We purposefully focused on feedback from users because they are experts in the CFIR; they can provide detailed input based on their own experiences identifying gaps in the framework and applying real-world adaptations to the framework. However, this choice means that feedback from individuals who have not published work using the CFIR was not included. Including these individuals could potentially broaden tenets and design of the CFIR and is a direction for future research. The CFIR is part of the public commons – free and open to all – and citations of the CFIR are continuing to grow each year. Future updates will be needed, and we encourage other researchers to continue evolving the CFIR as a public good.

## Conclusion

The updates in the CFIR 2.0 reflect feedback from the growing community of CFIR users; and although there are many updates, constructs can be mapped back to the CFIR 2009 to ensure longitudinal consistency. As with its original publication, we encourage users to publish critiques, and highlight questions to consider: 1) Is CFIR 2.0 terminology and language clear? 2) Does the CFIR 2.0 promote comparison of findings across studies? 3) Does the CFIR 2.0 stimulate theory development to advance implementation science? We thank past users for their feedback and encourage future users to continue critique and evolution of the framework.

## Abbreviations

CFIR 2009

Consolidated Framework for Implementation Research published in 2009

CFIR 2.0

Updated Consolidated Framework for Implementation Research

EBI

Evidence-Based Innovation

QUERI

Quality Enhancement Research Initiative

US

United States

VHA

Veterans Health Administration

## **Declarations**

### **Ethics approval and consent to participate**

The VA Ann Arbor Healthcare System IRB approved this study, declaring it exempt from the requirements of 38 CFR 16 based on category 2.

### **Consent for publication**

Not applicable

### **Availability of data and materials**

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

### **Competing interests**

The authors declare that they have no competing interests.

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# Authors' contributions

MW, CR, and LD developed the literature review search criteria and created the survey. MW conducted the literature review and fielded the survey. CR and MW analyzed the survey data. JL, LD, and CR drafted the manuscript; MW provided survey data in relevant sections. All authors read and approved the final manuscript.

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