Applying Implementation Science to Sexual Harassment Prevention Evaluation in Higher Education

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Overview

The goal of this paper is to provide higher education stakeholders with an overview of the field of implementation science for the purpose of identifying ways in which implementation science can be applied to sexual harassment prevention efforts in institutions of higher education. To achieve this goal, we (1) present a summary of the organizational barriers to preventing sexual harassment, (2) identify (a non-exhaustive) list of stakeholders involved in decision-making for preventing sexual harassment in higher education, (3) define implementation science, including a comparison to other intervention research fields, (4) detail a subset of the research methods, designs, and models used in implementation science, (5) provide concrete examples of applying models of implementation science to action collaborative projects, and (6) provide an overview of potential barriers and next steps for approaching sexual harassment prevention from an implementation science lens.

1. Organizational Climate and Context as Challenges to Preventing Sexual Harassment in Academic Settings

Academicians work in complex organizations. Any attempts to implement norms, policies, or practices must take that complexity into account. Some features are unique to academic institutions—differences in type and quality of evidence required for best practices among those who work in Human Resources or Student Affairs versus those trained to evaluate rigorous randomized controlled trials as researchers, for example. The degree of complexity, however, can be addressed with scientific practices and models focused on preventing or intervening in equally complex medical, educational, and other settings.

Some key challenges or barriers to implementing effective prevention and intervention strategies were outlined in the National Academies of Sciences, Engineering, and Medicine report on sexual harassment of women in academia (2018).

Setting

Sexual harassment occurs in research labs, field sites, research vessels, conference hotels, graduate recruitment weekend, happy hours and other social events, and other locations in which people are together for extended amounts of time, sometimes overnight, with alcohol, and away from other people or sources of support.

Power Structures

In some ways, the same power structures associated with sexual harassment in other industries and organizations are present in academic organizations and universities. Most Presidents, Provosts, Deans, and Department Chairs are men. Pay inequity in higher education is a problem, and is associated with other kinds of academic power, such as holding external funding, awards, endowed positions, and positions of power over raises, tenure and promotions, and work assignments. In addition, academicians often work under apprenticeship models that make students and early career colleagues extremely dependent on a single senior researcher. In addition, academic networks can be quite small, and hiring is strongly influenced by reputations within those networks as hiring institutions traditionally assess intellectual merit, collegiality, and program "fit" in ways that are not always driven by transparent and rigorously equitable processes. Even further, many research scientists and faculty operate like independent contractors who have a high degree of flexibility to define both their work and working conditions rather than like employees who are accountable to an employer.

Intersecting Systems

Sexual harassment, like child abuse, domestic violence, and other complex types of interpersonal misconduct and victimization, lies at the intersection of human resources, the criminal justice system, advocacy and activism, research, and professional ethics and civility codes, as well as civil family, disability, and discrimination law. Each of these systems has different and sometimes contradictory norms, processes, and assumptions. The less clear institutions are about how they respond to sexual harassment, the more harassment continues.

2. Who Are the Stakeholders?

Complex academic scientific workplaces are full of complex individuals who hold multiple roles. Department Chairs, for example, are typically in their roles for a limited period and remain dependent on senior faculty they supervise for raises and promotions. Faculty are subject to not only university policies, but also to professional society ethics codes and conference codes of conduct. An accounting of stakeholders requires an intersectional approach to identities and roles that change over time. A partial list includes the following:

- Academic Chair of Department Personnel Committee
- Members of department, college, and university Promotion and Tenure committees
- External Promotion and Tenure letter writers
- Undergraduate and graduate students and post-docs
- College and university leadership
- Human Resources
- Title IX/Office of Equity
- On-campus and off-campus advocates
- On-campus and off-campus physical and mental health providers
- Research Integrity Office
- General Counsel
- Risk Management
- Employee Assistance
- Office of Disability
- Scientific and professional societies

3. Defining Implementation Science

The U.S. Institute of Medicine (2001) has noted a problematic "quality chasm"—a situation where science fails to affect practice. One effort under way to connect what researchers know to what practitioners do is called implementation science (Dearing, Kee, and Peng 2017). Implementation science is defined as the study of "methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and hence, to improve the quality and effectiveness of [services]" (Eccles and Mittman 2006, p. 1). The use of implementation science requires only "a desire for valid and generalizable evidence to inform decisions" (Dearing, Kee, and Peng 2017, 56). The main objectives of implementation science are external validity and scale-up, or the replication of positive effects across settings and conditions (Dearing, Kee, and Peng 2017; Moffitt 2007).

Implementation science is part of a broader sector of research called knowledge translation. Although relatively new to the United States, efforts to translate research to practice have been ongoing in the United Kingdom and Canada and by international organizations such as the World Health Organization, albeit under different names. Implementation science is similar, conceptually and methodologically, to *translation*, *research utilization*, *uptake*, *dissemination*, and even *population health intervention research*. Reviews published in 2006 (Graham et al.) and 2010 (McKibbon et al.) identified between 29 and 100 different terms that

are used in the literature to describe knowledge translation. This certainly illustrates a need to consolidate terminology and improve the consistency with which terms are used, but it also speaks to the growing worldwide interest in applying this research field to help solve population-level issues.

Implementation science was originally conceived by researchers in medicine and public health, but, as a research field, it is discipline agnostic. In any case where there is a problem that can be addressed with an intervention, program, or other innovation and there is a question about how to drive adoption and routine use of that intervention, implementation science is appropriate for investigating what happens before, during, and after adoption of the program (Dearing, Kee, and Peng 2017). Implementation science is especially useful in cases where the intervention or program is implemented within complex organization settings. The dependent variables of interest in implementation science are the "extent and quality of implementation and client or constituent responses to it" (Dearing, Kee, and Peng 2017, 48). Thus, it is possible to apply models and methods from implementation science to a broad range of questions (e.g., Kelly 2012; Soicher et al. 2020).

A Brief Comparison of Implementation Science to Other Research Fields

It is beyond the scope of this manuscript (and the expertise of the authors) to describe all the ways in which implementation science differs from other research approaches. However, given the emphasis of the workshop, we thought it useful to provide some ideas about how implementation science can be used in conjunction with and in addition to other research approaches being considered by the action collaborative.

Implementation science v. program evaluation

Simply put, program evaluation refers to the systematic collection of results of programs in order to make judgments about program effectiveness (Patton, 2008). Generally, program evaluation occurs in a specific setting under well-controlled conditions. Results of a program evaluation can be used, not only to judge effectiveness, but also to help further refine the program, re-design the program, or increase understanding of the mechanisms through which the program is effective (Trochim, Rubio, and Thomas 2013). Comparatively, implementation research typically takes place under real-world implementation conditions and focuses on

multiple outcomes specific to implementation, and the results are used to improve the generalizability and sustainability of a program (see Table 1).

	Program Evaluation	Implementation Science
Focus	Systematic collection of information about a program to improve understanding and effectiveness to plan for future programming.	Systematic study of issues related to adoption, use, and generalizability of an evidence-based practice.
Outcome of interest	Single primary outcome: effectiveness.	Multiple outcomes related to implementation, for example: acceptability, appropriateness, feasibility, cost, and fidelity.
Setting	Specific setting under well-controlled conditions.	Complex organizational settings. Understand implementation process, identify contextual influences, and assess external validity
Uses	Program design	Identify critical components of a program, illustrate the implementation process, and describe contextual influences on successful implementation. Program design

TABLE 1 Brief Comparison of Program Evaluation and Implementation Science

Combining the goals of program evaluation and implementation science

There is also a good deal of overlap between program evaluation and implementation science. For example, program evaluation research can be used to adjust or modify the program. In implementation science, this can be referred to as *adaptation research,* and it is quite common. Almost universally in real-world settings, slight changes are made to intervention delivery, compared to the delivery that was evaluated in the more optimal conditions of

effectiveness studies. Most implementation studies will systematically measure fidelity—the extent to which a particular intervention (or program) is delivered as intended (Proctor et al. 2011). This is sometimes also referred to as adherence, compliance, or integrity.

One area of research that illustrates the overlap between program evaluation and implementation science is pragmatic trials. The concept of pragmatic trials comes from work by Schwartz and Lellouch (1967), who contrasted explanatory approaches (i.e., tightly controlled) with pragmatic ones (i.e., more flexible) in terms of settings, criteria, patients, and immediate application to a real-world problem. Explanatory trials have the goal of testing a causal research hypothesis, while pragmatic trials have the goal of helping choose between options for care. By focusing on pragmatic trials, researchers can combine the usual rigor of randomized controlled trials within the context of the natural setting to enhance the overall usability of a program.

Thorpe and colleagues (2009) described a continuum of research from explanatory to pragmatic and offered a tool, the pragmatic-explanatory continuum indicator summary (PRECIS), for evaluating the place of a given trial on that continuum. An improved, validated version of this tool, the PRECIS-2, was published more recently (Loudon et al. 2015). This tool assesses nine domains by which explanatory and pragmatic trials differ and provides a visual summary of the results. These results are to be used at the design stage to ensure that study results are relevant for the community of users (e.g., other researchers, clinicians, patients) for whom the study is intended.

Several researchers have suggested that by incorporating pragmatic clinical trials or pragmatic measures into the scientific evidence base, the usefulness of that evidence base for decision-makers will be greatly improved. For example, Tunis, Stryer, and Clancy (2003) argued that pragmatic trials provide the information needed to make relevant clinical and policy decisions. These trials address practical questions about an intervention, such as the risk/benefit ratio or cost to implement and incorporate a diverse set of participants across a wide range of clinical settings. Glasgow and colleagues (2013) have argued for pragmatic measures that are simultaneously important to stakeholders, sensitive to change over time, of little to no burden for participants and staff, and psychometrically sound and derived from theory. Although the development of these measures has not yet been made a priority, they will be a key to facilitating quality improvement and pragmatic research. Overall, an emphasis on pragmatic research would, to some extent, meet the needs of both program evaluators and implementation researchers.

Implementation science v. prevention science

Like program evaluation, prevention science has traditionally focused on the discovery, design, and effectiveness of prevention programs, to work to reduce the incidence problems in the general population (Botvin 2004). Because of the high cost to society for problems such as substance use and abuse, violence, and mental health disorders, the moral imperative to improve suffering, and the relative inability to address these issues through individual practitioners or treatment, prevention of issues with high prevalence rates is of top concern. Whereas program evaluation investigates the effectiveness of interventions to "treat" a problem, prevention science focuses on the evaluation of programs to prevent the problem from occurring in the first place. Prevention science operates at many levels to identify potential risk factors and avenues for prevention, from the individual biological to the individual psychosocial to the community-based ecological levels (Mrazek and Haggerty 1994).

For years, researchers in the realm of prevention science have noted the need to facilitate the translation of prevention research to widespread use for maximum benefit (e.g., Biglan 2004; Wandersman et al. 2008). More recently, the Society for Prevention Research has issued a call to action to "apply results from prevention science to sustained, large-scale implementation of evidence-based programs and policies" (2009). Furthermore, scientists interested in disease prevention programs have recommended that factors ultimately influencing dissemination and uptake be considered at early stages of prevention program development (Glasgow, Lichtenstein, and Marcus 2003; Rotheram-Borus and Duan 2003; Society for Prevention Research 2008).

Implementation science can be applied as an extension to both program evaluation and prevention science in analogous ways to aid in understanding the adoption, implementation, and maintenance of these programs in real-world settings. We think that researchers across many disciplines (including program evaluation, prevention science, and implementation science), should work together to consolidate the theories, frameworks, and models underlying their research. By doing so, interdisciplinary teams can begin to grow the body of knowledge around closing the research-practice gap, rather than continuing to duplicate efforts or create new systems that make small to no additional gains over existing ones.

Hybrid implementation trials

One way to incorporate implementation science into earlier stages of research is with "effectiveness-implementation hybrid designs" (Curran et al. 2012). Combining elements of both clinical effectiveness and implementation research may enhance the translational gains, implementation strategies, and information for decision-makers above and beyond either of these approaches alone. By treating research as a continuum from efficacy to effectiveness to implementation, like the explanatory-pragmatic continuum, it is possible to formally identify research designs that incorporate varying levels of each type of research. In the future, approaching research in this way can help avoid the unhelpful distinctions between research types that have heretofore been conceptualized as mutually exclusive.

Curran and colleagues (2012) defined a hybrid trial as "a study design that takes a dual focus in assessing clinical effectiveness and implementation" (p. 13). Hybrid trials take one of three types (see Table 2):

1. Emphasis on testing the effectiveness of an intervention while also describing the implementation processes,
2. Equal emphasis on testing of effectiveness and implementation strategies, or
3. Emphasis on testing the implementation strategy while also collecting data on the impact of the intervention.

Characteristic	Type 1	Type 2	Type 3
Research Aims	Primary: Effectiveness of an intervention Secondary: Describe context for implementation	Effectiveness of an intervention *and* feasibility of implementation strategy	Primary: Effectiveness of an implementation strategy Secondary: Associated clinical outcomes
Units of randomization	Recipient of the intervention	Recipient of the intervention, case study	Intervention provider, academic unit, university, higher education system

Comparison groups	Placebo, treatment as usual, competing intervention	Mix of Type 1 and Type 3	Implementation as usual, competing implementation strategy
Outcomes	Quantitative/summative recipient functioning, feasibility and acceptability of implementing the intervention, barriers and facilitators to implementation	Quantitative/summative recipient functioning, adoption of and fidelity to the intervention	Implementation outcomes (see Proctor et al., 2011)
Design Challenges	Generating buy-in for implementation aims, appropriate expertise for designing and evaluating implementation, larger budgets, more study personnel	In addition to the Type 1 challenges: Slow/unrecorded adaptation of the intervention away from optimal effectiveness, Institutional Review Board complexities	In addition to Type 2 challenges: Recipient outcome data not as extensive as in typical trials, difficulty with data collection across large, multisite trials

TABLE 2 Characteristics of Hybrid Effectiveness-Implementation Trials
SOURCE: Modified from Curran et al. (2012).

All three hybrid types are useful for speeding translation of interventions but will be successful under different conditions. For example, a Type 1 hybrid trial is best when there is evidence that an intervention *should* work in a new setting and there is minimal risk if the intervention is not effective, while a Type 2 hybrid trial is best under those same conditions plus momentum within the organization to implement the intervention. By adopting this hybrid design framework, future efforts to blend effectiveness and implementation studies would be more systematic and could more quickly and more significantly reduce the research practice gap (Curran et al. 2012).

4. Implementation Strategies, Outcomes, Designs, and Models

The conceptual model in Figure 1 illustrates the relationships between evidence-based interventions, outcomes critical to implementation research (Proctor et al. 2009), successful organization contexts, and significant social outcomes (Fixsen et al. 2005). Effectiveness is defined by an intervention achieving more good than harm, typically in well-controlled settings (Flay 1986; Flay et al. 2005). Effectiveness is the outcome that researchers are typically well-acquainted with. Implementation strategies are the process by which an intervention is implemented, and the effectiveness of those strategies are a separate research target from the practice itself. Implementation science is primarily concerned with both implementation strategies and systematic measurement of the contextual factors that promote implementation.

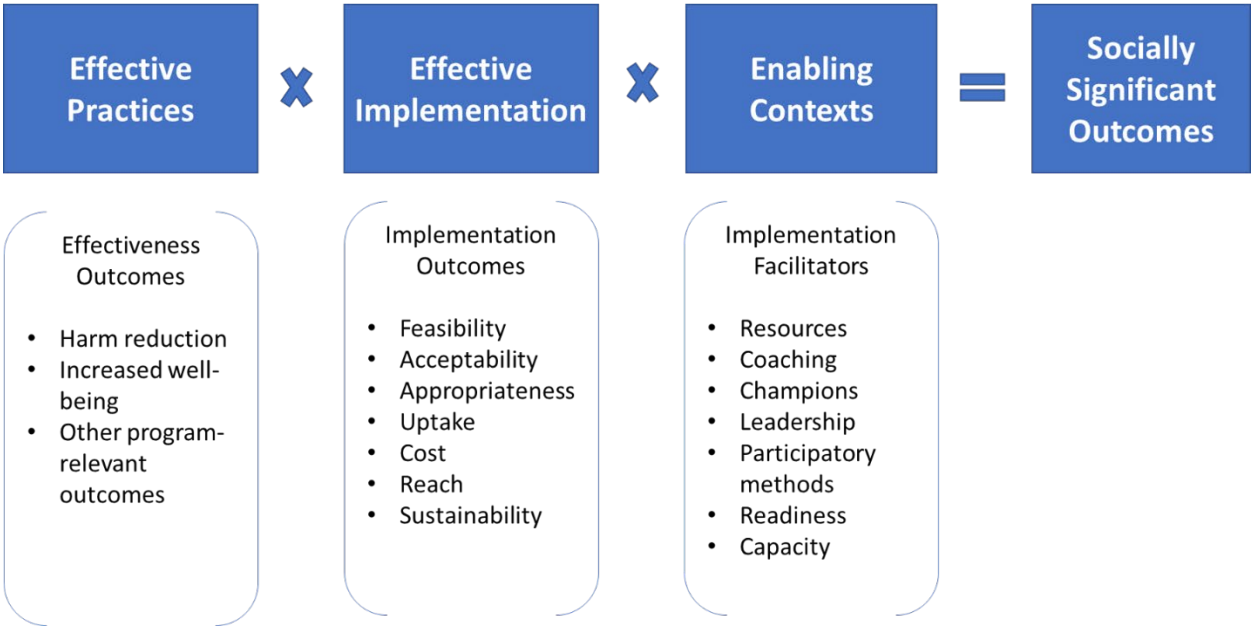

FIGURE 1 Conceptual model of implementation research.

Implementation Strategies

Implementation strategies are the specific set of processes that increase the adoption and continued use of an evidence-based practice, program, or intervention in a real-world setting to improve individual and/or organizational outcomes (Proctor, Powell, and McMillen 2013). The most common implementation strategies are education/training modules, toolkits, checklists, formal guidelines, and policy changes. Strategies may be as simple as a single component

("discrete strategies") or involve a series or combination of components (e.g., training, consultation, audit, and feedback cycles). There is consensus in the field that discrete strategies, which tend to be passive in nature, do little to produce change in actual behavior, while more effective strategies are multi-faceted (Powell, Proctor, and Glass 2014).

Implementation strategies can be further classified under four broad categories: professional, financial, organizational, and regulatory (Mazza et al. 2013). Professional strategies include actions such as distribution of educational materials, reminders, marketing, and audit and feedback. Financial strategies include actions such as institutional incentives or penalties and recipient incentives or penalties. Organizational strategies can include revision of professional roles, forming of interdepartmental teams, learning collaboratives, mechanisms for handling suggestions and complaints, changes in technology, and presence and organization of quality monitoring systems. Lastly, regulatory strategies involve peer review, licensure, or other policy-related compliance. In the healthcare literature (Mazza et al. 2013), the majority of implementation strategies are professional (57%), a large percentage are organizational (39%), and many fewer are financial (2%) or regulatory (2%).

Overall, a significant challenge facing implementation science is the lack of a consistent taxonomy and or standardized language around implementation strategies. Proctor and colleagues (2013) have suggested that researchers follow a specific set of steps to specify their implementation strategies in publications. These steps for detailed specification are as follows:

1. Name the strategy;
2. Operationally define the components of the strategy;
3. Specify who enacts the strategy, what the specific actions are, and the target of the action, including unit of analyses;
4. Specify when the strategy is used (time or stage);
5. Specify the dose of the strategy;
6. Identify the implementation outcomes affected by the strategy; and
7. Provide empirical or pragmatic justification for using the strategy.

Proctor, Powell, and McMillen (2013) further suggested that detailed descriptions of implementation strategies be provided in protocols or manuals. These "packages" could be published in online supplements, journal appendices, or stored in public archives (e.g., Open Science Framework). Following these guidelines would increase the comparability of different

implementation strategies and improve the replicability of implementation strategies in both research and practice.

Implementation Outcomes

As indicated in Figure 1, implementation science takes as its outcome variables those factors that will directly impact the ability to implement the intervention (Fixsen et al. 2005). This contrasts with the more typical effectiveness outcomes that are measured in areas such as program evaluation and prevention science. Implementation outcomes are acceptability, adoption, appropriateness, cost, feasibility, fidelity, penetration (or spread), and sustainability (see Table 3). The appropriate level of analysis, theoretical basis, useful implementation stage, and available types of measurement for each outcome are detailed in Proctor and colleagues (2011).

Outcome	Definition
Acceptability	The extent to which stakeholders find a particular intervention, practice, or policy agreeable, in terms of complexity, comfort, or satisfaction.
Adoption	Intention or action of using the practice, also referred to as uptake.
Appropriateness	The extent to which stakeholders perceive the intervention, practice, or policy to be a good fit in a particular context OR to appropriately address the problem targeted by the practice.
Cost	Costs of implementing an intervention in terms of money, time, or other resources.
Feasibility	The ease of use of a particular practice within a specific setting.
Fidelity	The degree to which an intervention is delivered as intended, also referred to as adherence.
Penetration (Reach)	The extent to which a particular practice or intervention has been integrated into a specific setting.
Sustainability	The extent to which a new practice or intervention is maintained in ongoing operations.

TABLE 3 Definitions of Implementation Outcomes
SOURCE: Proctor et al. (2011).

Incredible gains have been made over the past 10 years in creating theoretically based, psychometrically sound measures for these outcomes. For example, the Instrument Review Project, conducted by the Society for Implementation Research Collaboration, published a review of 104 instruments used in mental and behavioral health that assessed both psychometric properties and usability of the measures for all eight outcomes (Lewis et al. 2015). The Society continues to maintain a repository[1] that rates both psychometric properties (nine types of reliability and validity) and pragmatic characteristics (e.g., cost, burden, and length). As a second example, the National Cancer Institute (Division of Cancer Control and Population Sciences) maintains the Grid-Enabled Measures database[2] that organizes behavioral and social science measures by theoretical construct (gem-measures.org). From the Dissemination & Implementation Models in Health Research & Practice construct page (https://dissemination-implementation.org/content/measure.aspx), one can link directly to the Dissemination and Implementation Measures Initiative Workspace on the Grid-Enabled Measures database for each construct of interest. The database page contains the construct definition, theoretical foundation, related measures, and references.

Using reliable and valid measures of implementation outcomes will allow researchers to better determine the success of implementation efforts, as opposed to relying on intervention outcomes alone. That an intervention (or other evidence-based program or policy) is effective does not guarantee that it will be used appropriately or with fidelity within organizational settings. Implementation outcomes can be mathematically modeled to examine the success of an implementation strategy, making future decisions about implementation more explicit (Proctor et al. 2011).

Research Methods and Designs

Extensive coverage of research designs and statistical analyses is beyond the scope of this paper. However, it is helpful to see examples of the most common types of research methods underlying implementation research. These examples illustrate the interdisciplinary nature of implementation research and highlight the common methods used by implementation science and other research fields. As in any research field, the appropriate research design is going to

[1] Access to the repository requires a paid membership in the Society for Implementation Research Collaboration.
[2] Access to the database requires (free) registration and login.

depend on the purpose of the research. Table 4 outlines a set of example designs and research purposes from Brown and colleagues (2017) for testing implementation processes and strategies.

In implementation studies, it is common to combine both quantitative and qualitative analyses in mixed methods designs (Palinkas et al. 2011). Mixed methods approaches are not only used to compensate for use of one method by use of another, as is common, for example, when ameliorating low sample sizes in quantitative analyses. Mixed methods approaches are especially useful in implementation research to (1) understand the complex interpersonal nature of the implementation process, (2) conduct exploratory and confirmatory analyses, (3) examine the complexity and variation in implementation contexts, and (4) incorporate personal perspectives (Palinkas et al. 2011). Mixed methods designs can occur in a variety of formats. For example, a qualitative study can be embedded in a larger quantitative one, a qualitative study can precede a quantitative one (e.g., as a pilot study), or qualitative and quantitative data can be merged in one analysis. Some researchers have argued that mixed methods research has the greatest potential to accelerate understanding of how to scale up evidence-based practices (Berwick 2008; Palinkas et al. 2011).

Given the inherent stakeholder orientation of implementation science, another set of research methods especially well-suited to studying implementation are community-based participatory designs (Minkler, Salvatore, and Chang 2017). Community-based participatory research (CBPR), an umbrella term for many types of similar approaches, combines research, participation, education, and action (Cornwall and Jewkes 1995). Among the benefits of CBPR are increased buy-in and shared commitment to the implementation of an intervention among all stakeholders involved. Additionally, involving community members in research design may improve the ability of research measures to capture meaningful data and increase understanding of the research topic. Having a strong community network involved in the research may facilitate study of environments normally closed to members of the out-group (especially researchers) while simultaneously leading to changes in a broader system with wider, culturally appropriate dissemination (Minkler et al. 2017). Though not without its challenges, CBPR can add significant value at every stage of the dissemination-implementation-evaluation continuum.

CBPR approaches are especially relevant given their focus on empowerment of vulnerable and marginalized communities. Thus, CBPR has the potential to be an effective methodology for working with the communities (typically marginalized) most impacted by

sexual violence and sexual harassment. CBPR approaches can be used to decrease the inherent power dynamics in the research context between "experts" and the community (van der Riet and Boettiger 2009), especially when attention is paid to the ethical issues involved (Kwan and Walsh 2018).

Site	Design	Purpose
Within-Site		
	Post-test	Examine factors that predicted intervention adoption.
		Examine organizational response to new guidelines or policies regarding the intervention.
	Pre-test/Post-test	Examine the impact of the intervention.
		Measure the sustainability of the intervention over time.
Between-Site		
	Strategy v. treatment-as-usual	Compare the impact of a new implementation strategy to what already exists to see whether the new strategy improves reach, penetration, or use of the intervention.
	Head-to-head comparison	Compare two different implementation strategies for the same intervention to determine which has better quality, quantity, or speed of implementation.
	Doubly randomized, two-level nested designs	Investigate the synergistic effect of implementation factors across two different levels of an organization.

TABLE 4 Potential Research Designs for Implementation Research

SOURCE: Brown et al. (2017).

Models

The first step of conducting an implementation study is selecting a model. The use of theories, models, and frameworks[3] in guiding implementation studies has many benefits. For example, the use of models can help at all phases of a research study, from planning to execution to evaluation (Moullin et al. 2020). Models increase the interpretability of research results and helps to highlight the essential components for successful implementation (Tabak et al. 2012). Using models helps to provide a shared language among researchers, practitioners, and community members when discussing implementation efforts (Moullin et al. 2020). Lastly, reports on the use of a model contribute meaningful empirical evidence to the scientific evidence base.

To select a model, consider the following questions:

1. Does the model cover the key constructs in your research project/question?
2. What is the purpose of the research? Is the emphasis on dissemination or implementation?
3. What are the socio-ecological levels of the research? It is common for implementation projects to include multiple socio-ecological levels, from individual participants to staff to the larger organization.
4. To what extent have the models you are considering been used? More widely used models are more likely to have examples on how to adapt and operationalize the model.

Consolidated Framework for Implementation Research

The Consolidated Framework for Implementation Research (CFIR) is a framework that synthesizes common constructs from across multiple implementation theories and provides a consistent taxonomy for building a knowledge base around what works where and why (Damschroder et al. 2009). Although the CFIR does not specify the direction of relationships

[3] Though conceptually different, it is not uncommon for theories, models, and frameworks to be referred to collectively as models (Rabin et al. 2019; Tabak et al. 2012).

between constructs or identify critical hypotheses, it does outline relatively detailed construct definitions and steps for research processes (a 4 out of 5 on a 5-point scale; Tabak et al. 2012). Another benefit of the CFIR is that it addresses a wide range of socio-ecological levels: individual, organization, community, system, and policy (Powell, Proctor, and Glass 2014). The CFIR has been cited nearly 3,000 times in the literature, making it one of the most used models in implementation science.

The CFIR consists of five major domains, which are thought to interact to influence the implementation of evidence-based practices, outlined in Table 5 (Damschroder et al. 2009). The CFIR has been classified as a *determinant framework*—a framework that describes factors that influence implementation and recognizes the multidimensional nature of implementation (Nilsen 2015). Determinant frameworks, such as the CFIR, take a systems approach to implementation, arguing that implementation can only be understood as an integrated whole, rather than the sum of its parts. The comprehensiveness of the CFIR allows for a focus on context, which is critically important for successful sexual harassment prevention. Lastly, elements of the CFIR, and other determinant frameworks, can be linked to theories from psychology (e.g., behavior change), organizational change, economics, and spread of innovations, thereby strengthening the overall utility of the framework.

Domain	Description
Intervention Characteristics	Core components of the intervention—aspects which that be preserved to maintain the effectiveness of the intervention. Peripheral components of the intervention—adaptable elements that may be modified to improve the fit of the intervention within a specific organization or workflow.
Outer Setting	Economic, political, and social context that influences implementation of an intervention within an organization. Examples include pressures from competing organizations or external policies and incentives to implement an intervention.

Inner Setting	Local culture, climate, and structure of the organization through which implementation takes place. Examples include social networks, tension for change, prioritization (or not) of the change, and organizational incentives.
Individual Characteristics	"Individual" can refer either to the recipients of the intervention, the agents of implementation, or both. Characteristics refer to knowledge/beliefs about the intervention, levels of self-efficacy, readiness for change, identification with the organization, and other personal attributes (e.g., motivation and values).
Process	Details of the active change process, occurring both sequentially and simultaneously, linearly, and nonlinearly, for effective implementation. The major stages are typically planning, engaging, executing, reflecting, and evaluating.

TABLE 5 Five Domains of the Consolidated Framework for Implementation Research (CFIR)

Practical, Robust Implementation and Sustainability Model (PRISM)

The Practical, Robust Implementation and Sustainability Model (PRISM) is another comprehensive model that focuses on both the process and evaluation of implementation (Feldstein and Glasgow 2008). The PRISM draws on quality improvement, chronic disease care, and diffusion of innovations to measure the effectiveness of scaling up evidence-based practices to improve population-based health. The PRISM is an extension of a widely-used planning and evaluation framework known as Reach, Effectiveness, Adoption, Implementation, Maintenance (RE-AIM; Glasgow, Vogt, and Boles 1999; Glasgow et al. 2019). The PRISM operationalizes the contextual factors that affect the RE-AIM outcomes, including infrastructure, sharing of best practices, reflection and modification of implementation processes, facilitators to implementation, and adaptation of intervention protocols (McCreight et al. 2019).

The PRISM, because it incorporates the RE-AIM framework, has a high level of operationalization of constructs and spans most socio-ecological levels (i.e., individual, organization, and community). The PRISM is the natural result of the continued evolution of the RE-AIM framework, which has been through multiple iterations of development. As a result, either PRISM or RE-AIM (version 1 or 2) have appeared in more than 1,600 publications. The primary domains of the PRISM are outlined in Table 6.

Domain	Elements
Program (Intervention)	
Organization-level	Readiness for change
	Extent to which the intervention addresses barriers for staff
	Burden (cost and complexity)
	Coordination across levels of the organization
Consumer-level	Strength of evidence base
	Burden
	Ability to observe results
External Environment	Regulatory environment
	Community resources
	Funder satisfaction
Implementation and Sustainability	Support team
Infrastructure	Adopter training and support
	Adaptability of procedures
	Implementation and effectiveness data
	Plan for sustainability
Recipients	
Organization-level	Management and leadership
	Staffing and incentives
	Shared goals and cooperation
Consumer-level	Demographics
	Burden
	Competing demands
	Knowledge and beliefs

TABLE 6 Four Domains of the Practical, Robust Implementation and Sustainability Model (PRISM)

5. Applying Implementation Science to Sexual Harassment Prevention in Higher Education

Institutions of higher education are inherently complex organizations with a wide range of stakeholders who should, would, or would want to be included in sexual harassment prevention efforts. As such, a key challenge facing higher education in the United States is how best to scale up effective prevention strategies. We believe that by taking an implementation science approach, researchers can begin to better understand the contextual factors that facilitate or impede successful adoption and maintenance of sexual harassment programs or policies. With this knowledge, decision-makers within institutions will be better able to select a prevention program that aligns with their organizational culture and will be better prepared for executing and maintaining implementation of that program over time. What types of questions can implementation science help to answer? Let's imagine a few scenarios.

Scenario A

In this case, imagine that a particular policy has been shown to effectively reduce sexual harassment of undergraduate students by faculty at an elite, primarily white institution (PWI). Will this policy be successful in prevention at a primarily Hispanic-serving institute (HSI)? Because the effectiveness data in this case come from a different student population and the policy intervention includes a complex set of workflow procedures, it would be reasonable to conduct a Type 1 hybrid study. In this type of study, the primary outcome of interest is the effectiveness of the policy in reducing sexual harassment of undergraduates by faculty. The implementation questions that can be answered appear in the second column of Table 6 (Proctor et al. 2011).

Scenario B

It has been observed across multiple Division II athletics universities that sexual harassment prevention education for both coaches and athletes has been shown to effectively reduce the number of reported incidents in which athletes are accused of sexual assault. To determine whether this approach will also be successful at Division I schools, coaches and athletes at 10 institutions are tested in a 2X2 factorial randomized controlled trial to compare the effectiveness of no education, coach-only education, athletes-only education, or combined

athletes and coach education. The implementation questions that can be answered appear in the third column of Table 7.

	Implementation Research Questions	
Implementation Outcome	**Scenario A**	**Scenario B**
Acceptability	How satisfied are the stakeholders with the policy?	
Adoption	What is the perceived fit of the policy at the institution?	
Appropriateness		Are the educational materials used at Division II schools relevant for coaches and athletes at Division I schools?
Feasibility	How easy will it be to incorporate this policy change at the new institution?	
Fidelity	Was the policy implemented as intended?	To what extent did the participants (coaches, athletes, or both) complete the education programs?
Cost		Does the cost of the program (in terms of money or time spent) create a barrier to program completion?
Reach		Did all eligible athletes and coaches complete the education program?
Sustainability		After the study is complete, do the coaches and athletes continue to use the program?

TABLE 7 Examples of Research Questions Answered with an Implementation Science Approach

Examples from the Action Collaborative

To apply a model from implementation science to the implementation of sexual harassment prevention programs from the Action Collaborative on Preventing Sexual Harassment in Higher Education, we suggest the following steps (Moullin et al. 2020):

1. Select a model,
2. Create and maintain a community of stakeholders,
3. Define the issue and develop research hypotheses,
4. Develop a process model of implementation,
5. Select research methods,
6. Determine implementation factors,
7. Develop an implementation strategy,
8. Specify and assess implementation outcomes,
9. Use the model to fine-tune the implementation, and
10. Report the results.

Below, we outline the application of the two models described above (PRISM and CFIR) to cases from the Action Collaborative. Because the authors are unfamiliar with the projects beyond the Description of Work published in the Action Collaborative's Sexual Harassment Repository (2021), these are meant only as illustrative examples or starting places for considering how implementation science could be applied.

Altering Departmental Admissions Policies to Diffuse Dependent Relationships Between Graduate Students and Their Advisors (Vanderbilt University)

Tables 8 and 9 represent potential implementation questions that could be developed, and answered, for the Vanderbilt University project using the PRISM.

Intervention Questions	***Potential* Implementation Questions**

Student perceptions	Student perspective
Connectedness	Demographics
Conflict with advisor	Admissions process
Academic success	Understanding of differences between admissions processes (umbrella v. direct admit)
Professional productivity	
Retention to the PhD	
	Ultimate choice (if both are available)
	Impact of mentoring compact
	Work with pre-candidacy committee
	Connectedness with student-advisory group
Percentage of direct-admit students who previously worked with advisor (predicted increase)	Organizational perspective
	Readiness for policy change
	Burden (complexity and cost)
	Trialability/Reversibility
	Data and decision support
	Staffing
	Management support and communication
Number of direct-admit graduate students (predicted decrease)	External environment
	Support and promotion of change
	Similarity to other admissions policies at other institutions
	Implementation and sustainability infrastructure
	Infrastructure for continuation of the policy
	Adaptability of the policy for other departments or institutions
	Facilitators for sharing of best practices

TABLE 8 The PRISM Applied to the Vanderbilt University Case

RE-AIM Element	***Potential*** **Implementation Questions**

Reach	Who will the change in admissions policy appeal to? How should the policy change be advertised and promoted?
Effectiveness	The three metrics identified in the program summary. What are the potential barriers to the expected results of the policy change? What unintended consequences might there be? What impact might there be on mentors/advisors?
Adoption	What are the key characteristics an organization must have for this policy to be a good fit? Who would lead or enact the policy change?
Implementation	How would you know whether adjustments need to be made to the policy? Who would be responsible for making those changes? What costs and resources need to be considered?
Maintenance	Can organizations sustain the initiative over time? How likely is the change to produce lasting effects for students? What easy to understand materials can you produce to tell others about your lessons learned? How can you track changes made over time?

TABLE 9 RE-AIM Applied to the Vanderbilt University Case

Lab-Based Inclusive Culture Workshops (MIT)

Table 10 represents the potential implementation components of the MIT case identified by applying the CFIR.

CFIR Domain	*Potential* Implementation Components
Intervention Characteristics	Stakeholders' perceptions of the origin of the intervention (e.g., do they perceive it to be faculty-driven?)
	Stakeholders' perceptions of the quality and validity of evidence in support of the workshops
	Stakeholders' perceptions of the advantage of the workshops over alternatives
	The degree to which the workshops can be tailored to meet local needs
	Perceived difficulty of implementation Perceived quality of intervention packaging, marketing, and delivery
	Costs of implementation: financial, supply, and opportunity
Outer Setting	The extent to which stakeholders' needs are prioritized and met
	The degree to which MIT is networked with organizations doing similar work
	Pressure from peer or competing organizations to offer workshops
	External policies, mandates, and incentives that might be at play

Inner Setting	Norms, values, and assumptions within each department/lab
	Stakeholders' shared receptivity to the workshops
	The degree to which stakeholders perceive the current situation as needing change
	Stakeholders' shared perception of the importance of the workshops within the department
	Departmental incentives such as awards, promotions, or increase in respect
	The extent to which goals are clearly communicated
	Leadership engagement
	Available resources
Individual Characteristics	Student, faculty, and staff attitudes toward the workshops as well as their familiarity with the topic of the workshops
	Student, faculty, and staff self-efficacy to host successful workshops
	Student, faculty, and staff identification with their department and/or MIT as a place that values the workshop
	Student, faculty, and staff motivations for hosting/requesting workshops
Process	The degree to which an implementation strategy is planned in advance
	Attracting and involving appropriate stakeholders to participate in the use of the workshops

	Identifying formal and informal "champions"—individuals who are willing to be provocative in leading adoption of the workshops
	External change agents who might formally facilitate uptake of the workshops
	The extent to which the implementation strategy is carried out as planned
	Reflecting and evaluating on the quality and progress of implementation

TABLE 10 CFIR Applied to the MIT Case

For additional guidance on different aspects of implementation science that may be helpful when evaluating sexual harassment prevention initiatives, please see the Appendix.

6. Moving Forward with Implementation Science

There are, of course, potential barriers to engaging with implementation science. It may be helpful to have these highlighted before work begins, to brainstorm ways to avoid or address them.

A recent national survey of applied health science researchers identified several critical barriers to individual researchers in engaging with implementation science (Stevens, Shelley, and Boden-Albala 2021). A large proportion of survey respondents indicated an inability to define implementation science, lack of training in implementation science, and the lack of funding and/or institutional support to pursue implementation science as their top concerns. Fewer survey respondents indicated that, as a researcher, integrating with communities/organizations was too difficult. The single strongest barrier was a personal belief that implementation research is not beneficial for one's career (e.g., would not help faculty gain tenure).

Aside from individual barriers, researchers have also noted barriers within the field of implementation science itself. In 2009, Proctor and colleagues identified significant challenges regarding measurement (e.g., psychometrically sound measures of implementation-specific outcomes) and design (e.g., small sample sizes, need for complex statistical analyses). As recently as 2017, Brownson and colleagues continued to call for improvements in measures for

implementation outcomes. Additionally, researchers feel a need for continued consolidation of terminology in the field. Elsewhere, researchers have noted that the current structure of academic research favors novel scientific discovery above improvement, effectively thwarting attempts to engage in implementation science (Perl 2011).

Lastly, the culture and context of higher education is unique in several important ways. One example of this uniqueness is power dynamics within institutions of higher education (e.g., between a graduate student and their mentor). Power differentials between students, staff, faculty, and administration make academic settings especially difficult to navigate and change. We suggest that researchers draw on a body of literature in organizational psychology to better understand power dynamics in change processes (Boonstra and Bennebroek Gravenhorst 1998; Munduate and Bennebroek Gravenhorst 2003). Additionally, CBPR approaches are encouraged as a way to center survivors and breakdown power dynamics. Lastly, applying implementation science itself to the study of intervention implementation can contribute meaningfully to our understanding of how contextual features unique to higher education impact implementation and large-scale success of programs.

Despite the challenges described above, we believe implementation science to be a field of research critical for understanding how to improve the translation of science to practice. Due to its interdisciplinary nature, implementation science models and measures can be (relatively) easily adapted to the issue of sexual harassment prevention programs. We make the following recommendations for practitioners, scholars, and institutional leaders to plan for and evaluate dissemination and implementation efforts for sexual harassment prevention programs:

- Design for implementation—consider aspects of implementation in early stages of planning for implementation.
- Ask research questions that would truly provide answers that are meaningful for those who would be expected to put them to use — students, faculty, and staff.
- Use existing terminology, tools, models, and measures from implementation science as much as you are able.
- Publish the results of your implementation efforts.

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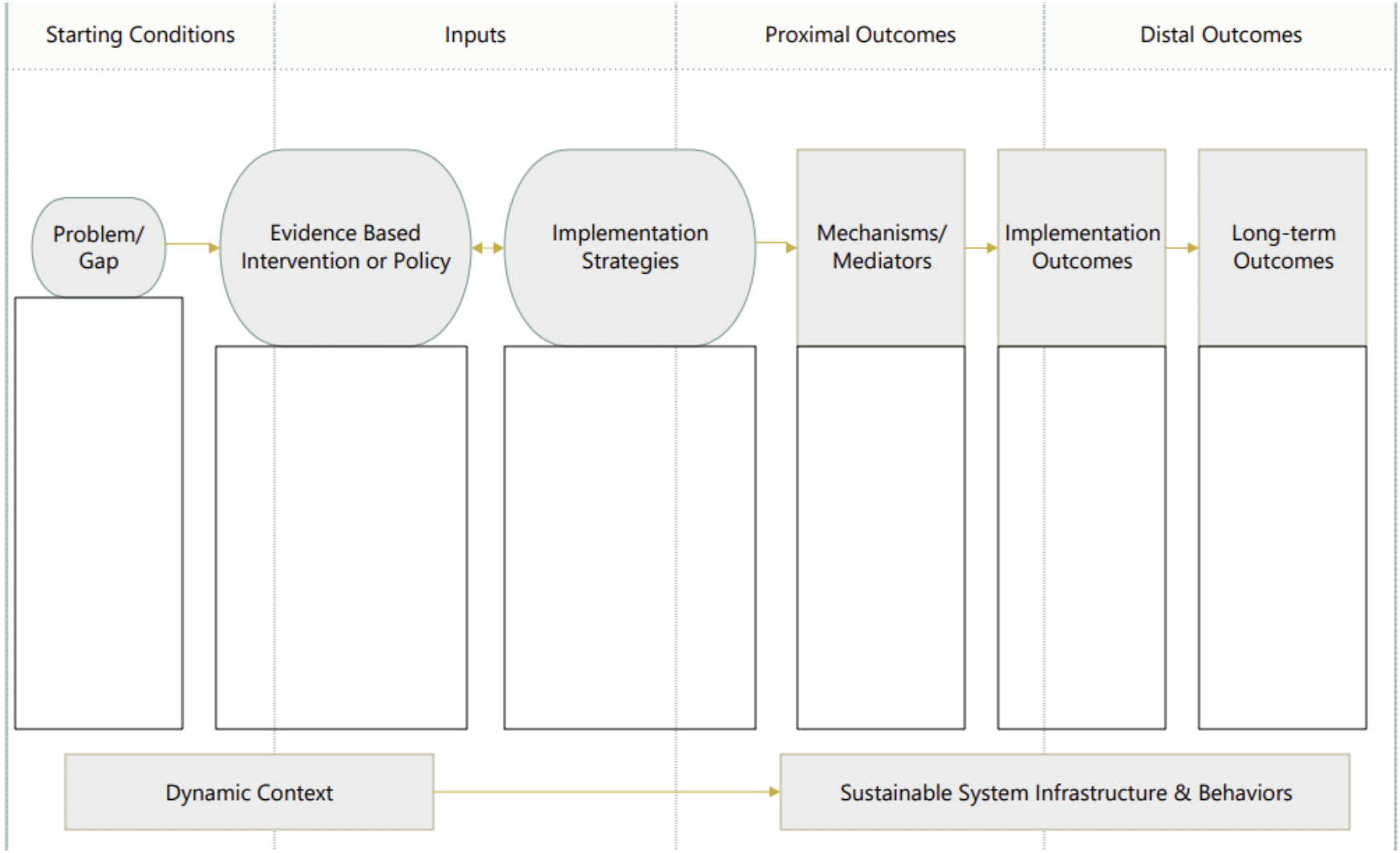
Appendix A: Worksheets for Getting Started with Implementation Science



Logic Model of an Implementation Science Project. Source: Rabin et al. (2019).

Logic Model Worksheet

Modified from Rabin et al. (2019)

For each item below, select one or more options that describes or is relevant to your project. For each box you check, you should use a separate sheet to add details.

1. **Problem**
   - ❑ Dissemination
   - ❑ Implementation
   - ❑ Policy
   - ❑ Individual Level
   - ❑ Organizational Level
   - ❑ Context—inner setting
   - ❑ Context—outer setting
   - ❑ Target audience

2. **Evidence-Based Program, Intervention, or Policy**
   - ❑ Cost
   - ❑ Relative Advantage
   - ❑ Dose
   - ❑ Acceptability
   - ❑ Trialability
   - ❑ Complexity

3. **Implementation strategies**
   - ❑ Fit
   - ❑ Dose
   - ❑ Compatibility
   - ❑ Champion
   - ❑ Communication channels
   - ❑ Stakeholders

4. **Mechanisms**
   - ❑ Process
   - ❑ Knowledge
   - ❑ Goals
   - ❑ Readiness
   - ❑ Engagement
   - ❑ Knowledge
   - ❑ Transfer

5. **Implementation Outcomes**
   - ❑ Reach
   - ❑ Cost
   - ❑ Adoption
   - ❑ Fidelity
   - ❑ Maintenance
   - ❑ Acceptability
   - ❑ Feasibility
   - ❑ Appropriateness

6. **Long-Term Outcomes**
   - ❑ Intervention outcomes
   - ❑ Fidelity
   - ❑ Maintenance/Sustainability

Worksheet to Guide Application of the CFIR Model

(modified from https://cfirguide.org/guide/app/#/)

Not all questions need to be (or even should be) answered. Choose the domains and constructs that make the most sense for your project.

Domain	Constructs	Guiding Questions
Intervention Characteristics		
	Intervention Source	Who developed the intervention? What are stakeholders' opinions of this group/person? Why is the intervention being implemented in this setting? Who decided to implement the intervention and how was that decision made?
	Strength of Evidence	What kind of information or evidence are you aware of that shows whether the intervention will work in your setting? Where is that evidence from? How does this evidence influence your perception of the intervention? What do administrative or other leaders think of the intervention? What kind of supporting evidence is needed to increase stakeholders' buy-in?

	Relative Advantage	What advantages and disadvantages does this intervention have compared to other similar existing programs in your setting? How does the intervention compare to other alternatives that may have been considered or that you know about? Is there another intervention that people would rather implement? Why do they have this preference?
	Adaptability	What kinds of changes or alterations do you think you will need to make to the intervention so that it will work effectively in your setting? Are there components that should not be altered?
	Trialability	Can/will the intervention be piloted prior to full-scale implementation?
	Complexity	How complicated is the intervention in terms of duration, scope, intricacy, and number of steps involved?
	Design Quality & Packaging	What supports, such as online resources, marketing materials, or a toolkit, are available to help you implement and use the intervention? How will available materials affect implementation in your setting?
	Cost	What costs will be incurred to implement the intervention?
Outer Setting		

	Stakeholders' Needs & Resources	How "in touch" are staff and leadership with the individuals served by your organization? To what extent were the needs and preferences of the individuals served by your organization considered when deciding to implement the intervention? How do you think the individuals served by your organization will respond to the intervention? What barriers will the individuals served by your organization face to participating in the intervention? Have you elicited information from participants regarding their experiences with the intervention?
	Cosmopolitanism	To what extent do you network with colleagues or people in similar professions/positions outside your setting? What kind of information exchange do you have with others outside your setting, either related to the intervention, or more generally about your profession? To what extent does your organization encourage you to network with colleagues outside your own setting?

	Peer Pressure	What you know about any other organizations that have implemented the intervention or other similar programs? To what extent are other organizations implementing the intervention? To what extent are other units within your organization implementing the intervention? To what extent would implementing the intervention provide an advantage for your organization compared to other organizations in your area? Is there something about the intervention that would bring more individuals into your organization, instead of another one in your area?
	External Policies & Incentives	What kind of local, state, or national performance measures, policies, regulations, or guidelines influenced the decision to implement the intervention? How will the intervention affect your organization's ability to meet these measures, policies, regulations, or guidelines? What kind of financial or other incentives influenced the decision to implement the intervention?
Inner Setting		
	Structural Characteristics	How will the infrastructure of your organization (social architecture, age, maturity, size, or physical layout) affect the implementation of the intervention?

		What kinds of infrastructure changes will be needed to accommodate the intervention? Changes in scope of practice? Changes in formal policies? Changes in information systems or electronic records systems?
	Networks & Communications	Do you meet (formally or informally) with a team of people? Can you describe your working relationship with leaders? Can you describe your working relationship with influential stakeholders? How do you typically find out about new information, such as new initiatives, accomplishments, issues, new staff, staff departures? When you need to get something done or to solve a problem, who are your "go-to" people?
	Culture	How would you describe the culture of your organization? Of your own setting or unit? How do you think your organization's culture (general beliefs, values, assumptions that people embrace) will affect the implementation of the intervention? To what extent are new ideas embraced and used to make improvements in your organization?
	Implementation Climate	What is the general level of receptivity in your organization to implementing the intervention?

	Tension for Change	How essential is this intervention to meet the needs of the individuals served by your organization or other organizational goals and objectives?
	Compatibility	How well does the intervention fit with your values and norms and the values and norms within the organization? How well does the intervention fit with existing work processes and practices in your setting? Can you describe how the intervention will be integrated into current processes? Will the intervention replace or complement a current program or process?
	Relative Priority	To what extent might the implementation take a backseat to other high-priority initiatives going on now? How will you juggle competing priorities in your own work? How will your colleagues juggle these priorities?
	Organizational Incentives & Rewards	What kinds of incentives are there to help ensure that the implementation of the intervention is successful? To what extent do you think your supervisor will consider your role in this implementation in your (next) evaluation? In their regard for your work or role?

		Are there any special recognitions or rewards planned that are related to implementing the intervention?
	Goals & Feedback	Have you/your unit/your organization set goals related to the implementation of the intervention? If yes, what are they? To what extent does your organization/unit set goals for current programs/initiatives? To what extent are organizational goals monitored for progress? How will you get feedback about the implementation?
	Learning Climate	To what extent do you feel like you can try new things to improve your work processes?
	Readiness for Implementation	What level of endorsement or support have you seen or heard from leaders? What kind of support or actions can you expect from leaders in your organization to help make implementation successful? Do you expect to have sufficient resources to implement and administer the intervention? What kind of training is planned for you? For colleagues? Who do you ask if you have questions about the intervention or its implementation?

Characteristics of Individuals		
	Knowledge & Beliefs	What do you know about the intervention or its implementation? Do you think the intervention will be effective in your setting?
	Self-efficacy	How confident are you that you will be able to successfully implement the intervention? How confident are you that you will be able to use the intervention? How confident do you think your colleagues feel about implementing the intervention? How confident do you think your colleagues feel about using the intervention?
	Individual Stage of Change	How prepared are you to use the intervention? • Knowledge stage (Pre-contemplation)—knowledge of key aspects of the intervention • Persuasion stage (Contemplation)—likes the intervention, discusses it with others, buys into it, has a positive view • Decision stage (Preparation)—intends to seek additional information and try it • Implementation stage (Action)—acquires additional information, uses intervention regularly, and has continued use • Confirmation stage (Maintenance)—recognizes benefits, has integrated the intervention into routines, promotes use to others

	Individual Identification with the Organization	What are individuals' buy-in to organizational or intervention-related goals?
	Other Personal Attributes	Other motivational or behavior change constructs that could be related to the intervention.
Process		
	Planning	What have you done (or what do you plan to do) to get a plan in place to implement the intervention? Can you describe the plan for implementing the intervention?
	Engaging	Who are the key influential individuals to get on board with this implementation? What are influential individuals saying about the intervention? How did your organization become involved in implementing the intervention? Other than the formal implementation leader, are there people in your organization who are likely to champion (go above and beyond what might be expected) the intervention? Can you describe people's perception of this champion/individual?

		Will someone (or a team) outside your organization be helping you with implementing the intervention? What steps have been taken to encourage individuals to commit to using the intervention? Who are the key individuals to get on board with the intervention?
	Executing	(During or post-implementation) Has the intervention been implemented according to the implementation plan?
	Reflecting & Evaluating	What kind of information do you plan to collect as you implement the intervention? Which measures will you track? How will you track them? How will this information be used? Will you receive feedback reports about the implementation or the intervention itself? How will you assess progress toward implementation or intervention goals? How will results of the evaluation be distributed to stakeholders?

Worksheet to Guide Application of the PRISM

(modified from McCreight et al., 2019)

Not all questions need to be (or even should be) answered. Choose the domains and constructs that make the most sense for your project.

Domain	Constructs	Guiding Questions
Program/Intervention		
	Organizational Perspective	Are there any specific staff roles that are needed to support the intervention? Are these already in place or do they need to be created?
	Consumer Perspective	How does the intervention affect the intended target(s)? How do the target(s) of the intervention feel about the current situation (pre-intervention)?
External Environment		To what extent does the intended intervention fit in with national priorities in higher education?
Implementation and Sustainability Infrastructure		What does the ideal setting (e.g., lab, department, college) look/function like? What resources need to be in place to make this happen? How would the intervention continue to persist in the workflow of the organization?

		Do you have the tools and skills needed to continue to provide and develop the intervention?
Recipients		
	Organizational	Is sexual harassment prevention explicitly valued in the organization? For the individuals within the organization? How much support is there from institutional leaders to combat this issue? Are there any champions to support the intervention? Does the intervention fit in with institutional priorities? What processes or policies are already in place around this issue? How could they affect implementation of the intervention? What barriers currently exist for addressing sexual harassment in your organization? What are the benefits to the organization of participating in implementation?
	Consumer	How confident are you that you will be able to successfully implement the intervention?

	How confident are you that you will be able to use the intervention? How confident do you think your colleagues feel about implementing the intervention? How confident do you think your colleagues feel about using the intervention? What is your opinion of how the institution handles sexual harassment and prevention? What are your concerns about these topics? How are you affected by current policies? How would receiving the intervention impact you?