

# BMJ Open

BMJ Open is committed to open peer review. As part of this commitment we make the peer review history of every article we publish publicly available.

When an article is published we post the peer reviewers' comments and the authors' responses online. We also post the versions of the paper that were used during peer review. These are the versions that the peer review comments apply to.

The versions of the paper that follow are the versions that were submitted during the peer review process. They are not the versions of record or the final published versions. They should not be cited or distributed as the published version of this manuscript.

BMJ Open is an open access journal and the full, final, typeset and author-corrected version of record of the manuscript is available on our site with no access controls, subscription charges or pay-per-view fees (<http://bmjopen.bmj.com>).

If you have any questions on BMJ Open's open peer review process please email [info.bmjopen@bmj.com](mailto:info.bmjopen@bmj.com)

# BMJ Open

## Use of implementation science in tobacco control intervention studies in the United States between 2000-2018: A scoping review protocol

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2020-038617
Article Type:	Protocol
Date Submitted by the Author:	17-Mar-2020
Complete List of Authors:	Selove, Rebecca; Tennessee State University, Center for Prevention Research Neil-Sztramko, Sarah; McMaster University, Leng, Jennifer; Memorial Sloane Kettering Cancer Ctr., Immigrant Health and Cancer Disparities Center Walker, Philip; Vanderbilt University Medical Center, Eskind Biomedical Library Salloum, Ramzi; University of Florida, Health Outcomes and Policy Ginossar, Tamar; University of New Mexico, Communications & Journalism Heckman, Carolyn; Rutgers Cancer Institute of New Jersey, Division of Medicine Scheuermann, Taneisha; University of Kansas, Combs, Todd; Washington University in Saint Louis, Center for Public Health Systems Science Qualls-Hampton, Raquel; Meharry Medical College Armstrong, Rebecca; Australian Institute of Family Studies Ellis, Shellie ; University of North Carolina at Chapel Hill Gillings School of Global Public Health, Health Policy and Management
Keywords:	PUBLIC HEALTH, HEALTH SERVICES ADMINISTRATION & MANAGEMENT, PREVENTIVE MEDICINE

SCHOLARONE™  
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

1  
2  
3 **Use of implementation science in tobacco control intervention studies in the United States**  
4 **between 2000-2018: A scoping review protocol**  
5

6 Rebecca Selove<sup>1</sup>

7 Sarah Neil-Sztramko<sup>2</sup>

8 Jennifer Leng<sup>3</sup>

9 Philip D. Walker<sup>4</sup>

10 Ramzi G. Salloum<sup>5</sup>

11 Tamar Ginossar<sup>6</sup>

12 Carolyn Heckman<sup>7</sup>

13 Taneisha S. Scheuermann<sup>8</sup>

14 Todd Combs<sup>9</sup>

15 Raquel Qualls-Hampton<sup>10</sup>

16 Rebecca Armstrong<sup>11</sup>

17 Shellie D. Ellis<sup>8</sup>

18  
19  
20  
21  
22  
23  
24  
25 <sup>1</sup>Center for Prevention Research, Tennessee State University, Nashville, TN, USA

26 <sup>2</sup>Faculty of Health Sciences, McMaster University, Hamilton ON Canada

27 <sup>3</sup>Immigrant Health and Cancer Disparities Center, Memorial Sloan Kettering Cancer Center, New  
28 York, NY, USA

29 <sup>4</sup>Eskind Biomedical Library, Vanderbilt University, Nashville, TN, USA

30 <sup>5</sup>Health Outcomes & Biomedical Informatics, University of Florida College of Medicine,  
31 Gainesville, FL, USA

32 <sup>6</sup>Communications & Journalism, University of New Mexico, Albuquerque, NM, USA

33 <sup>7</sup>Division of Medicine, Rutgers Cancer Institute of New Jersey, New Brunswick, NJ, USA

34 <sup>8</sup>Population Health, University of Kansas School of Medicine, Kansas City, KS, USA

35 <sup>9</sup>Center for Public Health Systems Science, Washington University, St. Louis, MO, USA

36 <sup>10</sup>Meharry Medical College, Nashville, TN, USA

37 <sup>11</sup>Australian Institute of Family Studies, Southbank VIC, Australia

38  
39  
40  
41  
42  
43 **Corresponding Author:**

44 Rebecca Selove

45 Tennessee State University Center for Prevention Research

46 3500 John A. Merritt Blvd.

47 Nashville, TN 37209

48 615-963-2558

49 rselove@tnstate.edu

## ABSTRACT

**Introduction:** Despite continuing efforts to reduce tobacco use in the U.S., declines in smoking rates have stalled, and smoking remains a major contributor to preventable death. Use of implementation science has the potential to improve uptake and impact of evidence-based tobacco control interventions; however, no previous studies have systematically examined how implementation science has been used in this field. Our scoping review will describe use of implementation science in tobacco control in the U.S. and identify relevant knowledge gaps and future research directions.

**Methods and analysis:** Our team, including a medical research librarian, will conduct a scoping review guided primarily by Arksey and O'Malley's methodology. We will search English-language peer-reviewed literature published between 1-1-2000 and 12-31-2018 for terms synonymous with "tobacco use," "prevention," "cessation," and "implementation science" in PubMed, Embase, CINAHL, and PsycINFO. We will include cohort and quasi-experimental studies, single-group experiments and randomized trials that report qualitative and/or quantitative data related to applying implementation science to the delivery of interventions to prevent or reduce use of tobacco products. Studies must target potential or active tobacco users, intervention providers such as educators or healthcare professionals, or U.S. policy-makers. Studies conducted outside of the U.S. will be addressed in a separate review. A minimum of two reviewers will independently examine each title and abstract for relevance, and each eligible full text for inclusion and analysis. Use of implementation science in the design, delivery or evaluation of the intervention, as demonstrated by explicit reference to implementation frameworks, strategies, or outcomes, will be extracted from included studies and summarized.

**Ethics and dissemination:** This study is exempt from ethics board approval. The study protocol is registered with Open Science Framework: [osf.io/6yrk8](https://osf.io/6yrk8). We will document the equity-orientation of included studies with the PRISMA-Equity Extension Checklist. Results will be submitted for conferences and peer-reviewed journals.

**Keywords:** tobacco control; smoking cessation; implementation science; knowledge translation

**Abstract word count:** 299

**Manuscript word count:** 2971

## ARTICLE SUMMARY: STRENGTHS AND LIMITATIONS OF THIS STUDY

- This scoping review protocol addresses the need for successful implementation of effective tobacco control interventions to reduce the prevalence of preventable diseases and deaths.
- This proposed review focuses on databases that are widely used by investigators who could benefit from learning about the application of implementation science in tobacco control research programs.

- The study is designed to capture a comprehensive range of tobacco control programs.
- The reviewers developed a logic model depicting the intersection of tobacco control interventions and implementation science to support the relevance of this study for improving population health and reducing tobacco-related health disparities.
- A limitation of the proposed study is that it is restricted to interventions in the U.S. Studies that may meet inclusion criteria except for this element will be identified and considered for a later review.

For peer review only

## Use of implementation science in tobacco control intervention studies in the United States between 2000-2018: A scoping review protocol

### INTRODUCTION

1  
2  
3 Tobacco use is the leading preventable cause of mortality in the United States and is associated  
4 with a wide variety of poor health outcomes and health disparities.[1] Over the past 50 years, researchers  
5 and funding agencies have focused on developing and disseminating evidence-based programs to  
6 prevent and reduce tobacco use and exposure to tobacco smoke[2] Community-based programs  
7 coordinated with state and national policies have been identified as most effective for achieving public  
8 health goals of reducing tobacco use,[2] and clinical practice guidelines have been developed to treat  
9 tobacco dependence among current tobacco users.[3]

10  
11 Although tobacco use in the U.S. has declined since the first Surgeon General's report linking it to  
12 lung cancer and other diseases in 1964,[1] the decrease in cigarette use plateaued early in the last  
13 decade.[4] Recent trends show that tobacco product use, including nicotine delivery via cigarette  
14 alternatives, is on the rise.[5] Furthermore, observed declines in tobacco use have occurred  
15 disproportionately among populations with more education, better health status, skilled jobs, and higher  
16 household incomes, increasing disparities in health outcomes.[6 ]

17  
18 A review of studies on smoking cessation interventions noted a "perplexing" failure to increase  
19 rates of tobacco cessation despite advances in pharmacotherapy and programs demonstrated to be  
20 effective in research settings.[7] The authors noted a lack of conclusive research as to whether this is due  
21 to insufficient reach of effective interventions, reduced effectiveness when programs are translated to  
22 community settings, or populations of community smokers for whom available interventions are less  
23 effective. Surgeon General David Satcher described many effective interventions that have been  
24 developed for advancing tobacco control, and said "The challenge to public health professionals, health  
25 care systems, and other partners in our national prevention effort is to implement these proven  
26 approaches." [1, p. 12]

27  
28 Lags in effective translation of evidence to practice are common across health-related conditions,  
29 and can be addressed by applying best practices in implementation science.[8] Implementation science is  
30 the use of scientific methods in studying and improving the integration of evidence-based interventions  
31 with routine practice in non-research environments.[9] This field examines facilitators and barriers to  
32 establishing and sustaining evidence-based programs in particular contexts to achieve specific  
33 implementation outcomes.[10] Implementation science offers enhanced understanding of ways  
34 implementation strategies (such as developing a formal plan for implementing an intervention, or  
35 providing ongoing consultation to those who deliver the intervention[11]) can be tested and successfully  
36 applied in varied contexts to maximize successful intervention outcomes.[12]

37  
38 Implementation science resources include theoretically-informed frameworks and models,[13,14]  
39 implementation strategies,[11] and measures of implementation processes and outcomes. e.g.,[15-16]  
40 The use of implementation science to enhance the impact of tobacco control programs and policies has  
41 been identified as a priority for promoting tobacco use prevention and cessation in the U.S. population,  
42 especially among socioeconomically disadvantaged tobacco users.[17,18]

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

Despite prioritization of applying implementation science to improve public health, a review of ways in which implementation science has been used in guiding tobacco control programs and policies has not previously published. Rosen et al.[19] examined 46 systematic reviews of tobacco control-related interventions and noted that variability in implementation quality limits reviewers' ability to interpret intervention effectiveness. A recent scoping review[20] described targeted populations and settings for tobacco control interventions, but did not investigate the use of implementation science frameworks, models, strategies, or attention to implementation outcomes that could be used to interpret and improve intervention impact. We conducted a preliminary search of PROSPERO, the Joanna Briggs Institute Database of Systematic Reviews and Implementation Reports, and scoping reviews registered in the Center for Open Science. No existing or ongoing scoping reviews on the use of implementation science in tobacco control were identified.

Describing ways implementation science has been used in tobacco control interventions is essential to gaining an understanding of the state of the field regarding the use of frameworks, models, and strategies that can further reduce tobacco use rates and inequities. Thus, our goal is to examine peer-reviewed, published reports of tobacco control interventions in the U.S. to identify the use of implementation science in investigating the delivery of these interventions across the past two decades. We developed a logic model to depict the rationale for this project, following the recommendations of Anderson et al.[21] (Figure 1).

This study will describe the nature of the use of implementation science frameworks and models, implementation strategies, and measurement of implementation outcomes in research efforts to prevent tobacco use and second-hand smoke exposure, and/or to promote smoking cessation. Results from this scoping review can be used to inform a research agenda for addressing gaps in, and advancing the application of implementation science in tobacco control to achieve greater impact, especially in addressing tobacco-related health disparities.[22]

## REVIEW QUESTIONS

The primary research question for this scoping review is: How has implementation science been used in planning and delivering tobacco control interventions in the U.S. from 2000-2018? Specifically, the study is designed to address the following questions:

1. What aspects of implementation science (such as use of implementation science frameworks and models, implementation strategies, and measurement of implementation processes and outcomes) appear in reports of tobacco control intervention studies?
2. What types of interventions (i.e., public health interventions such as classroom-based prevention education, tobacco use policies, and electronic prompts for providers, as well as programs that target individuals and families such as group counseling and text messages to support smoking cessation) are associated with explicit use of implementation science?



3. What have authors identified in their studies as the contributions of implementation science? Examples are researchers' description of buy-in from healthcare providers for participating in training, and guidance from stakeholders for tailoring an intervention for a specific community as emerging from engaging providers or community members in implementation planning .
4. Have the number of peer-reviewed published studies explicitly using implementation science changed over the past 19 years?

## METHODS

The process for this scoping review will follow the guidance provided in Arksey and O'Malley's[23] seminal paper, as well as the Joanna Briggs Institute (JBI),[24-25] and other expert recommendations.[26] The steps are: (1) identify a research question; (2) identify relevant published studies; (3) select studies that will be included in the scoping review, using clearly articulated inclusion and exclusion criteria; (4) extract data from each study to address the research questions; and (5) summarize and disseminate the results of the data extraction and review process. The scoping review protocol has been registered with Open Science Framework as protocol number 6YRK8 ([osf.io/6yrk8](https://osf.io/6yrk8)).

### Search strategy

In consultation with our team's medical research librarian, and following JBI guidelines, a three-step search strategy will be utilized.[24] The first step, an initial pilot search, was performed in MEDLINE (PubMed) in 2017. Second, additional search terms were added upon review of the initial results and input from subject experts. The databases to be included in this search are MEDLINE (PubMed), EMBASE, CINAHL, and PsycINFO. All searches are limited to English language and publication dates from January 1, 2000 to December 31, 2018. The MEDLINE (PubMed) search strategy is defined in Table 1. Third, reference lists of the primary research articles and systematic reviews identified in the search will be screened for additional articles which may meet the inclusion criteria.

### Study selection

All identified references will be uploaded into Covidence systematic review software (Veritas Health Innovation, Melbourne, Australia). Duplicate citations will be removed using the Covidence software. Each title and abstract will be reviewed for relevance by two of the study authors. At the title and abstract screening phase, studies that will be included must describe a tobacco control intervention conducted in the U.S., and be published between 2000 and 2018. Conflicts regarding inclusion for full text review will be resolved by the senior author (RJS) and through team discussion where necessary. During the

**Table 1: Search strategy for Medline (PubMed)**

<p>("Tobacco Products"[Mesh] OR "Tobacco Use"[Mesh] OR "Tobacco Smoke Pollution"[Mesh] OR "Smoking"[Mesh] OR tobacco[tiab] OR tobacco use[tiab] OR smoking[tiab] OR second hand smoke exposure[tiab] OR second hand smoke[tiab] OR tobacco use initiation[tiab] OR smoking initiation[tiab] OR "Tobacco Use Cessation"[Mesh] OR tobacco control[tw] OR "smoking cessation"[MeSH Terms] OR smoking cessation[tw]) AND ("Smoking Prevention"[Mesh] OR smoking prevention[tw] OR "Health Promotion"[Mesh] OR health promotion[tw] OR "Health Education"[Mesh] OR health education[tw] OR</p>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

program[tw] OR programs[tw] OR intervention[tw] OR interventions[tw] OR "Policy"[Mesh] OR "Smoke-Free Policy"[Mesh] OR "Social Control Policies"[Mesh] OR "Organizational Policy"[Mesh] OR "Public Policy"[Mesh] OR policy[tw] OR policies[tw] OR public policy[tw] OR health policy[tw]) AND (implementation science[tw] OR implementation[tw] OR "diffusion of innovation"[MeSH Terms] OR implementation frameworks[tw] OR implementation models[tw] OR implementation study[tw] OR translational research[tw] OR "translational medical research"[MeSH Terms] OR knowledge translation[tw]) AND (Clinical Trial[ptyp] OR Comparative Study[ptyp] OR Controlled Clinical Trial[ptyp] OR Evaluation Studies[ptyp] OR Observational Study[ptyp] OR Randomized Controlled Trial[ptyp] OR "Qualitative Research"[Mesh] OR "Prospective Studies"[Mesh] OR "Cohort Studies"[Mesh] OR Meta-Analysis[ptyp] OR systematic[sb] OR evaluation studies[ptyp] OR evaluation studies[tw] OR clinical trial[tw] OR comparative study[tw] OR observational study[tw] OR qualitative research[tw] OR "program evaluation"[MeSH Terms] OR program evaluation[tw] OR hybrid design[tw] OR experimental[tw] OR mixed methods study[tw]) AND ("2000/01/01"[PDAT] : "2018/12/31"[PDAT]) AND English[lang]

initial title and abstract screen, relevant systematic reviews will be identified for hand searching. For titles found through hand searches of systematic reviews that are not already in the original data set, the associated abstracts will be reviewed by two of the study authors using the same inclusion and exclusion criteria in Table 2. Full texts will be retrieved for final eligibility screening using the inclusion and exclusion criteria presented below. Each full text will be reviewed for inclusion in the final study by two members of the study team, with conflicts resolved through team discussion. During full text reviews, members of the study team will hand search for citations of related publications that might provide more complete descriptions of the tobacco control intervention, and these titles and abstract will be reviewed by two members of the study team as described above.

### Inclusion criteria

We will use the Population-Concept-Context (PCC) framework described by the scoping review guidelines of the JBI[24] as one dimension of our inclusion criteria. Based on the variety of tobacco control interventions, we expect that populations represented in included studies will vary. Tobacco control interventions are designed to prevent use, as well as reduce primary and secondary exposure to tobacco. Thus, study populations can include non-smokers, combustible tobacco and smokeless tobacco users, and individuals exposed to second-hand smoke. These populations include males and females of

**Table 2. Criteria for review of full texts for inclusion in study**

INCLUSION	EXCLUSION
<ul style="list-style-type: none"> <li>Article was published during 2000 – 2018</li> <li>Study was conducted inside of United States (may include other countries as well as long as U.S. is named also)</li> <li>The implementation of a tobacco control intervention or program was studied.</li> <li>Data were collected and analyzed.</li> <li>Implementation science was explicitly used. The authors:</li> </ul>	<ul style="list-style-type: none"> <li>Completely outside of the United States</li> <li>Dissertation or thesis</li> <li>Essay or opinion piece</li> <li>Study protocol only</li> <li>Only describes guidelines</li> <li>Report of a conference presentation</li> </ul>

<p>1) described planned actions to promote human behavior change in order to integrate tobacco control interventions into educational, community, or clinical settings;</p> <p>2) considered organizational constraints and facilitators that could affect uptake and delivery of the intervention, and</p> <p>3) collected data regarding the processes and/or outcomes of their planned actions.</p> <p>Explicit use is further defined as reference to use of implementation science, knowledge translation or transfer, a specific implementation science framework or model, implementation strategies, assessment of implementation stages or implementation outcomes. Other elements may be included if they emerge in the course of the review.</p>	<ul style="list-style-type: none"> <li>• Book</li> <li>• Does not describe implementation of a tobacco control intervention.</li> <li>• Analysis of secondary surveillance or cross-sectional data by authors not involved in delivering intervention</li> <li>• No indication that implementation science elements were used</li> </ul>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

all races and ethnicities, and range in age from infants to older adults.[6,27] Targets of tobacco control interventions include pregnant women, school children, parents, healthcare providers, smoking cessation counselors, teachers, public health workers, policy makers, media stakeholders, and proprietors of establishments that sell tobacco products or regulate exposure to tobacco smoke. With regard to contexts, tobacco control interventions are delivered in a wide variety of settings, including healthcare providers' offices, hospitals, classrooms, daycare centers, after school programs, community centers, faith communities, and more. Because of this diversity, we will not exclude studies based on participant characteristics or program settings.

This study will examine the intersection of two key concepts: tobacco control programs, and implementation science. For this study, *tobacco control programs or interventions* are defined as activities that aim to achieve one or more of the following goals: 1) promote tobacco-free culture; 2) prevent initiation of tobacco use; 3) eliminate second-hand smoke exposure; 4) increase tobacco cessation; or 5) eliminate disparities in tobacco use treatment.[28-29] Examples of such interventions include, but are not limited to, public health interventions (e.g., mass media campaigns, tobacco use restrictions, or policies relevant to tobacco retail environments) or individual-level interventions (e.g., healthcare provider training, tailored communication interventions, pharmacotherapy, or structured counseling).[2] We drew from the Centers for Disease Control and Prevention's best practices for tobacco control,[2] an Institute of Medicine committee report related to smoking cessation in the military,[29] and a scoping review of guideline implementation[30] to develop a matrix of tobacco control interventions presented in Table 3.

Table 3. Tobacco control programs/interventions: Goals, target audience, components					
PROGRAM/INTERVENTION COMPONENTS AT TWO LEVELS[2,36]	PROGRAM GOALS[29]				
	Promote tobacco-free culture	Prevent initiation	Eliminate 2nd-hand smoke exposure	Increase tobacco cessation	Eliminate disparities in tobacco use treatment
<b>PUBLIC HEALTH INTERVENTIONS:</b> Society (government, industry); Community (e.g., healthcare providers, schools and educators, housing complexes, workplaces/retailers)					

<b>Communication interventions</b> Mass-media campaigns: <ul style="list-style-type: none"> <li>• Harms of tobacco use,</li> <li>• Availability of state QuitLine counseling,</li> <li>• Self-help programs on radio, TV, web, blogs, billboards, leaflets</li> <li>• Promoting access to tobacco cessation medications</li> <li>• Education in schools, workplaces, public spaces</li> </ul>	PH1	PH2	PH3	PH4	PH5
<b>Tobacco use restrictions</b> <ul style="list-style-type: none"> <li>• Tobacco-free campus, park, stadium policy</li> <li>• Smoking bans in restaurants, work places, etc.</li> <li>• Multi-use housing tobacco ban</li> <li>• Licensing retailers</li> <li>• Minimum legal age for purchase</li> </ul>	PH6	PH7	PH8	PH9	PH10
<b>Tobacco retail environment</b> <ul style="list-style-type: none"> <li>• Restriction re: product design, marketing, placement</li> </ul>	PH11	PH12	PH13	PH14	PH15
<b>Provider/teacher education</b> <ul style="list-style-type: none"> <li>• Training for physician, nurse, pharmacist, dentist, teacher</li> <li>• Electronic /written prompts to check tobacco use status</li> </ul>	PH16	PH17	PH18	PH19	PH20
<b>Tobacco screening/other intervention guideline[30]</b>	PH21	PH22	PH23	PH24	PH25
<b>INDIVIDUAL INTERVENTIONS: Family, individual adults, children and youth</b>					
<b>Communication interventions</b> <ul style="list-style-type: none"> <li>• Text message for quitting</li> <li>• Web-based media literacy education</li> </ul>	I26	I27	I28	I29	I30
<b>Behavioral therapies and medication</b> <ul style="list-style-type: none"> <li>• Brief advice from healthcare provider-3 or 5 As</li> <li>• Provider referral to QuitLine</li> <li>• Multi-session QuitLine counseling</li> <li>• Face-to-face group, individual counseling</li> <li>• FDA-approved medications, NRT</li> <li>• App and web-based programs</li> </ul>	I31	I32	I33	I34	I35
<b>Cessation programs for special populations</b> <ul style="list-style-type: none"> <li>• Homeless people, smokers with mental health and/or substance use disorders, cancer survivors, ethnic minorities, pregnant women</li> </ul>	I36	I37	I38	I39	I40

The inclusion criteria for *use of implementation science* were developed by reviewing seminal writings in the field, e.g., [8,10,11,14] and operational definitions reported in a scoping review of

1  
2  
3 implementation science associated with nursing interventions in German-speaking countries.[31] We also  
4 asked five leading scholars in the implementation science field how they would determine if a study  
5 should be included in this scoping review. This led to identification of three broad elements for  
6 determining that implementation science was used: investigators (1) described planned actions to  
7 promote human behavior change in order to integrate evidence-based tobacco control interventions into  
8 educational, community or clinical settings, (2) considered organizational constraints and facilitators that  
9 could affect uptake and delivery of the intervention, and (3) collected data regarding the processes and/or  
10 outcomes of their planned actions.

11 To address Research Question 1 (What aspects of implementation science appear in the studies?), the  
12 multi-disciplinary scoping review team reviewed a sample of articles that would be considered for the  
13 scoping review, and identified two categories of implementation science use: Tier 1 and Tier 2. Tier 1  
14 studies include elements that are explicitly labeled as implementation science, such as: use of a specific  
15 implementation science framework such as the Interactive Systems Framework,[32] or an implementation  
16 toolkit[33,34] for planning adoption of an intervention; describing use of specific implementation  
17 strategies[11,35] for enhancing delivery of an intervention; measuring stages of implementation[37,38]  
18 during the process of delivering an intervention; or measuring implementation outcomes as articulated by  
19 Proctor et al.[10] as part of evaluating an intervention.

20 Implementation outcomes of interest include, but are not limited to, rates of intervention adoption,  
21 acceptability to patients, feasibility, appropriateness, costs, fidelity, penetration and sustainability;[10] or  
22 broader service outcomes assessing processes of care such as safety, timeliness, efficiency,  
23 effectiveness, equity or patient-centeredness.[10,39] Provider acceptability, self-efficacy for delivering an  
24 intervention, as well as satisfaction with outcomes of an intervention will also be considered as aspects of  
25 implementation science, among variables that may be associated with implementation outcomes[40] as  
26 listed previously. Multiple definitions and terminologies are used globally to convey the use of science to  
27 translate evidence-based research into practice,[41,42] e.g., knowledge translation and translation of  
28 research into practice, and investigators may use these terms to refer to such planned activities.[34,43]

29 We anticipate that we will find peer-reviewed articles indicating that investigators assessed  
30 implementation facilitators and barriers,[40] such as attitudes of key stakeholders toward a proposed  
31 intervention, organizational capacity for accommodating a new intervention, or community readiness to  
32 adopt and implement a tobacco-related policy, without explicitly describing their work as implementation  
33 science. We will tag these Tier 2 articles for a separate review.

34 This review will include studies published from 2000 through 2018. We chose the year 2000 as a  
35 starting point as it represents the beginning of “preparation”[44] for application of the resources of the  
36 emerging field, and the early stage of an era when implementation research and implementation science  
37 began expanding as a focus in the peer-reviewed literature.[45,46] We will limit our review to studies  
38 conducted in the U.S. because policies, laws, regulations (e.g., on advertising) and cultural norms related  
39 to tobacco vary widely across countries and regions of the world. This inclusion criteria reduces the  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

heterogeneity of contextual factors, which are prime considerations for implementation science,[46] and enhances the feasibility of our undertaking. Studies conducted only outside the U.S. which may meet all other criteria for this scoping review will be identified for a future project.

Qualitative and quantitative empirical studies published in peer-reviewed journals will be eligible for inclusion. Study designs may include prospective cohort studies, natural experiments, quasi-experimental studies, single-group experiments, and/or randomized controlled trials. Studies will be eligible if they report on primary data collection related to the process of implementing an intervention, whether or not they report evaluation of the effectiveness of the intervention. Dissertations, theses, reports of conference presentations, letters, guidelines, grey literature, and books will be excluded, as we are limiting the review to publications that are more readily accessible to the broader scientific and practitioner community. As we are interested in ways that use of implementation science will be readily apparent to researchers and practitioners, we will not seek additional information from authors to investigate use of implementation science that is not reported in their published work.

### **Assessment of methodological quality**

As the purpose of this review is to explore the use of implementation science across a wide range of study designs in tobacco control research, and not to assess the quality of the primary studies themselves, we will not conduct a critical appraisal of included studies.[28]

### **Extraction of results**

Once full texts to be included in the scoping review have been identified, two members of the study team will independently extract study characteristics from each one using a structured data extraction form in Covidence. Elements to be extracted include: (a) characteristics of the population targeted by the intervention, including sex, age, tobacco use status, ethnicities, roles (such as dentist or nurses, pregnant women, policy maker); (b) context in which the intervention is implemented, such as classroom, hospital, multi-unit housing, county; (c) specific types and goals of interventions as categorized in Table 3, as well as if and how the authors described the evidence-base for the intervention; (d) what aspects of implementation science were used in the design, delivery and/or evaluation of the intervention, such as specific implementation frameworks or models, implementation strategies, or measurement of intervention processes or outcomes; and (e) contributions of implementation science to the study identified by the study's authors.

Discrepancies in extracted responses will be resolved through team discussion when necessary. The data extraction process will be trialed by the study team prior to execution to ensure consistency and relevance of fields before proceeding to full data extraction.

### **Data synthesis**

Following data extraction, frequencies of study characteristics will be calculated where possible. In addition, the study team will conduct a narrative synthesis[47] of characteristics of populations, content, and contexts in included studies. The purpose of this analytic approach is to tell a story about use of implementation science in tobacco control research in the U.S., including description of patterns that may

1  
2  
3 emerge, such as target audiences, intervention goals, or settings associated with implementation science  
4 use, as well as the impact of its use. The critical reflection required in this process has the potential for  
5 generating hypotheses[47] regarding evolution of the use of implementation science in this field. A meta-  
6 analysis will not be conducted as this will not be necessary to address the research question.  
7  
8

### 9 **Presentation of results**

10 The findings from this study will be disseminated via peer-reviewed publications and conference  
11 presentations for audiences interested in tobacco control and implementation science. All results will be  
12 prepared in accordance with JBI guidelines[48] and checklists for Preferred Reporting Items for  
13 Systematic reviews and Meta-Analyses,[49] the Extension for Scoping Reviews (PRISMA-ScR),[50] and  
14 equity reporting.[51] A PRISMA flow diagram[49] will indicate the numbers of articles identified in each  
15 search method, duplicates removed, and number of studies excluded and included, along with reasons  
16 for exclusion at the full text review level. The main findings will be presented using tables and a narrative  
17 description that will detail the results in view of the objectives and research questions of the scoping  
18 review. A list of the included studies, along with their key characteristics, will be provided in the primary  
19 manuscript reporting the results of this review.  
20  
21  
22  
23  
24  
25

26 **ACKNOWLEDGMENTS:** The authors would like to thank the following individuals who were consulted  
27 regarding the definition of use of implementation science developed for this paper: Sarah Birken, Ross  
28 Brownson, Anne Sales, and Michel Wensing.  
29

### 30 **Funding statement:**

31 Support for this project came in part from the National Institutes of Health Mentored Training for  
32 Dissemination and Implementation Research in Cancer Program (MT-DIRC) (grant number  
33 5R25CA171994), the US Department of Veterans Affairs, and the Cancer Research Network.

34 R. Selove is supported by the National Cancer Institute through the Meharry-Vanderbilt-Tennessee State  
35 University Cancer Partnership (U54CA16306607).

36 J..Leng is supported by the National Cancer Institute: Core Cancer Center Support Grant (P30  
37 CA008748).

38 S. Ellis is supported by the National Institute of General Medical Sciences COBRE grant (P20GM130423).

39 T. Schneurmann is funded by a NIH/NIDA K01 (K01 DA040745).  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## REFERENCES

1. U.S. Department of Health and Human Services. The health consequences of smoking- 50 years of progress. A report of the surgeon general. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office of Smoking and Health; 2014.
2. Centers for Disease Control and Prevention. Best practices for comprehensive tobacco control programs - 2014. Atlanta, GA: Department of Health and Human Services, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2014.
3. Fiore M, Jaen C, Baker T, et al. Treating Tobacco Use and Dependence: 2008 Update. Rockville, MD: Department of Health and Human Services, Public Health Service; 2008.
4. Balogh E, Patlak M, Nass SJ, et al. Reducing tobacco-related cancer incidence and mortality: Workshop summary. National Academies Press; 2013.
5. Kasza KA, Ambrose BK, Conway KP, et al. Tobacco-product use by adults and youths in the United States in 2013 and 2014. *N Engl J Med*. 2017 Jan 26;376(4):342–53. DOI: 10.1056/NEJMsa1607538
6. Wang TW, Asman K, Gentzke AS, et al. Tobacco Product Use Among Adults — United States, 2017. *Morbidity & Mortality Weekly*, 2018;67(44):8.
7. Zhu S-H, Lee M, Zhuang Y-L, et al. Interventions to increase smoking cessation at the population level: how much progress has been made in the last two decades? *Tob Control*. 2012 Mar;21(2):110–8. DOI: 10.1136/tobaccocontrol-2011-050371
8. Brownson RC, Colditz GA, Proctor EK, editors. Dissemination and implementation research in health: Translating science to practice. New York: Oxford University Press; 2012.
9. Eccles MP, Mittman BS. Welcome to Implementation Science. *Implement Sci*. 2006 Dec;1(1):1, 1748-5908-1–1. DOI: 10.1186/1748-5908-1-1
10. Proctor E, Silmere H, Raghavan R, et al. Outcomes for implementation research: conceptual distinctions, measurement challenges, and research agenda. *Adm Policy Ment Health Ment Health Serv Res*. 2011 Mar;38(2):65–76. DOI: 10.1007/s10488-010-0319-7
11. Powell BJ, Waltz TJ, Chinman MJ, et al. A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project. *Implement Sci*. 2015 Dec;10(1). DOI: 10.1186/s13012-015-0209-1
12. Chilenski SM, Greenberg MT, Feinberg ME. Community readiness as a multidimensional construct. *J Community Psychol*. 2007;35(3):347–365. DOI: 10.1002/jcop.20152
13. Bauer MS, Damschroder L, Hagedorn H, Smith J, Kilbourne AM. An introduction to implementation science for the non-specialist. *BMC Psychol*. 2015 Dec;3(1):32. DOI: 10.1186/s40359-015-0089-9
14. Tabak RG, Khoong EC, Chambers D, Brownson RC. Bridging research and practice: Models for dissemination and implementation research. *American Journal of Preventive Medicine*, 2012;. 43(3):337-350. DOI:10.1016/j.amepre.2012.05.024
15. GEM: Grid-Enabled Measures Database [Internet]. Available from: <https://www.gem-beta.org/Public/Home.aspx>

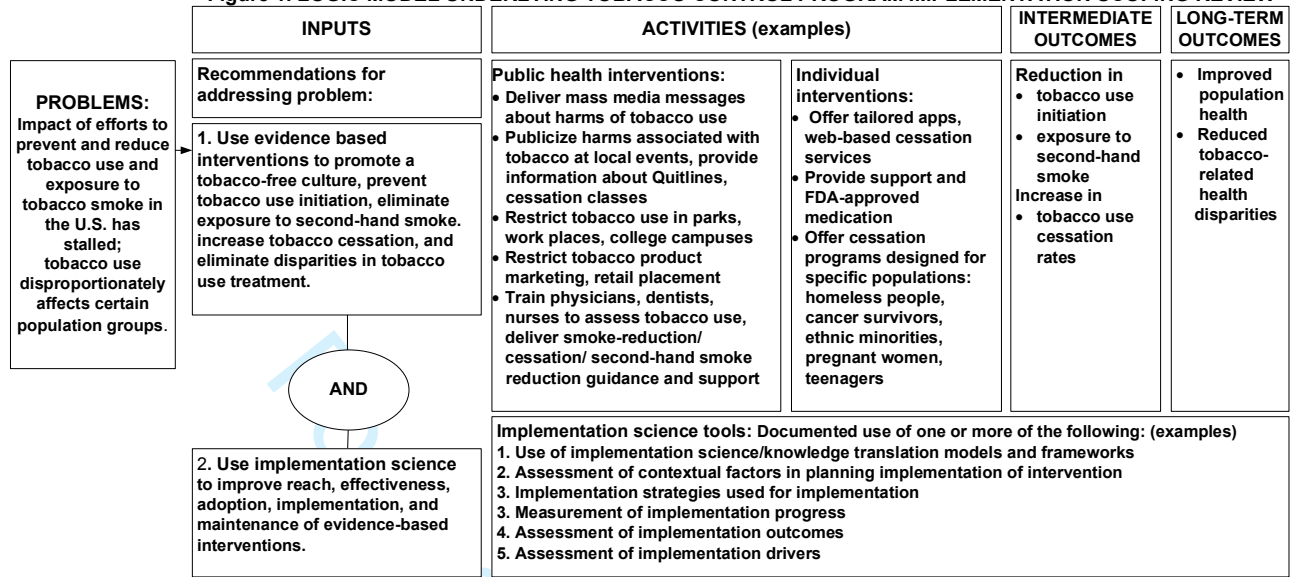


16. Huijg JM, Gebhardt WA, Dusseldorp E, Verheijden MW, van der Zouwe N, Middelkoop BJ, et al. Measuring determinants of implementation behavior: psychometric properties of a questionnaire based on the theoretical domains framework. *Implement Sci*. 2014 Dec;9(1):33. DOI:10.1186/1748-5908-9-33
17. U.S. Department of Health and Human Services. Improving smoking cessation in socioeconomically disadvantaged populations via scalable interventions (R01). 2016. Available from: <https://grants.nih.gov/grants/guide/pa-files/par-16-202.html>
18. U.S. Department of Health and Human Services. U.S. tobacco control policies to reduce health disparities (R01 CLinical Trial Optional). 2018. Available from: <https://grants.nih.gov/grants/guide/pa-files/par-18-675.html>
19. Rosen LJ, Ben Noach M, Rosenberg E. Missing the forest (plot) for the trees? A critique of the systematic review in tobacco control. *BMC Med Res Methodol*. 2010 Dec;10(1):34. DOI: 10.1186/1471-2288-10-34
20. Halas G, Schultz AS, Rothney J, Wener P, Holmqvist M, Cohen B, et al. A scoping review of foci, trends, and gaps in reviews of tobacco control research. *Nicotine Tob Res*. 2019 Feb 2. DOI: 10.1093/ntr/nty269/5306037
21. Anderson LM, Petticrew M, Rehfuess E, Armstrong R, Ueffing E, Baker P, et al. Using logic models to capture complexity in systematic reviews: Logic Models in Systematic Reviews. *Res Synth Methods*. 2011 Mar;2(1):33–42. DOI: 10.1002/jrsm.32
22. Chinman M, Woodward EN, Curran GM, Hausmann LRM. Harnessing Implementation Science to Increase the Impact of Health Equity Research. *Med Care*. 2017 Sep;55:S16–23. DOI:10.1097/MLR.0000000000000769
23. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol*. 2005 Feb;8(1):19–32. DOI: 10.1080/1364557032000119616
24. Joanna Briggs Institute. *Joanna Briggs Institute Reviewer's Manual*. Adelaide, AU: The Joanna Briggs Institute; 2015.
25. Khalil H, Peters M, Godfrey CM, McInerney P, Soares CB, Parker D. An evidence-based approach to scoping reviews. *Worldviews Evid Based Nurs*. 2016 Apr;13(2):118–23. DOI: 10.1111/wvn.12144
26. Daudt HM, van Mossel C, Scott SJ. Enhancing the scoping study methodology: a large, inter-professional team's experience with Arksey and O'Malley's framework. *BMC Med Res Methodol*. 2013 Dec;13(1):48. DOI:10.1186/1471-2288-13-48
27. Gentzke AS, Creamer M, Cullen KA, Ambrose BK, Willis G, Jamal A, et al. *Vital Signs: Tobacco Product Use Among Middle and High School Students — United States, 2011–2018*. *MMWR Morb Mortal Wkly Rep*. 2019 Feb 15;68(6):157–64.
28. Halas G, Schultz ASH, Rothney J, Goertzen L, Wener P, Katz A. A scoping review protocol to map the research foci trends in tobacco control over the last decade. *BMJ Open*. 2015 Jan 28;5(1):e006643–e006643. DOI:10.1136/bmjopen-2014-006643
29. Institute of Medicine. *Combating Tobacco Use in Military and Veteran Populations*. Washington, D.C.: National Academies Press; 2009.
30. Gagliardi AR, Alhabib S. Trends in guideline implementation: a scoping systematic review. *Implement Sci*. 2015;10(1). DOI:10.1186/s13012-015-0247-8

- 1  
2  
3 31. Hoben M, Berendonk C, Buscher I, Quasdorf T, Riesner C, Wilborn D, et al. Scoping review of  
4 nursing-related dissemination and implementation research in German-speaking countries: Mapping  
5 the field / Scoping Review zum Stand der pflegebezogenen Disseminations- und  
6 Implementierungsforschung in deutschsprachigen Ländern: eine Bestandsaufnahme. *Int J Health*  
7 *Prof.* 2014 Dec 1;1(1):34–49. DOI: 10.2478/ijhp-2014-0002
- 8  
9 32. Wandersman A, Duffy J, Flaspohler P, Noonan R, Lubell K, Stillman L, et al. Bridging the gap  
10 between prevention research and practice: The Interactive Systems Framework for Dissemination  
11 and Implementation. *Am J Community Psychol.* 2008 Jun;41(3–4):171–81. DOI: 10.1007/s10464-  
12 008-9174-z
- 13  
14 33. Washington University in St. Louis. Dissemination and Implementation at Washington University in  
15 St. Louis. D & I Toolkits. Available from: <https://sites.wustl.edu/wudandi/di-toolkits/>
- 16  
17 34. Barac R, Stein S, Bruce B, Barwick M. Scoping review of toolkits as a knowledge translation  
18 strategy in health. *BMC Med Inform Decis Mak.* 2014 Dec;14(1):121. DOI: 10.1186/s12911-014-  
19 0121-7
- 20  
21 35. Proctor EK, Powell BJ, McMillen JC. Implementation strategies: recommendations for specifying  
22 and reporting. *Implement Sci.* 2013;8(1):139. DOI:10.1186/1748-5908-8-139
- 23  
24 36. Halas G, Schultz ASH, Rothney J, Goertzen L, Wener P, Katz A. A scoping review protocol to map  
25 the research foci trends in tobacco control over the last decade. *BMJ Open.* 2015 Jan  
26 28;5(1):e006643–e006643. DOI:10.1136/bmjopen-2014-006643
- 27  
28 37. Meyers DC, Durlak JA, Wandersman A. The Quality Implementation Framework: A synthesis of  
29 critical steps in the implementation process. *Am J Community Psychol.* 2012 Dec;50(3–4):462–80.  
30 DOI: 10.1007/s10464-012-9522-x
- 31  
32 38. Saldana L. The stages of implementation completion for evidence-based practice: protocol for a  
33 mixed methods study. *Implement Sci.* 2014;9(1):1. DOI:10.1186/1748-5908-9-43
- 34  
35 39. Institute of Medicine (U.S.), Committee on Quality of Health Care in America. Crossing the quality  
36 chasm: a new health system for the 21st century. Washington, D.C.: National Academy Press; 2001
- 37  
38 40. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering  
39 implementation of health services research findings into practice: a consolidated framework for  
40 advancing implementation science. *Implement Sci.* 2009 Dec;4(1). DOI:10.1186/1748-5908-4-50
- 41  
42 41. Rabin BA, Brownson RC. Developing the terminology for dissemination and implementation  
43 research. In: Brownson RC, Colditz GA, Proctor E, editors. *Dissemination and implementation*  
44 *research in health: Translating science into practice.* New York, NY: Oxford University Press; p. 23–  
45 51.
- 46  
47 42. Sales A. *Implementation science: How can it support healthcare research? Training in*  
48 *implementation: Actionable research approaches (TIARA).* 2019 Jun 19; Kansas City, KA.
- 49  
50 43. Slaughter SE, Zimmermann GL, Nuspl M, Hanson HM, Albrecht L, Esmail R, et al. Classification  
51 schemes for knowledge translation interventions: a practical resource for researchers. *BMC Med*  
52 *Res Methodol.* 2017 Dec;17(1):161. DOI 10.1186/s12874-017-0441-2
- 53  
54 44. Chambers D. Forward. In: *Dissemination and implementation research in health: Translating*  
55 *science into practice.* New York; 2012. p. vii–x.

- 1
- 2
- 3 45. Dearing JW, Kee K. Historical roots of dissemination and implementation science. In: Brownson RC,
- 4 Colditz GA, Proctor EK, editors. Dissemination and implementation research in health: Translating
- 5 science into practice. New York: Oxford University Press; 2012. p. 55–71.
- 6
- 7 46. Kerner JF, Glasgow RE, Vinson CA. A history of the National Cancer Institute's support for
- 8 implementation science across the cancer control continuum: Context counts. In: Chambers D,
- 9 Vinson CA, Norton W, editors. Advancing the science of implementation across the cancer
- 10 continuum. New York, NY: Oxford University Press; 2019.
- 11
- 12 47. Tricco AC, Soobiah C, Antony J, Cogo E, MacDonald H, Lillie E, et al. A scoping review identifies
- 13 multiple emerging knowledge synthesis methods, but few studies operationalize the method. *J Clin*
- 14 *Epidemiol.* 2016 May;73:19–28. DOI:10.1016/j.jclinepi.2015.08.030
- 15
- 16 48. Peters MDJ, Godfrey CM, Khalil H, McInerney P, Parker D, Soares CB. Guidance for conducting
- 17 systematic scoping reviews: *Int J Evid Based Healthc.* 2015 Sep;13(3):141–6. DOI:
- 18 10.1097/XEB.0000000000000050
- 19
- 20 49. Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred Reporting Items for Systematic Reviews and
- 21 Meta-Analyses: The PRISMA Statement. *PLoS Med.* 2009;6(7):6.
- 22 DOI:10.1371/journal.pmed.1000097
- 23
- 24 50. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for
- 25 Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.* 2018 Oct
- 26 2;169(7):467. DOI:10.7326/M18-0850
- 27
- 28 51. Welch V, Petticrew M, Tugwell P, Moher D, O'Neill J, Waters E, et al. PRISMA-Equity 2012
- 29 Extension: Reporting guidelines for systematic reviews with a focus on health equity. *PLoS Med.*
- 30 2012 Oct 30;9(10):e1001333. DOI:10.1371/journal.pmed.1001333
- 31
- 32
- 33
- 34
- 35
- 36
- 37
- 38
- 39
- 40
- 41
- 42
- 43
- 44
- 45
- 46
- 47
- 48
- 49
- 50
- 51
- 52
- 53
- 54
- 55
- 56
- 57
- 58
- 59
- 60

**Figure 1. LOGIC MODEL UNDERLYING TOBACCO CONTROL PROGRAM IMPLEMENTATION SCOPING REVIEW**



# BMJ Open

## Use of implementation science in tobacco control intervention studies in the United States between 2000-2020: A scoping review protocol

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2020-038617.R1
Article Type:	Protocol
Date Submitted by the Author:	24-Aug-2020
Complete List of Authors:	Selove, Rebecca; Tennessee State University, Center for Prevention Research Neil-Sztramko, Sarah; McMaster University, Leng, Jennifer; Memorial Sloan Kettering Cancer Center, Immigrant Health and Cancer Disparities Center Walker, Philip; Vanderbilt University Medical Center, Eskind Biomedical Library Salloum, Ramzi; University of Florida, Health Outcomes and Policy Ginossar, Tamar; University of New Mexico, Communications & Journalism Heckman, Carolyn; Rutgers Cancer Institute of New Jersey, Division of Medicine Scheuermann, Taneisha; University of Kansas, Combs, Todd; Washington University in Saint Louis, Center for Public Health Systems Science Qualls-Hampton, Raquel; Meharry Medical College Armstrong, Rebecca; Australian Institute of Family Studies Ellis, Shellie ; University of North Carolina at Chapel Hill Gillings School of Global Public Health, Health Policy and Management
<b>Primary Subject Heading</b>:	Smoking and tobacco
Secondary Subject Heading:	Evidence based practice, Public health, Research methods
Keywords:	PUBLIC HEALTH, HEALTH SERVICES ADMINISTRATION & MANAGEMENT, PREVENTIVE MEDICINE

SCHOLARONE™  
Manuscripts



I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our [licence](#).

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which [Creative Commons](#) licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

1  
2  
3 1 **Use of implementation science in tobacco control intervention studies in the United**  
4 **States between 2000-2020: A scoping review protocol**  
5 2  
6 3  
7

8 4 Rebecca Selove<sup>1</sup>  
9 5 Sarah Neil-Sztramko<sup>2</sup>  
10 6 Jennifer Leng<sup>3</sup>  
11 7 Philip D. Walker<sup>4</sup>  
12 8 Ramzi G. Salloum<sup>5</sup>  
13 9 Tamar Ginossar<sup>6</sup>  
14 10 Carolyn Heckman<sup>7</sup>  
15 11 Taneisha S. Scheuermann<sup>8</sup>  
16 12 Todd Combs<sup>9</sup>  
17 13 Raquel Qualls-Hampton<sup>10</sup>  
18 14 Rebecca Armstrong<sup>11</sup>  
19 15 Shellie D. Ellis<sup>8</sup>  
20  
21  
22  
23  
24  
25  
26  
27

28 17 <sup>1</sup>Center for Prevention Research, Tennessee State University, Nashville, TN, USA

29 18 <sup>2</sup>Faculty of Health Sciences, McMaster University, Hamilton ON Canada

30 19 <sup>3</sup>Immigrant Health and Cancer Disparities Center, Memorial Sloan Kettering Cancer  
31 Center, New York, NY, USA

32 20 <sup>4</sup>Eskind Biomedical Library, Vanderbilt University, Nashville, TN, USA

33 21 <sup>5</sup>Health Outcomes & Biomedical Informatics, University of Florida College of Medicine,  
34 Gainesville, FL, USA

35 22 <sup>6</sup>Communications & Journalism, University of New Mexico, Albuquerque, NM, USA

36 23 <sup>7</sup>Division of Medicine, Rutgers Cancer Institute of New Jersey, New Brunswick, NJ, USA

37 24 <sup>8</sup>Population Health, University of Kansas School of Medicine, Kansas City, KS, USA

38 25 <sup>9</sup>Center for Public Health Systems Science, Washington University, St. Louis, MO, USA

39 26 <sup>10</sup>Meharry Medical College, Nashville, TN, USA

40 27 <sup>11</sup>Australian Institute of Family Studies, Southbank VIC, Australia

41 28  
42 29  
43 30 **Corresponding Author:**

44 31 Rebecca Selove

45 32 Tennessee State University

46 33 Center for Prevention Research

47 34 3500 John A. Merritt Blvd.  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 1 Nashville, TN 37209  
4 2 615-963-2558  
5 3 rselove@tnstate.edu  
6  
7  
8 4  
9  
10

## 11 5 **ABSTRACT**

12  
13 6 **Introduction:** Despite continuing efforts to reduce tobacco use in the U.S., declines in smoking  
14 7 rates have stalled, and smoking remains a major contributor to preventable death.  
15 8 Implementation science could potentially improve uptake and impact of evidence-based tobacco  
16 9 control interventions; however, no previous studies have systematically examined how  
17 10 implementation science has been used in this field. Our scoping review will describe use of  
18 11 implementation science in tobacco control in the U.S., identify relevant gaps in research, and  
19 12 suggest future directions for implementation science application to tobacco control.  
20 13

21 14 **Methods and analysis:** Our team, including a medical research librarian, will conduct a scoping  
22 15 review guided primarily by Arksey and O'Malley's methodology. We will search English-  
23 16 language peer-reviewed literature published 2000-June 30, 2020 for terms synonymous with  
24 17 "tobacco use," "prevention," "cessation," and "implementation science." The databases included  
25 18 in this search are MEDLINE (PubMed), EMBASE (Ovid), CINAHL (EBSCOhost), PsycINFO  
26 19 (ProQuest), ERIC (ProQuest), and the Cochrane Library (Wiley). We will include cohort and  
27 20 quasi-experimental studies, single-group experiments and randomized trials that report  
28 21 qualitative and/or quantitative data related to applying implementation science to the planning  
29 22 and/or delivery of interventions to prevent or reduce use of tobacco products. Studies must  
30 23 target potential or active tobacco users, intervention providers such as educators or healthcare  
31 24 professionals, or U.S. policy-makers. A minimum of two reviewers will independently examine  
32 25 each title and abstract for relevance, and each eligible full text for inclusion and analysis. Use of  
33 26 implementation science, demonstrated by explicit reference to implementation frameworks,  
34 27 strategies, or outcomes, will be extracted from included studies and summarized.  
35 28

36 29 **Ethics and dissemination:** This study is exempt from ethics board approval. The study  
37 30 protocol is registered with Open Science Framework: [osf.io/6yrk8](https://osf.io/6yrk8). We will document the equity-  
38 31 orientation of included studies with the PRISMA-Equity Extension Checklist. Results will be  
39 32 submitted for conferences and peer-reviewed journals.  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60



1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2 **Keywords:** tobacco control; smoking cessation; implementation science; knowledge translation

3 **Abstract word count:** 295

4 **Manuscript word count:** 3681

## 6 **ARTICLE SUMMARY: STRENGTHS AND LIMITATIONS OF THIS STUDY**

- 7 • This scoping review protocol describes the approach to an investigation of the explicit  
8 use of implementation science in planning and/or delivering tobacco control interventions  
9 in the U.S. to reduce the prevalence of preventable diseases and deaths.
- 10 • This proposed review focuses on databases that are widely used by investigators who  
11 could benefit from learning about the application of implementation science in tobacco  
12 control research programs.
- 13 • The study is designed to capture a comprehensive range of tobacco control programs.
- 14 • The reviewers developed a logic model depicting the intersection of tobacco control  
15 interventions and implementation science to support the relevance of this study for  
16 improving population health and reducing tobacco-related health disparities.
- 17 • A limitation of the proposed study is that it is restricted to interventions in the U.S.  
18 Studies that may meet inclusion criteria except for this element will be identified and  
19 considered for a later review.

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33

For peer review only

# 1 Use of implementation science in tobacco control intervention studies in the United 2 States between 2000-2020: A scoping review protocol

## 3 4 INTRODUCTION

5 Tobacco use is the leading preventable cause of mortality in the United States (U.S.) and is  
6 associated with a wide variety of poor health outcomes and health disparities.<sup>1</sup> Over the past 50  
7 years, researchers and funding agencies have focused on developing and disseminating  
8 evidence-based programs to prevent and reduce tobacco use and exposure to tobacco smoke.<sup>2</sup>  
9 Community-based programs coordinated with state and national policies have been identified as  
10 most effective for achieving public health goals of reducing tobacco use,<sup>2</sup> and clinical practice  
11 guidelines have been developed to treat tobacco dependence among current tobacco users.<sup>3</sup>

12  
13 Guidance regarding best practices for reducing tobacco use globally and in the U.S. has been  
14 available for decades. The WHO's Framework Convention on Tobacco Control,<sup>4</sup> and the related  
15 MPOWER website,<sup>5</sup> focus on national policies, including steps that reduce demand for tobacco  
16 products and exposure to second-hand smoke, and support cessation. Best practices for  
17 addressing tobacco use, provided by Centers for Disease Control and Protection (CDC)<sup>2</sup> include  
18 goals and strategies that are similar to those of the WHO. Similarly, an Institute of Medicine  
19 committee report related to smoking cessation in the military<sup>6</sup> outlined best practices that  
20 included establishing tobacco-free spaces and supporting tobacco use cessation.

21  
22 Although tobacco use in the U.S. has declined since the first Surgeon General's report linking it  
23 to lung cancer and other diseases in 1964,<sup>1</sup> the decrease in cigarette use plateaued early in the  
24 last decade.<sup>7</sup> Recent trends show that tobacco product use, including nicotine delivery via  
25 cigarette alternatives, is on the rise.<sup>8</sup> Furthermore, observed declines in tobacco use have  
26 occurred disproportionately among populations with more education, better health status, skilled  
27 jobs, and higher household incomes, increasing disparities in health outcomes.<sup>9</sup>

28  
29 Lags in effective translation of evidence to practice are common across health-related  
30 conditions, and can be addressed by applying best practices in implementation science.<sup>10</sup>  
31 Implementation science is the use of scientific methods in studying the uptake and integration of  
32 evidence-based interventions into routine practice in non-research environments to improve the  
33 quality and benefit of those interventions.<sup>11,12</sup> This field examines facilitators and barriers to  
34 establishing and sustaining evidence-based programs in particular contexts to achieve specific

1  
2  
3 1 implementation outcomes.<sup>13</sup> Implementation science offers enhanced understanding of ways  
4 2 implementation strategies (such as developing a formal plan for implementing an intervention,  
5 3 or providing ongoing consultation to those who deliver the intervention<sup>14</sup>) can be tested and  
6 4 successfully applied in varied contexts to maximize successful intervention outcomes.<sup>15</sup>  
7  
8  
9

10 5  
11 6 Implementation science resources include theoretically-informed frameworks and models,<sup>16,17</sup>  
12 7 implementation strategies,<sup>14</sup> and measures of implementation processes and outcomes,  
13 8 e.g.,<sup>18,19</sup> The use of implementation science to enhance the impact of tobacco control programs  
14 9 and policies has been identified as a priority for promoting tobacco use prevention and  
15 10 cessation in the U.S. population, especially among socioeconomically disadvantaged tobacco  
16 11 users.<sup>20,21</sup>  
17  
18  
19  
20  
21

22 13 Although implementation science is a young field, it has been applied across the cancer  
23 14 continuum.<sup>22</sup> However, despite prioritization of applying implementation science to improve  
24 15 public health, a review of ways in which implementation science has been used to plan and  
25 16 deliver tobacco control programs and policies has not previously published. Rosen et al.<sup>23</sup>  
26 17 examined 46 systematic reviews of tobacco control-related interventions and noted that  
27 18 variability in implementation quality limits reviewers' ability to interpret intervention effectiveness.  
28 19 A systematic review was conducted of studies that reported implementation strategies for a  
29 20 range of chronic disease prevention interventions, with control groups, and among the three  
30 21 studies that met their inclusion criteria, none focused on tobacco-related interventions.<sup>24</sup> A  
31 22 recent scoping review<sup>25</sup> described targeted populations and settings for tobacco control  
32 23 interventions, and found cessation interventions were most common topics of systematic  
33 24 reviews. The authors suggested that the focus on cessation reflects an incomplete approach to  
34 25 tobacco control as recommended by the World Health Organization (WHO).<sup>4</sup> The authors  
35 26 indicated they plan to publish their observations regarding implementation challenges  
36 27 associated with cessation interventions.  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46

47 29 A review of studies on smoking cessation interventions noted a failure to increase rates of  
48 30 tobacco cessation despite advances in pharmacotherapy and programs demonstrated to be  
49 31 effective in research settings.<sup>26</sup> The authors noted a lack of conclusive research as to whether  
50 32 this is due to insufficient reach of effective interventions, reduced effectiveness when programs  
51 33 are translated to community settings, or populations of community smokers for whom available  
52 34 interventions are less effective. Surgeon General David Satcher described many effective  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 1 interventions that have been developed for advancing tobacco control, and said “The challenge  
4 2 to public health professionals, health care systems, and other partners in our national  
5 3 prevention effort is to implement these proven approaches.”<sup>1</sup>, p. 12. This scoping review was  
6 4 undertaken to identify explicit use of implementation science across a comprehensive range of  
7 5 interventions as described by the WHO and the CDC,<sup>2</sup> in order to gauge awareness of this  
8 6 field’s potential contributions for improving effective use of tobacco control interventions.  
9  
10  
11  
12  
13

14 8 In our preliminary search for published reports of the use of implementation science in planning  
15 9 and delivering tobacco control interventions, we considered projects described in PROSPERO,  
16 10 the Joanna Briggs Institute Database of Systematic Reviews and Implementation Reports, and  
17 11 scoping reviews registered in the Center for Open Science. We found no existing or ongoing  
18 12 scoping reviews on the use of implementation science in tobacco control intervention research.  
19 13 The initial search by our medical librarian team member identified approximately 4,500 titles,  
20 14 and we noted that a significant number of studies were conducted completely outside of the  
21 15 U.S. Studies that describe explicit use of implementation science tools appeared rarely in the  
22 16 initial samples of articles we reviewed. We opted to consider studies across a comprehensive  
23 17 range of tobacco use interventions because the focus of our review is on the application of  
24 18 implementation science rather than specific types of interventions or goals. Our initial screening  
25 19 suggests that the number of studies that will qualify for inclusion will be manageable for data  
26 20 extraction and meaningful synthesis of the findings.  
27  
28  
29  
30  
31  
32  
33  
34  
35

36 22 Describing ways implementation science has been used in tobacco control interventions is  
37 23 essential to gaining an understanding of the state of the field regarding the use of frameworks,  
38 24 models, and strategies that can further reduce tobacco use rates and inequities. Thus, our goal  
39 25 is to examine peer-reviewed, published reports of tobacco control interventions in the U.S. to  
40 26 identify the use of implementation science in planning and/or delivering these interventions from  
41 27 2000 through June 30, 2020. We developed a logic model to depict the rationale for this project,  
42 28 following the recommendations of Anderson et al.<sup>27</sup> (Figure 1).  
43  
44  
45  
46  
47  
48

49 30 This study will describe the nature of the use of implementation science frameworks and  
50 31 models, implementation strategies, and measurement of implementation outcomes in research  
51 32 efforts to prevent tobacco use and second-hand smoke exposure, and/or to promote smoking  
52 33 cessation. Results from this scoping review can be used to inform a research agenda for  
53  
54  
55  
56  
57  
58  
59  
60

1 addressing gaps in, and advancing the application of implementation science in tobacco control  
 2 to achieve greater impact, especially in addressing tobacco-related health disparities.<sup>28</sup>

### 3 4 **REVIEW QUESTIONS**

5 The primary research question for this scoping review is: How has implementation science  
 6 been used in planning and delivering tobacco control interventions in the U.S. 2000-June 1,  
 7 2020? Our focus will be on ways researchers investigated use of implementation science to  
 8 plan and deliver tobacco control interventions. The inclusion criteria listed in Table 1 describe  
 9 specific elements of implementation science that will qualify studies to be examined in this  
 10 review. The study is designed to address the following questions:

- 11 1. What aspects of implementation science (such as use of implementation science  
 12 frameworks and models, implementation strategies, and measurement of  
 13 implementation processes and outcomes) appear explicitly in reports of tobacco  
 14 control intervention studies?
- 15 2. What types of interventions (i.e., public health interventions such as classroom-based  
 16 prevention education, tobacco use policies, and electronic prompts for providers, as  
 17 well as programs that target individuals and families such as group counseling and  
 18 text messages to support smoking cessation) are associated with explicit use of  
 19 implementation science?
- 20 3. What intervention goals (as described in Table 2) are associated with use of  
 21 implementation science?
- 22 4. Given the kinds of interventions that the proposed study identifies that have been  
 23 planned and delivered with the benefit of implementation science, where are there  
 24 gaps in implementation research? Specifically, in considering the dimensions of  
 25 comprehensive tobacco control offered by the WHO<sup>4</sup> and the CDC,<sup>2</sup> are there kinds of  
 26 interventions that less frequently used implementation science tools in planning and/or  
 27 delivery, where less is known about how implementation factors affected behavioral  
 28 and clinical outcomes?
- 29 5. Have the number of peer-reviewed published studies explicitly using implementation  
 30 science changed over the past 19 years?

31  
 32  
 33  
 34  
 35  
 36  
 37  
 38  
 39  
 40  
 41  
 42  
 43  
 44  
 45  
 46  
 47  
 48  
 49  
 50  
 51  
 52 **Table 1. Criteria for review of full texts for inclusion in study**

53 <b>Table 1. Criteria for review of full texts for inclusion in study</b>	
54 <b>INCLUSION</b>	55 <b>EXCLUSION</b>

<ul style="list-style-type: none"> <li>• Article was published 2000- June 1, 2020.</li> <li>• Study was conducted inside of United States (may include other countries as well as long as U.S. is named also)</li> <li>• The implementation of a tobacco control intervention or program was studied.</li> <li>• Data related to implementation science questions were collected and analyzed.</li> <li>• Implementation science was explicitly used. The authors:             <ol style="list-style-type: none"> <li>1) described planned actions to promote human behavior change in order to integrate tobacco control interventions into educational, community, or clinical settings;</li> <li>2) considered organizational constraints and facilitators that could affect uptake and delivery of the intervention, and</li> <li>3) collected data regarding the processes and/or outcomes of their planned actions.</li> </ol> </li> </ul> <p>Explicit use is further defined as reference to use of implementation science, knowledge translation or transfer, a specific implementation science framework or model, implementation strategies, assessment of implementation stages or implementation outcomes. Other elements may be included if they emerge in the course of the review.</p>	<ul style="list-style-type: none"> <li>• Completely outside of the United States</li> <li>• Dissertation or thesis</li> <li>• Essay or opinion piece</li> <li>• Study protocol only</li> <li>• Only describes guidelines</li> <li>• Report of a conference presentation</li> <li>• Book</li> <li>• Does not describe implementation of a tobacco control intervention.</li> <li>• Analysis of secondary surveillance or cross-sectional data by authors not involved in delivering intervention</li> <li>• No indication that implementation science elements were used</li> </ul>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

1

Table 2. Tobacco control programs/interventions: Goals, target audience, components					
	PROGRAM GOALS				
<b>PROGRAM/INTERVENTION COMPONENTS AT TWO LEVELS</b>	<b>Promote tobacco-free culture</b>	<b>Prevent initiation</b>	<b>Eliminate 2nd-hand smoke exposure</b>	<b>Increase tobacco cessation</b>	<b>Eliminate disparities in tobacco use treatment</b>

<b>PUBLIC HEALTH INTERVENTIONS:</b> Society (government, industry); Community (e.g., healthcare providers, schools and educators, housing complexes, workplaces/retailers)					
<b>Policy interventions</b> <ul style="list-style-type: none"> <li>Tobacco use restrictions such as bans in restaurants, work places, parks, cars with child passengers</li> <li>Multi-use housing bans</li> </ul>	PH1	PH2	PH3	PH4	PH5
<b>Communication interventions</b> Mass-media campaigns: Harms of tobacco use, Availability of state QuitLine counseling, <ul style="list-style-type: none"> <li>Self-help programs on radio, TV, web, blogs, billboards, leaflets</li> </ul> Promoting access to tobacco cessation medications Education in schools, workplaces, public spaces	PH6	PH7	PH8	PH9	PH10
<b>Provider/teacher education</b> Training for physician, nurse, pharmacist, dentist, teacher Electronic /written prompts to check tobacco use status	PH11	PH12	PH13	PH14	PH15
<b>Tobacco screening/other intervention guideline</b>	PH16	PH17	PH18	PH19	PH20
<b>INDIVIDUAL INTERVENTIONS:</b> Family, individual adults, children and youth					
<b>Communication interventions</b> Text messages for quitting Web-based media literacy education	I21	I22	I23	I24	I25
<b>Behavioral therapies and medication</b> Brief advice from healthcare provider-3 or 5 As Provider referral to QuitLine Multi-session QuitLine counseling Face-to-face group, individual counseling FDA-approved medications, NRT App and web-based programs	I26	I27	I28	I29	I30



<b>Cessation programs for special populations</b> Homeless people, smokers with mental health and/or substance use disorders, cancer survivors, ethnic minorities, pregnant women	I31	I32	I33	I34	I35
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----	-----	-----	-----	-----

## METHODS

The process for this scoping review will follow the guidance provided in Arksey and O'Malley's<sup>29</sup> seminal paper, as well as the Joanna Briggs Institute (JBI),<sup>30,31</sup> and other expert recommendations.<sup>32</sup> The steps are: (1) identify a research question; (2) identify relevant published studies; (3) select studies that will be included in the scoping review, using clearly articulated inclusion and exclusion criteria; (4) extract data from each study to address the research questions; and (5) summarize and disseminate the results of the data extraction and review process. The scoping review protocol has been registered with Open Science Framework as protocol number 6YRK8 ([osf.io/6yrk8](https://osf.io/6yrk8)).

### Patient and public involvement

No patient involvement was obtained in designing this scoping review protocol.

### Search strategy

In consultation with our team's medical research librarian, and following JBI guidelines, a three-step search strategy will be utilized.<sup>30</sup> The first step, an initial pilot search, was performed in MEDLINE (PubMed) in 2017. Second, additional search terms were added upon review of the initial results and input from subject experts. The databases to be included in this search are MEDLINE (PubMed), EMBASE (Ovid), CINAHL (EBSCOhost), PsycINFO (ProQuest), ERIC (ProQuest), and the Cochrane Library (Wiley). All searches are limited to English language and publication dates from January 1, 2000 to June 1, 2020. The MEDLINE (PubMed) search strategy is defined in Table 3. Full details for the search strategy are provided in the Appendix.

**Table 3: Search strategy for Medline (PubMed)**

("Tobacco Products"[Mesh] OR "Tobacco Use"[Mesh] OR "Tobacco Smoke Pollution"[Mesh] OR "Smoking"[Mesh] OR tobacco[tiab] OR tobacco use[tiab] OR smoking[tiab] OR second hand smoke exposure[tiab] OR second hand smoke[tiab] OR tobacco use initiation[tiab] OR

smoking initiation[tiab] OR "Tobacco Use Cessation"[Mesh] OR tobacco control[tw] OR "smoking cessation"[MeSH Terms] OR smoking cessation[tw]) AND ("Smoking Prevention"[Mesh] OR smoking prevention[tw] OR "Health Promotion"[Mesh] OR health promotion[tw] OR "Health Education"[Mesh] OR health education[tw] OR program[tw] OR programs[tw] OR intervention[tw] OR interventions[tw] OR "Policy"[Mesh] OR "Smoke-Free Policy"[Mesh] OR "Social Control Policies"[Mesh] OR "Organizational Policy"[Mesh] OR "Public Policy"[Mesh] OR policy[tw] OR policies[tw] OR public policy[tw] OR health policy[tw]) AND (implementation science[tw] OR implementation[tw] OR "diffusion of innovation"[MeSH Terms] OR implementation frameworks[tw] OR implementation models[tw] OR implementation study[tw] OR translational research[tw] OR "translational medical research"[MeSH Terms] OR knowledge translation[tw]) AND (Clinical Trial[ptyp] OR Comparative Study[ptyp] OR Controlled Clinical Trial[ptyp] OR Evaluation Studies[ptyp] OR Observational Study[ptyp] OR Randomized Controlled Trial[ptyp] OR "Qualitative Research"[Mesh] OR "Prospective Studies"[Mesh] OR "Cohort Studies"[Mesh] OR Meta-Analysis[ptyp] OR systematic[sb] OR evaluation studies[ptyp] OR evaluation studies[tw] OR clinical trial[tw] OR comparative study[tw] OR observational study[tw] OR qualitative research[tw] OR "program evaluation"[MeSH Terms] OR program evaluation[tw] OR hybrid design[tw] OR experimental[tw] OR mixed methods study[tw]) AND ("2000/01/01"[PDAT] : "2020/06/01"[PDAT]) AND English[lang]

## Study selection

All identified references will be uploaded into Covidence systematic review software (Veritas Health Innovation, Melbourne, Australia). Duplicate citations will be removed using the Covidence software. Each title and abstract will be reviewed for relevance by two of the study authors. At the title and abstract screening phase, studies that will be included must describe a tobacco control intervention conducted in the U.S., and be published 2000-June 1, 2020. Conflicts regarding inclusion for full text review will be resolved by the senior author (RJS) and through team discussion where necessary.

During the initial title and abstract screen, relevant systematic reviews will be identified for hand searching. For titles found through hand searches of systematic reviews that are not already in the original data set, the associated abstracts will be reviewed by two of the study authors using the same inclusion and exclusion criteria in Table 1. Full texts will be retrieved for final eligibility screening using the inclusion and exclusion criteria presented below. Each full text will be

1 reviewed for inclusion in the final study by two members of the study team, with conflicts  
2 resolved through team discussion. During full text reviews, members of the study team will hand  
3 search for citations of related publications that might provide more complete descriptions of the  
4 tobacco control intervention. Titles and abstracts of publication identified by hand searches will  
5 be reviewed by two members of the study team as described above.

### 6 7 **Inclusion criteria**

8 We will use the Population-Concept-Context (PCC) framework described by the scoping review  
9 guidelines of the JBI<sup>30</sup> as one dimension of our inclusion criteria. Based on the variety of  
10 tobacco control interventions, we expect that populations represented in included studies will  
11 vary. Tobacco control interventions are designed to prevent use, as well as reduce primary and  
12 secondary exposure to tobacco. Thus, study populations can include non-smokers, combustible  
13 tobacco and smokeless tobacco users, and individuals exposed to second-hand smoke. These  
14 populations include persons of all races and ethnicities, and range in age from infants to older  
15 adults.<sup>9,33</sup> Targets of tobacco control interventions include pregnant women, school children,  
16 parents, healthcare providers, smoking cessation counselors, teachers, public health workers,  
17 policy makers, media stakeholders, and proprietors of establishments that sell tobacco products  
18 or regulate exposure to tobacco smoke. With regard to contexts, tobacco control interventions  
19 are delivered in a wide variety of settings, including healthcare providers' offices, hospitals,  
20 classrooms, daycare centers, after school programs, community centers, faith communities, and  
21 more. Because of this diversity, we will not exclude studies based on participant characteristics  
22 or program settings.

23  
24 This study will examine the intersection of two key concepts: tobacco control programs, and  
25 implementation science. For this study, *tobacco control programs or interventions* are defined  
26 as activities that aim to achieve one or more of the following goals: 1) promote tobacco-free  
27 culture; 2) prevent initiation of tobacco use; 3) eliminate second-hand smoke exposure; 4)  
28 increase tobacco cessation; or 5) eliminate disparities in tobacco use treatment.<sup>4,6,34</sup> Examples  
29 of such interventions include, but are not limited to, public health interventions (e.g., taxation,  
30 mass media campaigns, tobacco use restrictions, or policies relevant to tobacco retail  
31 environments) or individual-level interventions (e.g., healthcare provider training, tailored  
32 communication interventions, pharmacotherapy, or structured counseling).<sup>2</sup> We drew from the  
33 CDC's best practices for tobacco control,<sup>2</sup> the WHO's Framework Convention on Tobacco  
34 Control<sup>4</sup> and the related MPOWER website,<sup>5</sup> and an Institute of Medicine committee report

1  
2  
3 1 related to smoking cessation in the military,<sup>6</sup> to develop a matrix of tobacco control interventions  
4 2 presented in Table 2. We will use this matrix to categorize reports of interventions to address  
5 3 Objective 3, and will compare our results to those of Halas et al.<sup>25</sup> who found that tobacco use  
6 4 cessation was the most common goal of studies they examined.

7 5 The inclusion criteria for *use of implementation science* were developed by reviewing seminal  
8 6 writings in the field, e.g.,<sup>10,13,14,17</sup> and operational definitions reported in a scoping review of  
9 7 implementation science associated with nursing interventions in German-speaking countries.<sup>35</sup>  
10 8 We also asked five leading scholars in the implementation science field how they would  
11 9 determine if a study should be included in this scoping review. This led to identification of three  
12 10 broad elements for determining that implementation science was used: investigators (1)  
13 11 described planned actions to promote human behavior change in order to integrate evidence-  
14 12 based tobacco control interventions into educational, community or clinical settings, (2)  
15 13 considered organizational constraints and facilitators that could affect uptake and delivery of the  
16 14 intervention, and (3) collected data regarding the processes and/or outcomes of their planned  
17 15 actions.

18 16  
19 17 To address Research Question 1 (What aspects of implementation science appear in the  
20 18 studies?), the multi-disciplinary scoping review team reviewed a sample of articles that would be  
21 19 considered for the scoping review, and identified two categories of implementation science use:  
22 20 Tier 1 and Tier 2. Tier 1 studies include elements that are explicitly labeled as implementation  
23 21 science, such as: use of a specific implementation science framework such as the Interactive  
24 22 Systems Framework,<sup>36</sup> or an implementation toolkit<sup>37,38</sup> for planning adoption of an intervention;  
25 23 use of specific implementation strategies<sup>14,39</sup> for enhancing delivery of an intervention;  
26 24 measuring stages of implementation<sup>40,41</sup> during the process of delivering an intervention; or  
27 25 measurement of implementation outcomes as articulated by Proctor et al.<sup>13</sup> as part of evaluating  
28 26 an intervention.

29 27  
30 28 Implementation outcomes of interest include, but are not limited to, rates of intervention  
31 29 adoption, acceptability to patients, feasibility, appropriateness, costs, fidelity, penetration and  
32 30 sustainability;<sup>13</sup> or broader service outcomes assessing processes of care such as safety,  
33 31 timeliness, efficiency, effectiveness, equity or patient-centeredness.<sup>13,42</sup> Provider acceptability,  
34 32 self-efficacy for delivering an intervention, as well as satisfaction with outcomes of an  
35 33 intervention will also be considered as aspects of implementation science, among variables that  
36 34 may be associated with implementation outcomes<sup>43</sup> as listed previously. Multiple definitions and

1 terminologies are used globally to convey the use of science to translate evidence-based  
2 research into practice,<sup>44,45</sup> e.g., knowledge translation and translation of research into practice,  
3 and investigators may use these terms to refer to such planned activities.<sup>38,46</sup>  
4

5 We anticipate that we will find peer-reviewed articles indicating that investigators assessed  
6 implementation facilitators and barriers,<sup>43</sup> such as attitudes of key stakeholders toward a  
7 proposed intervention, organizational capacity for accommodating a new intervention, or  
8 community readiness to adopt and implement a tobacco-related policy, without explicitly  
9 describing their work as implementation science. We will tag these Tier 2 articles for a separate  
10 review.  
11

12 This review will include studies published 2000-June 1, 2020. We chose the year 2000 as it  
13 represents the beginning of “preparation”<sup>47</sup> for application of the resources of the emerging field,  
14 and the early stage of an era when implementation research and implementation science began  
15 expanding as a focus in the peer-reviewed literature.<sup>48,49</sup> We will limit our review to studies  
16 conducted in the U.S. because policies, laws, regulations (e.g., on advertising) and cultural  
17 norms related to tobacco vary widely across countries and regions of the world. This inclusion  
18 criteria reduces the heterogeneity of contextual factors, which are prime considerations for  
19 implementation science,<sup>49</sup> and enhances the feasibility of our undertaking. Studies conducted  
20 only outside the U.S. that may meet all other criteria for this scoping review will be identified for  
21 a future project.  
22

23 Qualitative and quantitative empirical studies published in peer-reviewed journals will be eligible  
24 for inclusion. Study designs may include prospective cohort studies, natural experiments, quasi-  
25 experimental studies, single-group experiments, and/or randomized controlled trials. Studies will  
26 be eligible if they report on primary data collection related to the process of implementing an  
27 intervention, whether or not they report evaluation of the effectiveness of the intervention.

28 Dissertations, theses, reports of conference presentations, letters, guidelines, grey literature,  
29 and books will be excluded, as we are limiting the review to publications that are more readily  
30 accessible to the broader scientific and practitioner community. As we are interested in ways  
31 that use of implementation science will be readily apparent to researchers and practitioners, we  
32 will not seek additional information from authors to investigate use of implementation science  
33 that is not reported in their published work.  
34

## 1 **Assessment of methodological quality**

2 The purpose of this review is to identify how implementation science has been utilized across a  
3 wide range of study designs in tobacco control research. We do not plan to assess the  
4 methodological quality of the interventions themselves, nor to provide a summary of what kinds  
5 of interventions are effective. We plan to describe findings regarding the explicit application of  
6 implementation science including frameworks and models, strategies, assessment and  
7 measurement of implementation barriers and facilitators, stages, and outcomes. Our critical  
8 appraisal will focus on uses and gaps of implementation science in included studies.<sup>30</sup>

## 10 **Extraction of results**

11 Once full texts to be included in the scoping review have been identified, two members of the  
12 study team will independently extract study characteristics from each one using a structured  
13 data extraction form in Covidence. Elements to be extracted include: (a) characteristics of the  
14 population targeted by the intervention, including sex, age, tobacco use status, ethnicities, roles  
15 (such as dentists or nurses, pregnant women, policy makers); (b) context in which the  
16 intervention is implemented, such as classroom, hospital, multi-unit housing, county; (c) specific  
17 types and goals of interventions as categorized in Table 2, as well as if and how the authors  
18 described the evidence-base for the intervention; (d) what aspects of implementation science  
19 were used in the design, delivery and/or evaluation of the intervention, such as specific  
20 implementation frameworks or models, implementation strategies, or measurement of  
21 intervention processes or outcomes; and (e) contributions of implementation science to the  
22 study if identified by the study's authors.

24 Discrepancies in extracted responses will be resolved through team discussion when  
25 necessary. The data extraction process will be trialed by the study team prior to execution to  
26 ensure consistency and relevance of fields before proceeding to full data extraction.

## 28 **Data synthesis**

29 Following data extraction, frequencies of study characteristics will be calculated where possible.  
30 In addition, the study team will conduct a narrative synthesis<sup>50</sup> of characteristics of populations,  
31 content, and contexts in included studies. The purpose of this analytic approach is to tell a story  
32 about use of implementation science in tobacco control research in the U.S., including  
33 description of patterns that may emerge, such as target audiences, intervention goals, or  
34 settings associated with implementation science use, as well as the impact of its use. The

1 critical reflection required in this process has the potential for generating hypotheses<sup>50</sup> regarding  
2 evolution of the use of implementation science in this field. A meta-analysis will not be  
3 conducted, as this will not be necessary to address the research question.  
4

### 5 **Potential implications of findings**

6 Preliminary reviews of full text suggest that implementation science has not been utilized  
7 extensively in efforts to prevent and reduce tobacco use in the United States. We anticipate that  
8 the results of this scoping review will contribute to the knowledge base of implementation  
9 researchers in describing the extent and nature of implementation science application to public  
10 health and individual levels of tobacco control (Table 2). This study will also provide  
11 investigators who implement tobacco control interventions across the range of goals described  
12 by the CDC and the WHO<sup>4</sup> with examples of studies that are informed by implementation  
13 science, as well as gaps in applications from this field. As the scoping review will include  
14 almost two decades of research, we anticipate that we will identify trends in implementation  
15 science use in tobacco control intervention research as the field has matured over time.  
16

### 17 **Ethics and dissemination:**

18 One goal of this study is to contribute to improvement in tobacco control interventions in  
19 reducing health disparities (Figure 1). Efforts to promote effective tobacco control reflect  
20 commitments to social justice,<sup>51</sup> and implementation science can substantially improve the  
21 outcomes of these efforts. We will document the equity-orientation of included studies with the  
22 PRISMA-Equity Extension Checklist.<sup>52</sup>  
23

24 The findings from this study will be disseminated via peer-reviewed publications and conference  
25 presentations for audiences interested in tobacco control and implementation science. All  
26 results will be prepared in accordance with JBI guidelines<sup>30</sup> and checklists for Preferred  
27 Reporting Items for Systematic reviews and Meta-Analyses,<sup>53</sup> the Extension for Scoping  
28 Reviews (PRISMA-ScR),<sup>52</sup> and equity reporting.<sup>54</sup> A PRISMA flow diagram<sup>53</sup> will indicate the  
29 numbers of articles identified in each search method, duplicates removed, and number of  
30 studies excluded and included, along with reasons for exclusion at the full text review level. The  
31 main findings will be presented using tables and a narrative description that will detail the results  
32 in view of the objectives and research questions of the scoping review. A list of the included  
33 studies, along with their key characteristics, will be provided in the primary manuscript reporting  
34 the results of this review.

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2 Figure 1. Logic model underlying tobacco control program implementation scoping review  
3

4 **ACKNOWLEDGMENTS:** The authors would like to thank the following individuals who were  
5 consulted regarding the definition of use of implementation science developed for this paper:  
6 Sarah Birken, Ross Brownson, Anne Sales, and Michel Wensing.  
7

8 **Funding statement:**

9 Support for this project came in part from the National Institutes of Health Mentored Training for  
10 Dissemination and Implementation Research in Cancer Program (MT-DIRC) (grant number  
11 5R25CA171994), the US Department of Veterans Affairs, and the Cancer Research Network.

12 R. Selove is supported by the National Cancer Institute through the Meharry-Vanderbilt-  
13 Tennessee State University Cancer Partnership (U54CA163066).

14 J..Leng is supported by the National Cancer Institute: Core Cancer Center Support Grant (P30  
15 CA008748).

16 S. Ellis is supported by the National Institute of General Medical Sciences COBRE grant  
17 (P20GM130423).

18 T. S. Schneurmann is funded by a NIH/NIDA K01 (K01 DA040745).  
19

20 **Competing interests:**

21 There are no competing interests for any author.  
22

23 **Contributorship statement**

24 All co-authors have participated via email, phone, or in-person to the development of the  
25 protocol for this project.

26 Rebecca Selove conceptualized the initial project, coordinated the research team in developing  
27 the protocol, was lead author for the protocol manuscript, and participated in writing, reviewing  
28 and editing the manuscript, and drafted the detailed response to reviewers.

29 Sarah Neil-Sztramko contributed to developing the protocol and protocol manuscript,  
30 participated in writing, reviewing and editing the manuscript.

31 provided consultation regarding the Covidence software used for data review, and provided  
32 suggestions regarding scoping review procedures.

33 Jennifer Leng contributed to developing the protocol, writing, reviewing and editing the  
34 manuscript.



1 Philip D. Walker, an experienced medical research librarian, developed and conducted the  
2 literature search, writing, reviewing and editing the manuscript.  
3 Ramzi G. Salloum contributed to developing the protocol, writing, reviewing and editing the  
4 manuscript.  
5 Tamar Ginossar contributed to developing the protocol, and writing, reviewing and editing the  
6 manuscript.  
7 Carolyn Heckman contributed to developing the protocol, and writing, reviewing and editing the  
8 manuscript.  
9 Taneisha S. Scheuermann contributed to developing the protocol, writing, reviewing and editing  
10 the manuscript, and provided suggestions regarding scoping review procedures.  
11 Todd Combs contributed to developing the protocol, writing, reviewing and editing the  
12 manuscript, and provided suggestions regarding scoping review procedures.  
13 Raquel Qualls-Hampton contributed to developing Table 2 and the protocol.  
14 Rebecca Armstrong contributed to developing the protocol and protocol manuscript.  
15 Shellie D. Ellis contributed to developing the protocol, developed the first draft of the protocol  
16 manuscript, reviewed and edited it, and contributed to editing the detailed description of  
17 responses to reviewers.  
18

## 1 REFERENCES

- 2 1. U.S. Department of Health and Human Services. The health consequences of smoking- 50  
3 years of progress. A report of the surgeon general. Atlanta, GA: U.S. Department of Health  
4 and Human Services, Centers for Disease Control and Prevention, National Center for  
5 Chronic Disease Prevention and Health Promotion, Office of Smoking and Health; 2014.
- 6 2. Centers for Disease Control and Prevention. Best practices for comprehensive tobacco  
7 control programs - 2014. Atlanta, GA: Department of Health and Human Services, National  
8 Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and  
9 Health; 2014.
- 10 3. Fiore M, Jaen C, Baker T, et al. Treating Tobacco Use and Dependence: 2008 Update.  
11 Rockville, MD: Department of Health and Human Services, Public Health Service; 2008.
- 12 4. WHO. WHO framework convention on tobacco control. Geneva: WHO; 2005.
- 13 5. World Health Organization. Tobacco Free Initiative (TFI). Tobacco Free Initiative (TFI).  
14 Available from: <https://www.who.int/tobacco/mpower/publications/en/>
- 15 6. Institute of Medicine. Combating Tobacco Use in Military and Veteran Populations.  
16 Washington, D.C.: National Academies Press; 2009.
- 17 7. Balogh E, Patlak M, Nass SJ, others. Reducing tobacco-related cancer incidence and  
18 mortality: Workshop summary. National Academies Press; 2013.
- 19 8. Kasza KA, Ambrose BK, Conway KP, Borek N, Taylor K, Goniewicz ML, et al. Tobacco-  
20 product use by adults and youths in the United States in 2013 and 2014. *N Engl J Med*.  
21 2017 Jan 26;376(4):342–53. DOI: 10.1056/NEJMsa1607538
- 22 9. Wang TW, Asman K, Gentzke AS, Cullen KA, Holder-Hayes E, Reyes-Guzman C, et al.  
23 Tobacco Product Use Among Adults — United States, 2017. *Morbidity and Mortality*  
24 *Weekly Report*, 2018;67(44):8.
- 25 10. Brownson RC, Colditz GA, Proctor EK, editors. Dissemination and implementation  
26 research in health: Translating science to practice. New York: Oxford University Press;  
27 2012.
- 28 11. Eccles MP, Mittman BS. Welcome to Implementation Science. *Implement Sci*. 2006  
29 Dec;1(1):1, 1748-5908-1–1. DOI:10.1186/1748-5908-1-1
- 30 12. Nilsen P, Birken SA. Handbook on Implementation Science. Cheltenham UK: Edward  
31 Elgar Publishing; 2020.
- 32 13. Proctor E, Silmere H, Raghavan R, Hovmand P, Aarons G, Bunger A, et al. Outcomes for  
33 implementation research: conceptual distinctions, measurement challenges, and research  
34 agenda. *Adm Policy Ment Health Ment Health Serv Res*. 2011 Mar;38(2):65–76. DOI  
35 10.1007/s10488-010-0319-7
- 36 14. Powell BJ, Waltz TJ, Chinman MJ, Damschroder LJ, Smith JL, Matthieu MM, et al. A  
37 refined compilation of implementation strategies: results from the Expert

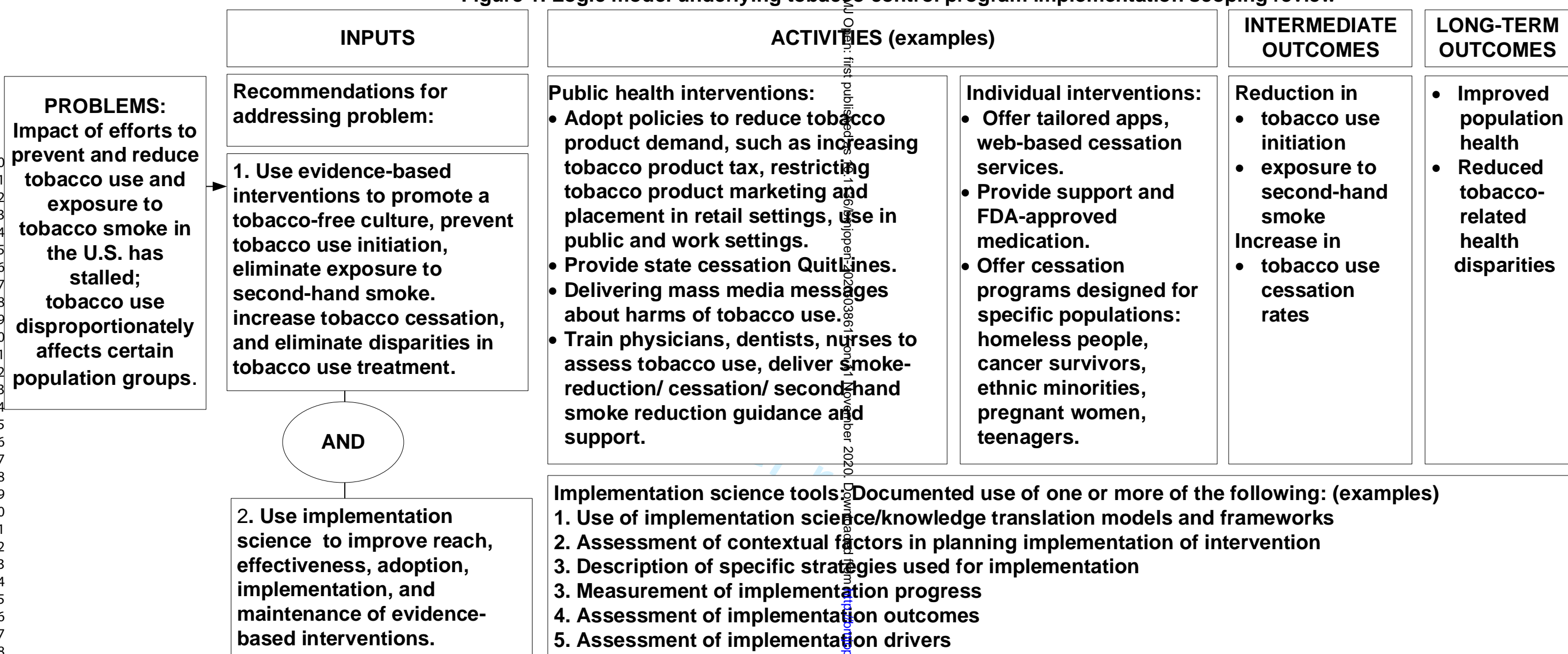
- 1  
2  
3 1 Recommendations for Implementing Change (ERIC) project. *Implement Sci.* 2015;10(1).  
4 2 DOI: 10.1186/s13012-015-0209-1  
5
- 6 3 15. Chilenski SM, Greenberg MT, Feinberg ME. Community readiness as a multidimensional  
7 4 construct. *J Community Psychol.* 2007;35(3):347–365.  
8
- 9 5 16. Bauer MS, Damschroder L, Hagedorn H, Smith J, Kilbourne AM. An introduction to  
10 6 implementation science for the non-specialist. *BMC Psychol.* 2015 Dec;3(1):32. DOI  
11 7 10.1186/s40359-015-0089-9  
12
- 13 8 17. Tabak RG, Khoong EC, Chambers D, Brownson RC. Models in dissemination and  
14 9 implementation research: useful tools in public health services and systems research.  
15 10 *Front Public Health Serv Syst Res.* 2013;2(1):8.  
16
- 17 11 18. GEM: Grid-Enabled Measures Database. Available from: [https://www.gem-](https://www.gem-beta.org/Public/Home.aspx)  
18 12 [beta.org/Public/Home.aspx](https://www.gem-beta.org/Public/Home.aspx)  
19
- 20 13 19. Huijg JM, Gebhardt WA, Dusseldorp E, Verheijden MW, van der Zouwe N, Middelkoop BJ,  
21 14 et al. Measuring determinants of implementation behavior: psychometric properties of a  
22 15 questionnaire based on the theoretical domains framework. *Implement Sci.* 2014  
23 16 Dec;9(1):33. DOI:10.1186/1748-5908-9-33  
24
- 25 17 20. U.S. Department of Health and Human Services. Improving smoking cessation in  
26 18 socioeconomically disadvantaged populations via scalable interventions (R01). 2016.  
27 19 Available from: <https://grants.nih.gov/grants/guide/pa-files/par-16-202.html>  
28
- 29 20 21. U.S. Department of Health and Human Services. U.S. tobacco control policies to reduce  
30 21 health disparities (R01 CLinical Trial Optional). 2018. Available from:  
31 22 <https://grants.nih.gov/grants/guide/pa-files/par-18-675.html>  
32
- 33 23 22. Chambers D, Vinson C, Norton W, editors. *Advancing the science of implementation*  
34 24 *across the cancer continuum.* New York, NY: Oxford University Press; 2019.  
35
- 36 25 23. Rosen LJ, Ben Noach M, Rosenberg E. Missing the forest (plot) for the trees? A critique of  
37 26 the systematic review in tobacco control. *BMC Med Res Methodol.* 2010 Dec;10(1):34.  
38 27 DOI:10.1186/1748-5908-9-33  
39
- 40 28 24. McFadyen T, Chai LK, Wyse R, Kingsland M, Yoong SL, Clinton-McHarg T, et al.  
41 29 Strategies to improve the implementation of policies, practices or programmes in sporting  
42 30 organisations targeting poor diet, physical inactivity, obesity, risky alcohol use or tobacco  
43 31 use: a systematic review. *BMJ Open.* 2018 Sep;8(9):e019151. DOI:10.1136/bmjopen-  
44 32 2017-019151  
45
- 46 33 25. Halas G, Schultz AS, Rothney J, Wener P, Holmqvist M, Cohen B, et al. A scoping review  
47 34 of foci, trends, and gaps in reviews of tobacco control research. *Nicotine Tob Res.* 2020;  
48 35 22(5), 599-612. DOI:10.1093/ntr/nty269  
49
- 50 36 26. Zhu S-H, Lee M, Zhuang Y-L, Gamst A, Wolfson T. Interventions to increase smoking  
51 37 cessation at the population level: how much progress has been made in the last two  
52 38 decades? *Tob Control.* 2012 Mar;21(2):110–8. DOI:10.1136/tobaccocontrol-2011-050371  
53
- 54  
55  
56  
57  
58  
59  
60

- 1  
2  
3 1 27. Anderson LM, Petticrew M, Rehfuss E, Armstrong R, Ueffing E, Baker P, et al. Using  
4 2 logic models to capture complexity in systematic reviews: Logic Models in Systematic  
5 3 Reviews. *Res Synth Methods*. 2011 Mar;2(1):33–42. DOI: 10.1002/jrsm.32  
6  
7 4 28. Chinman M, Woodward EN, Curran GM, Hausmann LRM. Harnessing implementation  
8 5 science to increase the impact of health equity research: *Med Care*. 2017 Sep;55:S16–23.  
9 6 doi:10.1097/MLR.0000000000000769  
10  
11 7 29. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc*  
12 8 *Res Methodol*. 2005 Feb;8(1):19–32. [DOI.org/10.1080/1364557032000119616](https://doi.org/10.1080/1364557032000119616)  
13  
14 9 30. Joanna Briggs Institute. *Joanna Briggs Institute Reviewer's Manual*. Adelaide, AU: The  
15 10 Joanna Briggs Institute; 2015.  
16  
17 11 31. Khalil H, Peters M, Godfrey CM, McInerney P, Soares CB, Parker D. An evidence-based  
18 12 approach to scoping reviews. *Worldviews Evid Based Nurs*. 2016 Apr;13(2):118–23. DOI:  
19 13 10.1111/wvn.12144  
20  
21 14 32. Daudt HM, van Mossel C, Scott SJ. Enhancing the scoping study methodology: a large,  
22 15 inter-professional team's experience with Arksey and O'Malley's framework. *BMC Med*  
23 16 *Res Methodol*. 2013 Dec;13(1):48. DOI:10.1186/1471-2288-13-48  
24  
25 17 33. Gentzke AS, Creamer M, Cullen KA, Ambrose BK, Willis G, Jamal A, et al. Vital Signs:  
26 18 Tobacco Product Use Among Middle and High School Students — United States, 2011–  
27 19 2018. *MMWR Morb Mortal Wkly Rep*. 2019 Feb 15;68(6):157–64. DOI:  
28 20 10.15585/mmwr.mm6806e1  
29  
30 21 34. *Best Practices for Comprehensive Tobacco Control Programs: 2014*. *Tob Control*.  
31 22 2014;144.  
32  
33 23 35. Hoben M, Berendonk C, Buscher I, Quasdorf T, Riesner C, Wilborn D, et al. Scoping  
34 24 review of nursing-related dissemination and implementation research in German-speaking  
35 25 countries: Mapping the field / Scoping Review zum Stand der pflegebezogenen  
36 26 Disseminations- und Implementierungsforschung in deutschsprachigen Ländern: eine  
37 27 Bestandsaufnahme. *Int J Health Prof*. 2014 Dec 1;1(1):34–49. DOI: 10.2478/ijhp-2014-  
38 28 0002  
39  
40 29 36. Wandersman A, Duffy J, Flaspohler P, Noonan R, Lubell K, Stillman L, et al. Bridging the  
41 30 Gap Between Prevention Research and Practice: The Interactive Systems Framework for  
42 31 Dissemination and Implementation. *Am J Community Psychol*. 2008 Jun;41(3–4):171–81.  
43 32 DOI 10.1007/s10464-008-9174-z  
44  
45 33 37. Washington University in St. Louis. *Dissemination and Implementation at Washington*  
46 34 *University in St. Louis. D & I Toolkits*. Available from: [https://sites.wustl.edu/wudandi/di-](https://sites.wustl.edu/wudandi/di-toolkits/)  
47 35 [toolkits/](https://sites.wustl.edu/wudandi/di-toolkits/)  
48  
49 36 38. Barac R, Stein S, Bruce B, Barwick M. Scoping review of toolkits as a knowledge  
50 37 translation strategy in health. *BMC Med Inform Decis Mak*. 2014 Dec;14(1):121. DOI:  
51 38 10.1186/s12911-014-0121-7  
52  
53  
54  
55  
56  
57  
58  
59  
60

- 1  
2  
3 1 39. Proctor EK, Powell BJ, McMillen JC. Implementation strategies: recommendations for  
4 2 specifying and reporting. *Implement Sci.* 2013;8(1):139. DOI:10.1186/1748-5908-8-139  
5  
6 3 40. Meyers DC, Durlak JA, Wandersman A. The Quality Implementation Framework: A  
7 4 synthesis of critical steps in the implementation process. *Am J Community Psychol.* 2012  
8 5 Dec;50(3-4):462-80. DOI: 10.1007/s10464-012-9522-x  
9  
10 6 41. Saldana L. The stages of implementation completion for evidence-based practice: protocol  
11 7 for a mixed methods study. *Implement Sci.* 2014;9(1):1. DOI:10.1186/1748-5908-9-43  
12  
13 8 42. Institute of Medicine (U.S.), Committee on Quality of Health Care in America. Crossing the  
14 9 quality chasm: a new health system for the 21st century. Washington, D.C.: National  
15 10 Academy Press; 2001. Available from:  
16 11 <http://public.eblib.com/choice/publicfullrecord.aspx?p=3375215>  
17  
18 12 43. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering  
19 13 implementation of health services research findings into practice: a consolidated  
20 14 framework for advancing implementation science. *Implement Sci.* 2009 Dec;4(1).  
21 15 DOI:10.1186/1748-5908-4-50  
22  
23 16 44. Rabin BA, Brownson RC. Developing the terminology for dissemination and  
24 17 implementation research. In: Brownson RC, Colditz GA, Proctor E, editors. *Dissemination  
25 18 and implementation research in health: Translating science into practice.* New York, NY:  
26 19 Oxford University Press; p. 23-51.  
27  
28 20 45. Sales A. Implementation science: How can it support healthcare research? Training in  
29 21 implementation: Actionable research approaches (TIARA). 2019 Jun 19; Kansas City, KA.  
30  
31 22 46. Slaughter SE, Zimmermann GL, Nuspl M, Hanson HM, Albrecht L, Esmail R, et al.  
32 23 Classification schemes for knowledge translation interventions: a practical resource for  
33 24 researchers. *BMC Med Res Methodol.* 2017 Dec;17(1):161. DOI: 10.1186/s12874-017-  
34 25 0441-2  
35  
36 26 47. Chambers D. Forward. In: *Dissemination and implementation research in health:  
37 27 Translating science into practice.* New York; 2012. p. vii-x.  
38  
39 28 48. Dearing JW, Kee K. Historical roots of dissemination and implementation science. In:  
40 29 Brownson RC, Colditz GA, Proctor EK, editors. *Dissemination and implementation  
41 30 research in health: Translating science into practice.* New York: Oxford University Press;  
42 31 2012. p. 55-71.  
43  
44 32 49. Kerner JF, Glasgow RE, Vinson CA. A history of the National Cancer Institute's support for  
45 33 implementation science across the cancer control continuum: Context counts. In:  
46 34 Chambers D, Vinson CA, Norton W, editors. *Advancing the science of implementation  
47 35 across the cancer continuum.* New York, NY: Oxford University Press; 2019.  
48  
49 36 50. Tricco AC, Soobiah C, Antony J, Cogo E, MacDonald H, Lillie E, et al. A scoping review  
50 37 identifies multiple emerging knowledge synthesis methods, but few studies operationalize  
51 38 the method. *J Clin Epidemiol.* 2016 May;73:19-28. DOI: 10.1016/j.jclinepi.2015.08.030  
52  
53  
54  
55  
56  
57  
58  
59  
60

- 1  
2  
3 1 51. Borges LC, Menezes HZ de, Souza IML de. Dilemas na implementação da Convenção-  
4 2 Quadro para o Controle do Tabaco da Organização Mundial da Saúde. Cad Saúde  
5 3 Pública. 2020;36(2):e00136919. DOI: 10.1590/0102-311X00136919  
6  
7 4 52. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension  
8 5 for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. Ann Intern Med. 2018 Oct  
9 6 2;169(7):467. DOI: 10.7326/M18-0850  
10  
11 7 53. Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred Reporting Items for Systematic  
12 8 Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med. 2009;6(7):6. DOI:  
13 9 10.1186/2046-4053-4-1  
14  
15 10 54. Welch V, Petticrew M, Tugwell P, Moher D, O'Neill J, Waters E, et al. PRISMA-Equity 2012  
16 11 Extension: Reporting Guidelines for Systematic Reviews with a Focus on Health Equity.  
17 12 PLoS Med. 2012 Oct 30;9(10):e1001333. DOI:10.1371/journal.pmed.1001333  
18  
19  
20 13  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

Figure 1. Logic model underlying tobacco control program implementation scoping review



1  
2  
3 **1 APPENDIX: Search Strategies**

4 **2 Medline (PubMed)**

5  
6  
7  
8 ("Tobacco Products"[Mesh] OR "Tobacco Use"[Mesh] OR "Tobacco Smoke Pollution"[Mesh]  
9 OR "Smoking"[Mesh] OR tobacco[tiab] OR tobacco use[tiab] OR smoking[tiab] OR second hand  
10 smoke exposure[tiab] OR second hand smoke[tiab] OR tobacco use initiation[tiab] OR smoking  
11 initiation[tiab] OR "Tobacco Use Cessation"[Mesh] OR tobacco control[tw] OR smoking  
12 cessation[mesh] OR smoking cessation[tw])

13  
14  
15  
16  
17  
18 AND

19  
20  
21 ("Smoking Prevention"[Mesh] OR smoking prevention[tw] OR "Health Promotion"[Mesh] OR  
22 health promotion[tw] OR "Health Education"[Mesh] OR health education[tw] OR program[tw] OR  
23 programs[tw] OR intervention[tw] OR interventions[tw] OR "Policy"[Mesh] OR "Smoke-Free  
24 Policy"[Mesh] OR "Social Control Policies"[Mesh] OR "Organizational Policy"[Mesh] OR "Public  
25 Policy"[Mesh] OR policy[tw] OR policies[tw] OR public policy[tw] OR health policy[tw])

26  
27  
28  
29  
30 AND

31  
32  
33 (implementation science[tw] OR implementation[tw] OR "diffusion of innovation"[MeSH Terms]  
34 OR implementation frameworks[tw] OR implementation models[tw] OR implementation study[tw]  
35 OR translational research[tw] OR translational medical research[mesh] OR knowledge  
36 translation[tw])

37  
38  
39  
40  
41 AND

42  
43  
44 (Clinical Trial[ptyp] OR Comparative Study[ptyp] OR Controlled Clinical Trial[ptyp] OR  
45 Evaluation Studies[ptyp] OR Observational Study[ptyp] OR Randomized Controlled Trial[ptyp]  
46 OR "Qualitative Research"[Mesh] OR "Prospective Studies"[Mesh] OR "Cohort Studies"[Mesh]  
47 OR Meta-Analysis[ptyp] OR systematic[sb] OR evaluation studies[ptyp] OR evaluation  
48 studies[tw] OR clinical trial[tw] OR comparative study[tw] OR observational study[tw] OR  
49 qualitative research[tw] OR program evaluation[mesh] OR program evaluation[tw] OR hybrid  
50 design[tw] OR experimental[tw] OR mixed methods study[tw])

51  
52  
53  
54  
55  
56  
57  
58  
59  
60



1 AND ("2000/01/01"[PDAT] : "2020/06/01"[PDAT]) AND English[lang]

2  
3 **CINAHL (EBSCOhost)**

4  
5 (MH "Tobacco+" OR "tobacco" OR MH "Tobacco Products+" OR MH "Passive Smoking" OR  
6 MH "Smoking+" OR "smoking" OR tobacco use OR tobacco smoke pollution OR second hand  
7 smoke OR tobacco use cessation)

8  
9 AND

10  
11 (program OR programs OR intervention OR interventions) AND (MH "Program Implementation"  
12 OR "implementation" OR implementation science OR implementation OR "diffusion of  
13 innovation" OR implementation frameworks OR implementation models OR implementation  
14 study)

15  
16 Limiters - Published Date: 20000101-2020601; Publication Type: Clinical Trial, Meta  
17 Analysis, Randomized Controlled Trial, Research, Systematic Review

18  
19  
20 **EMBASE (OvidSP)**

21  
22 1 tobacco consumption/ or tobacco smoke/ or "tobacco use"/ or tobacco.mp. or tobacco/  
23 (116453)

24  
25 2 second hand smoke.mp. or passive smoking/ (9970)

26  
27 3 smoking/ (222969)

28  
29 4 smoking cessation/ or tobacco cessation.mp. or smoking cessation program/ (46618)

30  
31 5 1 or 2 or 3 or 4 (322595)

32  
33 6 (program or programs or intervention or interventions).mp. [mp=title, abstract, heading  
34 word, drug trade name,

1 original title, device manufacturer, drug manufacturer, device trade name, keyword] (1674770)

2

3 1 2

4 3 7 5 and 6 (47645)

5 4

6 5 8 (implementation science or implementation or "diffusion of innovation" or implementation

7 frameworks or

8 implementation models or implementation study).mp. [mp=title, abstract, heading word, drug

9 trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword]

10 (196216)

11 9 7 and 8 (2385)

12 10 limit 9 to (english language and yr="2000 -Current") (2031)

13 11 limit 10 to ((meta analysis or outcomes research or "systematic review") and (clinical trial

14 or randomized

15 controlled trial or controlled clinical trial or multicenter study)) (17)

16 12 observational study.mp. or observational study/ (117369)

17 13 qualitative research/ or qualitative research.mp. (44130)

18 14 10 and (12 or 13) (58)

19 15 cohort study.mp. or cohort analysis/ (292554)

20 16 10 and 15 (50)

21 17 11 or 14 or 16 (121)

22 18 10 and (meta analysis or outcomes research or "systematic review" or clinical trial or

23 randomized controlled

24

25

26

27

28

29

30

31

32

33

34

35

36

37

38

39

40

41

42

43

44

45

46

47

48

49

50

51

52

53

54

55

56

57

58

59

60

1 trial or controlled clinical trial or multicenter study).mp. [mp=title, abstract, heading word, drug  
2 trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword]  
3 (415)

4  
5 19 14 or 16 or 18 (504)

### 8 **PsycINFO (ProQuest)**

9  
10 (("Tobacco Products" OR "Tobacco Use" OR "Tobacco Smoke Pollution" OR "Smoking" OR  
11 tobacco OR tobacco use OR smoking OR second hand smoke exposure OR second hand  
12 smoke OR tobacco use initiation OR smoking initiation OR "Tobacco Use Cessation") AND  
13 (program OR programs OR intervention OR interventions) AND (implementation science OR  
14 implementation OR "diffusion of innovation" OR implementation frameworks OR implementation  
15 models OR implementation study)) AND (la.exact("ENG") AND stype.exact("Scholarly  
16 Journals") AND me.exact("Empirical Study" OR "Quantitative Study" OR "Qualitative Study" OR  
17 "Followup Study" OR "Longitudinal Study" OR "Treatment Outcome/Clinical Trial") AND  
18 yr(2000-2020))

### 20 **ERIC (ProQuest)**

21 (("Tobacco Products" OR "Tobacco Use" OR "Tobacco Smoke Pollution" OR "Smoking" OR  
22 tobacco OR tobacco use OR smoking OR second hand smoke exposure OR second hand  
23 smoke OR tobacco use initiation OR smoking initiation OR "Tobacco Use Cessation") AND  
24 (program OR programs OR intervention OR interventions) AND (implementation science OR  
25 implementation OR "diffusion of innovation" OR implementation frameworks OR implementation  
26 models OR implementation study))

### 28 **Cochrane Library (Wiley): Database of Systematic Reviews, Central Register of 29 Controlled Trials**

30 '(tobacco cessation OR smoking cessation OR tobacco use OR smoking initiation OR tobacco  
31 OR smoking) in Title, Abstract, Keywords and (implementation OR implementation science OR  
32 implementation models OR implementation frameworks) in Title, Abstract, Keywords and  
33 (programs OR interventions) in Title, Abstract, Keywords in Cochrane Reviews' Limited to  
34 publication dates 2000-2020