Appendices

Appendix A. Summary of Effective CVD Prevention Strategies

		Evidence of Effectiveness						Evidence of Impact		
	Strategy	Effect	Internal Validity	Research Design	Independent Replication	Imple-mentation Guidance	External and Ecological Validity	Health Impact	Health Disparity Impact	Economic Impact
Domain 3: Health Care Systems	Promoting Team-Based Care to Improve Hypertension Control									
	Pharmacy: Collaborative Practice Agreements to Enable Collaborative Drug Therapy Management									
	Self-Measured Blood Pressure Monitoring with Clinical Support									
	Self-Management Support and Education									
	Reducing Out-of-Pocket Costs for Medications									
	Implementing Clinical Decision Support Systems									
Domain 4: Community-Clinical Links	Integrating Community Health Workers on Clinical Care Teams and in the Community									
	Community Pharmacists and Medication Therapy Management									

Well supported/ Supported
Promising/ Emerging
Unsupported/ Harmful
Supported
Moderate
Insufficient

Appendix B. Rapid Synthesis and Translation Process (RSTP)

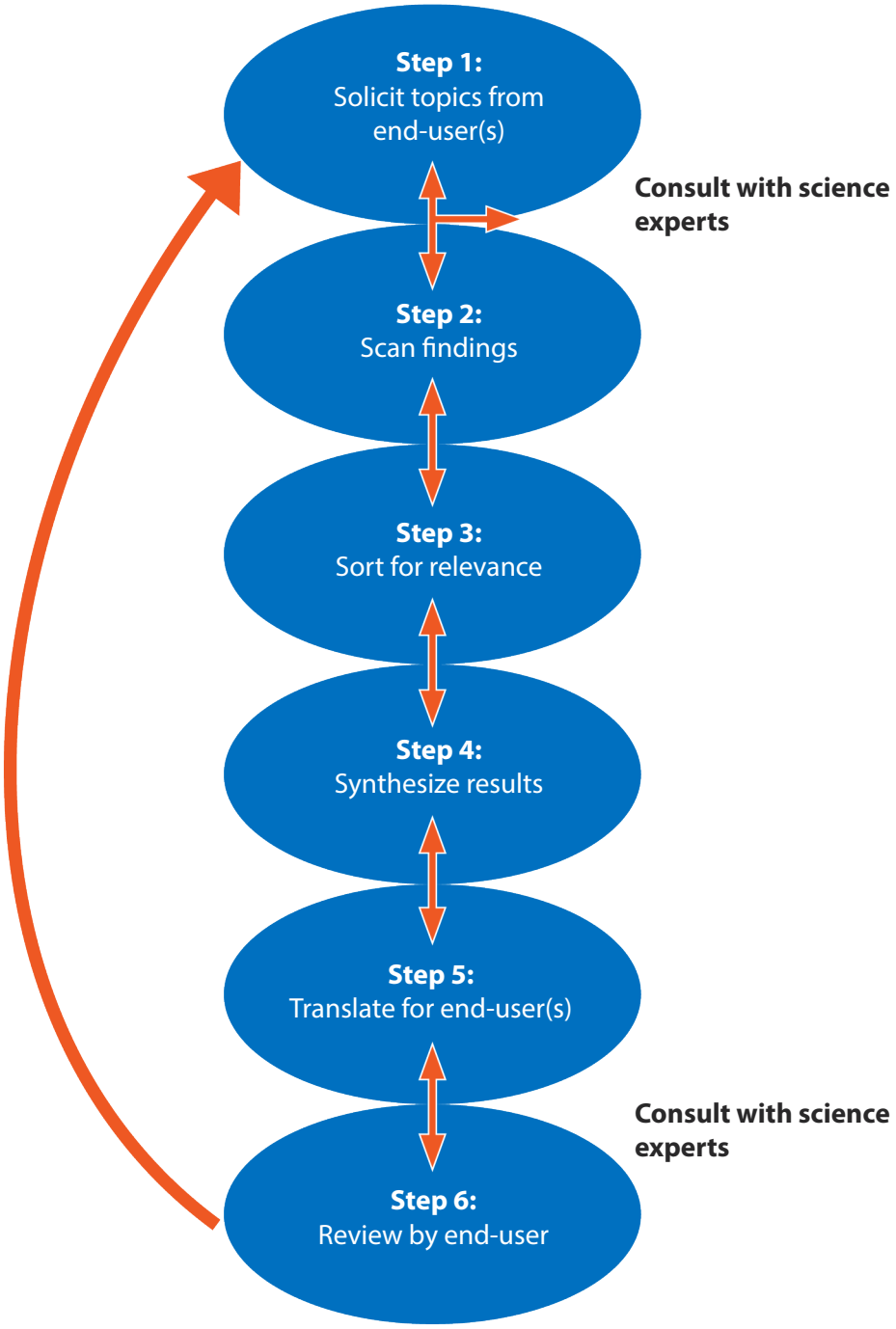
As part of the process of developing the *Best Practices Guide for CVD Prevention*, we adapted the Rapid Synthesis and Translation Process (RSTP) to provide a structure for engaging both subject matter experts (SMEs) and health care practice partners. This conceptual process, developed within CDC's Division of Violence Prevention in the National Center for Injury Prevention and Control, consists of six fundamental steps (Figure 2), which do not necessarily occur in chronological order.

The following steps and related definitions are applied in our adaptation of the RSTP framework:

- **Step 1: Solicit Topics from End Users —** For the *Best Practices Guide for CVD Prevention*, "end users" were grantees (health care practitioners), evaluators (internal), content SMEs (internal and external), and program specialists (internal).
- **Step 2: Scan Findings —** The *Best Practices Guide for CVD Prevention* development team in CDC's Division for Heart Disease and Stroke Prevention (DHDSP) reviewed the research literature to identify evidence-based strategies for preventing cardiovascular disease (CVD). The strategies determined to be potential best practices were moved to Step 3.
- **Step 3: Sort for Relevance —** Criteria for including strategies in the *Best Practices Guide for CVD Prevention* were determined according to an internal vetting process that included division and branch leadership, internal SMEs, and external SMEs. A group of grantees was also asked to identify practice-based relevance for each strategy.
- **Step 4: Synthesize Results —** Internal SMEs used the Continuum of Evidence of Effectiveness to assess the evidence behind the identified strategies. This interactive, online tool uses a series of questions about each strategy to place it on a continuum of six dimensions of evidence (see Appendix C for more information). Once this baseline assessment of the evidence was done, only strategies with results and methodology in the highest category (i.e., supported or well-supported) were considered further. The availability of implementation guidance was not a requirement for inclusion. Selected strategies were then reviewed for fit with the best practices framework to assess their potential to improve cardiovascular health, reduce health disparities, and demonstrate economic sustainability.
- **Step 5: Translate to End User(s) —** A small team in DHDSP used the data collected from the SME assessments, the best practice framework review, and additional input from internal program and evaluation experts to draft the *Best Practices Guide for CVD Prevention*.
- **Step 6: Review by End User(s) —** Standard processes for clearance by CDC and the US Department of Health and Human Services were initiated after additional review by a panel of grantees, SMEs, and other potential end users.

For more information on the best practices framework, see Spencer LM, Schooley MW, Anderson LA, et al. Seeking Best Practices: A Conceptual Framework for Planning and Improving Evidence-Based Practices. *Prev Chronic Dis*. 2013;10:130186. doi: http://dx.doi.org/10.5888/pcd10.130186.

Figure 2. Rapid Synthesis and Translation Process (RSTP)



Adapted figure from: Thigpen S, Puddy RW, Singer HH, Hall DM. Moving knowledge into action: developing the Rapid Synthesis and Translation Process within the Interactive Systems Framework. *Am J Community Psychol*. 2012;50(3-4):285–294.

Appendix C. Understanding the Continuum of Evidence of Effectiveness Tool

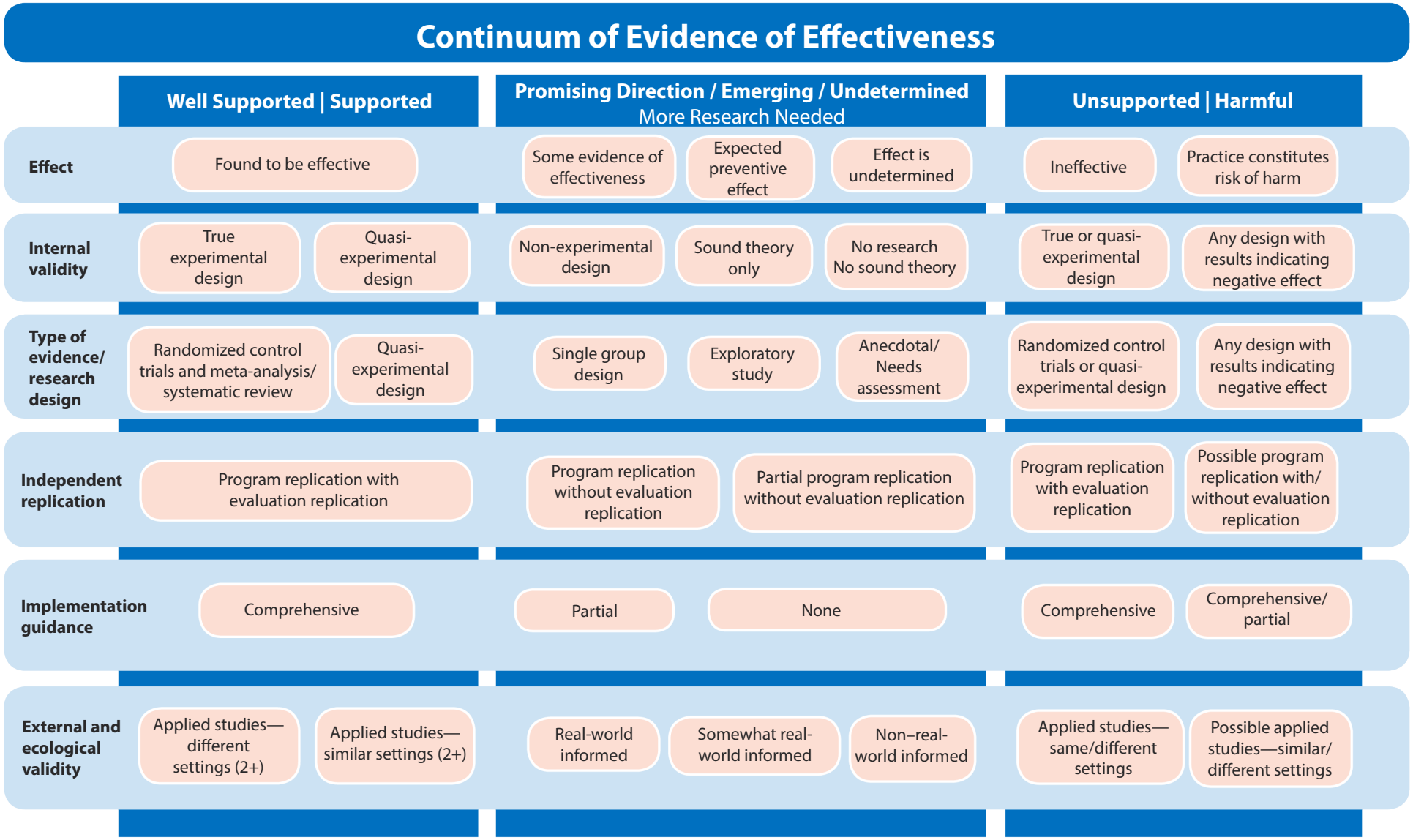
The Continuum of Evidence of Effectiveness (hereafter called the Continuum) tool clarifies and defines standards for assessing research evidence. Because of its ability to determine the strength of evidence on the basis of a clear and universal set of standards, the Continuum was chosen as the mechanism to rate the evidence behind the strategies included in the *Best Practices Guide for CVD Prevention*. This interactive, online tool was developed in 2007 by CDC's Division of Violence Prevention in the National Center for Injury Prevention and Control. The division needed a way to provide coherent and consistent language around the word "evidence" in programmatic activities. Division staff synthesized information about program effectiveness from the research literature, subject matter experts, and practitioners with experience implementing strategies in the field. This information guided the development of the Continuum, which assesses various components to determine the strength of the best available research evidence on a program, practice, or policy. The Continuum also illuminates the strengths and weaknesses of the research evidence and offers guidance on next steps for consideration.

Although this tool was developed to be applied specifically to the field of violence prevention, it can be used to guide evidence-based decision making in a wide range of health-related areas. In developing the *Best Practices Guide for CVD Prevention*, two knowledgeable reviewers used this tool to rate the evidence for each strategy considered for inclusion in this publication. Any discrepancies between the reviewers' results were resolved through discussion.

The structure and range of possible results from the Continuum tool are shown in Figure 3. The Continuum has six evidence dimensions, which are listed vertically down the left side of the figure. It has three overarching categories of evidence strength, which are listed horizontally across the top of the figure. The Continuum uses the reviewer's input for a specific program or strategy to determine the strength of evidence for each dimension and assign a corresponding strength category for each dimension. The full range of responses for each dimension is shown in Figure 3. Definitions and possible results for the six dimensions are provided in a table after the figure.

For more information about the Continuum of Evidence of Effectiveness, see CDC's 2011 publication, *Understanding Evidence Part 1: Best Available Research Evidence. A Guide to the Continuum of Evidence of Effectiveness*.

Figure 3. Continuum of Evidence of Effectiveness



Adapted figure from: Puddy, R. W. & Wilkins, N. (2011). *Understanding Evidence Part 1: Best Available Research Evidence. A Guide to the Continuum of Evidence of Effectiveness*. Atlanta, GA: Centers for Disease Control and Prevention.

Table 1. Possible Results and Definitions of the Six Dimensions of the Continuum of Evidence Effectiveness Tool

Dimensions and Possible Results	Definitions
Effect: The strategy's ability to reduce cardiovascular disease (CVD) or related risk factors or outcomes.	
Found to be effective 	Prevention strategies that are found to be effective are those that are based on sound theory, have been evaluated in at least two well-conducted studies, and have demonstrated significant, short-term or long-term preventive effects, depending on intent and design.
Some evidence of effectiveness 	Some programs may not have two or more rigorous evaluations to demonstrate short-term or long-term preventive effects, but they are based on sound theory and have been rigorously evaluated, and the results indicate that they may produce preventive outcomes.
Expected preventive effect 	Some programs may be grounded in theory and have been evaluated with a less rigorous design, or they may have been evaluated for short-term or long-term preventive effects that are different from the outcomes of interest.
Effect is undetermined 	Prevention programs that have not been evaluated or that have been evaluated poorly (with neither a true nor quasi-experimental design), whether or not they are based on sound theory, are considered to have undetermined effectiveness. It is not known whether these programs produce short-term or long-term preventive effects.
Ineffective 	Ineffective strategies are those that have been evaluated in at least two well-conducted studies and have demonstrated no significant short-term or long-term outcomes in these evaluation studies.
Practice constitutes risk of harm 	A prevention strategy is considered to be harmful if there is an indication that it causes harmful outcomes. This includes short-term outcomes, long-term outcomes, and/or unexpected outcomes. These harmful outcomes may be due to the inherent nature of the program, its implementation, an interaction with certain population-related factors, or an interaction with certain context/setting-related factors.
Internal Validity: The extent to which the short-term and long-term outcomes of a strategy can truly be attributed to the strategy itself.	
True experimental design 	True experiments are considered highest in internal validity because participants are randomly assigned to the treatment and control conditions. This helps assess whether the program, practice, or policy is likely responsible for changes in outcomes or if something else could be causing them. The strongest experimental designs also have multiple measurement points. These experiments are able to measure not only differences in outcomes between treatment and control groups, but also changes in outcomes over time. This helps to assess whether the demonstrated effects are sustained over time.
Quasi-experimental design 	Quasi-experiments are also considered to have high internal validity, although less so than true experiments. Quasi-experiments are based on sound theory and typically have comparison groups (but no random assignment of participants to condition) and/or multiple measurement points. Some quasi-experimental designs are used to evaluate policy changes or naturally occurring experiments. These evaluations may not have a comparison group but include multiple waves of observation both before and after the introduction of a treatment.

Dimensions and Possible Results	Definitions
Nonexperimental design 	Relative to experimental and quasi-experimental designs, nonexperimental studies are the weakest of the three in terms of internal validity. Even though these designs are not as rigorous as true and quasi-experiments, they may still be based on sound theory and include some empirical aspects geared toward internal validity. Nonexperimental studies do not have a control or comparison group or multiple measurement points, making it difficult to attribute observed changes to the program.
Sound theory only 	Prevention programs based on sound theory only are also unable to establish or attribute observed changes to the program as those based on experimental or quasi-experimental studies. These programs are often exploratory in nature and are rooted in well-established research and subject matter expert opinion, suggesting that the program and/or its components may modify known risk or protective factors and produce preventive outcomes.
No research, no sound theory 	Programs not based on research or sound theory are considered weakest of all in terms of establishing an empirical link to a preventive outcome. In the absence of research or sound theory, there is no evidence to suggest that they are likely to modify known risk/protective factors or produce preventive outcomes. Some, however, may have face validity. This type of validity is concerned with how a measure or procedure appears and whether it seems reasonably well designed and reliable. Unlike other forms of validity, face validity does not depend on established theories for support.
Research Design: The soundness of individual research method components.	
Randomized control trial and meta-analysis or systematic review 	Randomized control trials are true experiments and considered a highly rigorous research design. They are the strongest research design for establishing a cause-effect relationship. Randomized control trials have a control group and randomly assign participants to the control or treatment condition. Systematic reviews collect information from a number of scientific studies on a specific topic for the purpose of summarizing, analyzing, and interpreting the overall scientific findings on that topic. A meta-analysis is a type of systematic review that uses statistical analyses to combine and analyze the data from single scientific studies on a specific topic and uses these combined findings to generate a single estimate or effect size to make more conclusive statements about the topic. The strongest reviews are conducted independently, consist of studies that were conducted independent from one another, consist of studies that are comparable, and include some form of empirical analysis to draw broader, general conclusions about the effectiveness of a strategy.
Quasi-experimental design 	If a design uses multiple groups without random assignment or includes multiple measurement points, it is considered quasi-experimental. Quasi-experimental designs are considered rigorous designs, although not as rigorous as randomized control trials because participants are not randomly assigned to treatment and control conditions and may not be equivalent from the start. In this respect, they are weaker in controlling threats to internal validity than randomized control trials.
Single group design 	The single group design is not considered as rigorous as the randomized control trial or quasi-experimental designs because it does not include a control or comparison group. Single group designs may also have just one post-measure or they may include pre- and post-measures.

Dimensions and Possible Results	Definitions
Exploratory studies 	Exploratory studies are focused on learning about a program and the phenomena it addresses. Exploratory studies are based on sound theory derived from prior research and/or knowledge from subject matter experts. The information gleaned from an exploratory study may point to risk and protective factors that are potentially important to consider in developing or refining a prevention strategy or its components. Some descriptive and observational studies may also be considered exploratory studies.
Anecdotal or needs assessment 	Studies not based on empirical research or sound theory are the weakest with respect to research design. Studies that are based on anecdotal information, needs assessments, or windshield surveys are examples of this kind of research.
Independent Replication: Implementation and evaluation of a program by researchers or practitioners who were unaffiliated with the original program and who do not have any known conflicts of interest.	
Program replication with evaluation replication 	Programs that demonstrate the most reliability (ability to repeatedly produce the preventive effects) are those that have been replicated at least once by independent researchers or practitioners, in a similar setting to the original program, using a rigorous research design, and with high fidelity to the original program.
Program replication without evaluation replication 	Programs that demonstrate some reliability are those implemented with high fidelity to the original program and in settings that are similar to the setting of the original program. These replications may or may not be conducted by independent researchers/practitioners. Finally, these replications have not been evaluated in the same way as the original evaluation of the program.
Partial program replication without evaluation replication 	Programs that demonstrate weak reliability are those that are partially replicated and have not been evaluated. These replications may or may not be conducted by independent researchers/practitioners. Programs that are the weakest in reliability are those that are not replicated at all since there is no way to measure their reliability.
Possible program replication with or without evaluation replication 	If a program demonstrates harmful effects, it should not be replicated. In some cases, harmful effects may not have occurred during the original implementation of a prevention strategy but may occur in its replication. Evaluations may or may not have been conducted of this replication since a formal evaluation is not needed to prove harm. Once harmful effects have been associated with a program, either in the original or during a replication, no subsequent replications should be conducted.
Implementation Guidance: The availability of any and all services or materials that could help in the implementation of a strategy in different settings.	
Comprehensive 	Comprehensive guidance is the most effective way of ensuring that a program is carried out with fidelity in a different setting. This entails availability and accessibility of any products, services, or activities that facilitate proper implementation in a new setting. These products and services include training, coaching, technical assistance, support materials, organizational/systems change consultation, and manuals/guides, and may be offered by the program's developers or some other entity.
Partial 	For some programs, there may be some products, services, or activities to help researchers/practitioners implement them in different settings, but they may be limited in their availability and accessibility. It is important to note that since implementation support and guidance are limited for these programs, there is a chance that implementation issues may be influencing outcomes.
None 	Programs that do not have any products, services, or activities available to help researchers/practitioners implement them in a different setting run a high risk of experiencing implementation issues. This also means there is a significant chance that implementation issues may be influencing outcomes.

Dimensions and Possible Results	Definitions
External and Ecological Validity: Whether a program has been evaluated among diverse populations and in different contexts.	
Two or more applied studies: different settings 	Programs that demonstrate the highest external and ecological validity are those that have been implemented in two or more applied ("real-world") settings that are distinct from both the original setting and each other in terms of their populations and physical/geographical locations.
Two or more applied studies: same settings 	Some programs have been implemented in two or more applied ("real-world") settings that are similar to one another with similar populations. These prevention strategies demonstrate moderate external and ecological validity although not as much as those implemented in two or more settings that are different and that have different populations.
Real-world–informed 	Programs that have not been implemented in applied settings may still demonstrate some external and ecological validity if they are made up of components that are consistent with an applied setting. Likewise, programs may demonstrate external and ecological validity if they are implemented in ways that mirror conditions of the "real-world."
Somewhat real-world–informed 	Some programs have not been implemented in applied settings and are not structured and implemented in ways that are completely consistent with an applied setting. These prevention strategies demonstrate some external and ecological validity if some of their components and implementation approximate conditions in the "real world."
Not real-world–informed 	Programs that demonstrate the least amount of external and ecological validity are those whose basic components are not consistent with an applied setting and are not implemented in ways that mirror conditions of the "real world." While it is not known whether these programs will be effective in applied settings, there is no way to measure which aspects work well across different settings and populations or which aspects are setting-specific.
Possible applied studies in similar or different settings 	Programs that demonstrate harm in any kind of a setting, applied or otherwise, are considered harmful. In other words, the program is considered harmful regardless of whether or not it has been conducted in an applied setting.

Appendix D. Glossary

Best practice: A practice supported by a rigorous process of peer review and evaluation indicating effectiveness in improving health outcomes, generally demonstrated through systematic reviews.

Best practices framework: A conceptual framework that includes important aspects of impact and quality to provide a common lexicon and criteria for assessing and strengthening public health practice.

Clinical decision support system (CDSS): A program that analyzes data entered into an electronic health record to trigger reminders, flags, and treatment protocols to help health care providers make clinical decisions.

Collaborative drug therapy management (CDTM): Qualified pharmacists are permitted to assume professional responsibility for performing a full scope of services (e.g., ordering drug-therapy laboratory tests; administrating drugs; and selecting, initiating, monitoring, continuing, and adjusting drug regimens). Authority of CDTM is defined in the state's pharmacy practice within the scope of practice section.

Collaborative practice agreements (CPAs): A strategy to expand the pharmacist's role in team-based care with other providers and improving health outcomes. The range of services authorized under each state's practice act varies.

Community Guide (The Guide to Community Preventive Services): A resource with a collection of evidence-based findings from the Community Preventive Services Task Force (Task Force). This resource was created to help states, communities, community organizations, business, health care organizations, and schools select interventions to improve health and prevent disease.

Community health worker (CHW): The American Public Health Association defines a CHW as a "frontline public health worker who is a trusted member of and/or has an unusually close understanding of the community being served. This trusting relationship enables the CHW to serve as a liaison/link/intermediary between health/social services and the community to facilitate access to services and improve the quality and cultural competence of service delivery. In addition, a CHW builds individual and community capacity to improve health outcomes by increasing health knowledge and self-sufficiency through a range of activities such as outreach, community education, informal counseling, the provision of social support and advocacy."

Community Preventive Services Task Force (Task Force): An independent, nonfederal, unpaid panel of public health and prevention experts that provides evidence-based findings and recommendations about community preventive services, programs, and policies to improve health. Findings are summarized within the Guide to Community Preventive Services. The Task Force issues findings based on systematic reviews of effectiveness and economic evidence that are conducted with a methodology developed by the Community Guide Branch, which is based at CDC.

Community programs linked to clinical services: A term to describe connecting community programs with health care systems to improve disease prevention, care, and management.

Continuum of Evidence of Effectiveness: A tool to describe and assess various components in determining the strength of the best available research evidence on a program, practice, or policy's effectiveness. It illuminates the strengths and weaknesses of the research evidence and offers guidance on next steps for consideration. It consists of six dimensions, each of which addresses a specific aspect of the best available research evidence (e.g., effect, internal validity, research design, independent replication, implementation guidance, and external and ecological validity).

Effect: One of the six dimensions of CDC's Continuum of Evidence of Effectiveness. Effectiveness is important because it tells us whether a prevention strategy is having an impact on the outcomes of interest. The most effective strategies produce preventive effects in the short term, long term, or both. The effectiveness of a strategy is based on its intent and design.

E-Prescribing: A prescriber's ability to electronically send an accurate, error-free and understandable prescription directly to a pharmacy from the point-of-care. This is an important element in improving the quality of patient care.

External ecological validity: One of the six dimensions of CDC's Continuum of Evidence of Effectiveness. External validity refers to whether a program, practice, or policy can demonstrate preventive effects among a wide range of populations and contexts. Ecological validity refers to whether the program components and procedures approximate the "real-life" conditions specific to a specific setting.

Health care system interventions: Effective delivery and use of quality care and preventive services in clinical settings.

Implementation guidance: One of the six dimensions of CDC's Continuum of Evidence of Effectiveness. This includes any and all services and/or materials that aid in the implementation of a prevention strategy in a different setting, including but not limited to "training, coaching, technical assistance, support materials, organizational/systems change consultation, and manuals/guides."

Independent replication: One of the six dimensions of CDC's Continuum of Evidence of Effectiveness. This helps determine whether or not a prevention program can be replicated and implemented with other participants, and produce the same effects. Independent replications are not used to determine whether a program can be successfully generalized to a broad variety of settings or populations.

Internal validity: One of the six dimensions of CDC's Continuum of Evidence of Effectiveness. This refers to the extent to which the short-term and/or long-term outcomes of a program, practice, or policy can truly be attributed to it or if these outcomes could have been caused by something else.

Medication therapy management (MTM): According to the American Pharmacists Association (APhA), "MTM is a service or group of services that optimize therapeutic outcomes for individual patients. Medication therapy management services include medication therapy reviews, pharmacotherapy consults, anticoagulation management, immunizations, health and wellness programs and many other clinical services. Pharmacists provide medication therapy management to help patients get the best benefits from their medications by actively managing drug therapy and by identifying, preventing and resolving medication-related problems."

Public health domains of chronic disease prevention: Four key domains of CDC's National Center for Chronic Disease Prevention and Health Promotion, which include (1) epidemiology and surveillance, (2) environmental approaches, (3) health care system interventions, and (4) community programs linked to clinical services.

Rapid Synthesis and Translation Process (RSTP) Framework: A six-step process developed by and for CDC's Division of Violence Prevention in collaboration with partners in order to expedite the transfer of research knowledge to practitioners, specifically to prevent violence. The six-steps include the following: (1) topics suggested by end user(s); (2) scan findings; (3) sort for relevance; (4) synthesize results; (5) translate for end user(s); and (6) end user expert review.

Self-measured blood pressure monitoring (SMBP): The regular measurement of blood pressure by the patient outside the clinical setting, either at home or elsewhere. It is sometimes known as "home blood pressure monitoring."

Team-based care: Team-based health care is the provision of health services to individuals, families, and/or their communities by at least two health providers who work collaboratively with patients and their caregivers—to the extent preferred by each patient—to accomplish shared goals within and across settings to achieve coordinated, high-quality care.

Type of evidence or research design: One of the six dimensions of CDC's Continuum of Evidence of Effectiveness. The nature of the design of the research study determines whether and how to answer the research questions related to effectiveness. The more rigorous the research design, the higher its internal validity and the more likely outcomes can be attributed to the program, practice, or policy.