The development of a framework to integrate evidence into a national injury prevention strategy

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ABSTRACT

Background Injury is the leading cause of death from birth to age 34 in Canada (Statistics Canada, 2008). In 2013, a national injury prevention organization in Canada initiated a research-practitioner collaboration to establish a framework for incorporating evidence in the organization’s decision-making. In this study, we outline the development process and provide an overview of the framework.

Methods The process of development of the evidence-synthesis framework included consultation with national and international injury prevention experts, a review of the research literature to identify existing models for incorporating research evidence into public health practice and extensive interactions with the organization’s leadership and staff.

Results A framework emphasizing four types of research evidence was recommended: (i) epidemiologic evidence describing the burden and cause of injury, (ii) evidence concerning the effectiveness of interventions, (iii) evidence on effective methods for implementing promising interventions at a population level, and (iv) evidence and theory from the behavioral sciences. Through the evidence-synthesis process the framework prioritizes highly synthesized evidence-based strategies and draws attention to important research gaps.

Conclusions This study describes a novel opportunity to operationalize an organization’s commitment to integrate evidence into practice. The framework provides guidance on how to use evidence strategically to maximize the potential impact of prevention efforts. Opportunities for further evaluation and dissemination are discussed.

Keywords action research, models, public health

Background

Injury is the leading cause of death from birth to age 34 years in Canada,1 and leaders in the field of injury prevention have called for a national strategy. In 2013, Parachute, an injury prevention NGO in Canada initiated a research-practitioner collaboration to establish a framework for incorporating research evidence into the organization’s strategic planning and program decision-making. In this study, we outline the development process and provide an overview of an evidence-synthesis framework.

Parachute is a national injury prevention charity in Canada that was created in July 2012 through the amalgamation of four organizations that had over 80 years of collective experience in injury prevention. The establishment of Parachute created a unique opportunity to embed evidence-informed decision-making into the organization. This commitment was explicit in the organization’s inaugural Strategic Plan. Parachute then recruited two early-career public health scientists to develop an evidence-synthesis framework that
would guide the organization’s efforts to reduce the burden of preventable injury in Canada.

The process of development of the evidence-synthesis framework included consultation with national and international injury prevention experts, a review of the literature to identify existing models for incorporating research evidence within an injury prevention strategy and extensive interactions with Parachute’s leadership and staff. A framework emphasizing four types of research evidence was recommended: (i) epidemiologic evidence describing the burden and causes of injury, (ii) evidence on the effectiveness of interventions, (iii) evidence on effective methods for implementing interventions at a population level and (iv) evidence and theory from the behavioral sciences on the mechanisms behind intervention components that modify behavioral objectives. The framework prioritizes evidence-based strategies and also draws attention to important research gaps. We introduce the elements of the framework in Fig. 1. The objective of this study is to describe the setting and processes that influenced the development of this innovative framework.

The process

Parachute’s Strategic Plan has set a 3-year milestone of a 25% reduction in the frequency of injury in Canada. The evidence-synthesis framework was developed to align with six areas of focus to achieve this goal: (i) strategy development, (ii) prevention programming, (iii) raising awareness, (iv) influencing public policy, (v) influencing research priorities and (vi) strengthening data for monitoring injury trends. The following

![Fig. 1 Evidence-synthesis framework for injury prevention practice.](image-url)
sections highlight the influence of expert consultations, literature review and staff engagement in the development of the framework.

**Consultations with key informants**

We conducted interviews with 18 key informants from academic and non-academic injury prevention organizations within Canada (including the British Columbia Research and Prevention Unit, the Atlantic Collaborative in Injury Prevention, the Alberta Centre for Injury Control and Research, the Public Health Agency of Canada and the New Brunswick Trauma Program) and internationally (the Center for Disease Control and Prevention and the European Child Safety Alliance) to learn about existing frameworks that integrate evidence into decision-making processes. We also reviewed existing national and international injury prevention strategies. Two types of tools were identified in our networking process: frameworks that guide a priority setting process to integrate different types of evidence to select injury problems for strategic planning purposes and guidance on how to make decisions around the level of evidence for prevention strategies. Prioritization strategies involved selecting criteria making comparison across options; applying weights to those criteria and scoring each option based on performance. From the networking process we learned that existing strategies to integrate evidence into decision-making processes did not support the full spectrum of prevention activities. Furthermore, some organizations reported that it had been difficult to sustain evidence-based decision-making processes over time suggesting challenges in adoption, feasibility, and sustainability.

The key informant interviews reinforced the need for a new framework to synthesize evidence across a range of injury prevention activities. The two main strategies that organizations were using were perceived to be important for inclusion in the evidence-synthesis framework; however, there was recognition that processes would have to be feasible and sustainable overtime.

**Review of existing models for public health planning**

A broad scoping review of the literature was conducted to identify models, frameworks or general approaches to integrate evidence into decision-making processes across the following themes: priority setting, program design, evaluation, dissemination and implementation. Existing models that were identified were evaluated according to the level of flexibility of the model constructs. We also determined whether existing frameworks or models were designed specifically for decision-making at the individual, organizational, community, or systems level, whether elements of critical appraisal were included, whether the tool came with any resources and whether the model was associated with an existing theory or related framework. Our goal was to identify an existing comprehensive framework that would provide guidance on the integration of evidence across the full spectrum of prevention activities carried out by Parachute.

Four public health frameworks were identified that met the requirements of our search and helped frame an initial conception of the evidence-synthesis framework. These included the public health approach, the evidence-informed public health movement, the PRECEDE–PROCEED model and the RAND ‘getting to outcomes’ model. These frameworks were evaluated for their alignment with Parachute’s mandate and goals. Gaps and limitations inherent in the use of these existing frameworks provided the foundation for developing the evidence-synthesis framework introduced in this study. For each of the four public health frameworks, Table 1 highlights specific strengths, an example of a previous application in injury prevention and specific elements that informed Parachute’s evidence-synthesis framework.

The **public health approach** includes five functional steps: surveillance, research on risk and protective factors, research on interventions, program and policy implementation, and monitoring and evaluation. The approach provided limited details on how to operationalize each of these steps. Furthermore, additional guidance was needed on the synthesis of evidence to support the mobilization of strategies and to support the strategic use of evidence for priority setting.

The **evidence-based public health movement** also influenced the evidence-synthesis framework. While the movement has not produced an evidence-synthesis model, there are a number of principles within this movement that were perceived to be instrumental for Parachute to adopt. To align with the evidence-informed public health movement one needs to consider the quality of evidence, levels of evidence and adopt a more systematic approach to gathering and synthesizing evidence for practice.

The **PRECEDE–PROCEED model** is a widely known model in health promotion and public health program planning. The model describes a series of phases in the planning, implementation and evaluation of programs and also incorporates considerations around priority setting. There was a discrepancy in the alignment between this model and the scope of Parachute’s prevention work. The PRECEDE–PROCEED model is designed to guide the user through a process to develop a new prevention program. As Parachute is faced with competing opportunities we saw value in focusing on the identification of existing evidence-based strategies for mobilization.

The **RAND Getting to Outcomes model** was developed as a guide for public health practitioners. It includes 10 steps...
that incorporate planning, implementation and evaluation of prevention programs. Where the PRECEDE–PROCEED model is focused on the design of novel programs, the RAND model emphasizes the identification of ‘existing programs and best practices worth copying’. For an organization with competing opportunities and the opportunity to mobilize prevention strategies nationally, a focus on the identification and appraisal of programs and practices with established effectiveness was recognized as an important component of the Parachute evidence-synthesis framework. The RAND model also emphasized the adaptation of evidence-based strategies to meet the needs of a target population. This model provided significant utility in defining the scope of the evidence-synthesis framework; however, through our interactions with the organization we identified the need to rethink the placement of priority setting. The RAND model recommends that one define their goals, target population and outcomes prior to identifying existing programs and best practices worth implementing. The evidence-synthesis framework described in this study places priority setting after completing a high level synthesis of risk and protective factors and evidence-based strategies for a defined injury problem. The value of this approach will be described in the next section.

### Engagement with Parachute leadership and staff

An interactive engagement with Parachute leadership and staff, using the principles of appreciate inquiry, informed the modification of existing public health models to define an evidence-synthesis framework aligned with Parachute’s mandate and goals. We used a ‘collective discovery process’ (p. 2) to assess the applicability of the framework, and how the framework would exist within the existing organizational structure. At the onset of the framework development process, opportunities for collaboration, interviewing, discussions and presentations about the project and process were carried out with staff across the organizational hierarchy.

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<table>
<thead>
<tr>
<th>Model/approach</th>
<th>Strengths</th>
<th>Applications in injury prevention</th>
<th>Application to the framework</th>
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<tbody>
<tr>
<td>Public health approach</td>
<td>Draws attention to the importance of establishing evidence on the underlying determinants of injury risk. Describes a broad range of important public health prevention activities</td>
<td>The Center for Disease Control and Prevention has used the public health approach to identify important efforts needed to reduce the impact of traumatic brain injuries in the USA. All steps of the public health approach have been integrated into the framework (surveillance, research on risk and protective factors, prevention strategies and implementation best practices; and ongoing evaluation and monitoring)</td>
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<td>Evidence-based public health movement</td>
<td>Emphasizes the systematic identification and critical evaluation of the quality of different types of evidence that informs public health practice</td>
<td>The evidence-based public health movement has been applied to support recommendations for the U.S. Military on the effectiveness of injury prevention efforts.</td>
<td>The core components integrated into the framework provided the foundation of systematic use of evidence including: integration of different types of evidence, critical appraisal and evaluating the state of the evidence.</td>
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<tr>
<td>PRECEDE–PROCEED</td>
<td>Theoretically grounded and comprehensive in providing guidance in the areas of planning, implementation and evaluation. One of the most widely known program planning models with a number of applications</td>
<td>The PRECEDE–PROCEED model has been applied to support planning of child pedestrian injury prevention programs.</td>
<td>Core components integrated into the framework included epidemiological assessment and identification of risk and protective factors. The administrative and policy assessment phase informed the priority setting stage. The connections made between the PRECEDE planning steps and PROCEED evaluative activities informed the evaluation section of the evidence-synthesis framework.</td>
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<tr>
<td>RAND Getting to Outcomes</td>
<td>Theoretically grounded model that provides guidance across the full spectrum of prevention activities. Has been described as a user-friendly process incorporating a number of tools to support implementation</td>
<td>The Getting to Outcomes framework has been used for prevention strategy targeting underage drinking.</td>
<td>The RAND model informed the inclusion of guidance around mobilization of effective interventions including considerations around the adaptation of evidence-based strategies to align with the needs of a target population.</td>
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From early interactions with Parachute leadership and staff, it was recognized that priority setting would be an important component of the evidence-synthesis framework. Priority setting is not always consistently integrated within public health models. Among those models that do outline a priority setting stage, it tends to be placed early in the planning process. For example, the RAND model implicitly recommends a priority setting strategy that starts with defining the target population. The PRECEDE–PROCEED model recommends prioritization of risk and protective factors, prior to the behavioral and environmental assessment phase.

To align with the organization’s goal to mobilize a number of evidence-based strategies with high-impact potential, we saw value in delaying the priority setting process until information was collected on a wide range of available evidence-based strategies. The Parachute evidence-synthesis framework places priority setting at the core of the framework. The Parachute framework ‘flips’ the priority setting process upside down, first synthesizing available evidence on intervention options before specifying the target populations.

For an organization with competing opportunities and an ambitious prevention goal, we saw value in placing more emphasis on the impact of proven, effective interventions. The value would come from identifying evidence-based strategies with sufficient levels of evidence (i.e. what we know works) and prioritizing intervention option based on impact potential in addition to other important considerations related to feasibility and implementation complexity. This strategy provides an opportunity to identify proven interventions with high-impact potential for active mobilization across Canada.

The interviews with staff were used to acquire a detailed understanding of how the organization and individuals within the organization currently identified and used information and what was expected from the development of an evidence-synthesis framework.

Another unique component of the evidence-synthesis framework that was directly influenced by having an integrated and reflexive exchange with the organization was to integrate a process to identify research gaps and mobilize opportunities to evaluate promising strategies. One of the concerns expressed by Parachute staff was ‘missing opportunities’ to support innovative ideas in the community by excluding promising strategies that target emergent and important risk and protective factors. It was recognized that there was an opportunity in the existing evidence-synthesis process to identify and draw attention to research gaps. Promising strategies that have limited evidence of effectiveness yet target important risk or protective factors should be acknowledged and receive support for further attention and evaluation.

The evidence-synthesis framework

The evidence-synthesis framework model is outlined in Fig. 1. Detailed guidance on the processes, resources and tools to operationalize the evidence-synthesis framework is outlined in an evidence-synthesis manual. The framework functions within a context of on-going research exchange, using a participatory approach that involves stakeholders across the spectrum of prevention activities. These members include knowledge translation coordinators, practitioners, researchers and community members, relying on input and collaboration throughout the process. The framework integrates four types of evidence, triangulated to provide insight from both a quantitative and qualitative perspective. The use of the term ‘type’ of evidence is not to be aligned with ‘levels’ of evidence, it is specific to the type of information collected.

Type I evidence is reviewed at the epidemiological assessment phase and refers to information on incidence and prevalence of injury problems and risk and protective factors as well as the size and strength of associations between risk and protective factors and injury outcomes. Type II evidence is assessed at the next stage of the model referring to information on the relative effectiveness of interventions. Type III evidence is assessed at a stage termed ‘strategy mobilization’: an evidence-synthesis stage that serves to collect information that will promote fidelity, adaptation, successful implementation and sustainability of evidence-based strategies. A fourth type of evidence is also proposed (Type IV evidence) to guide the development of the program theory at the solution mobilization stage. Evidence and theory from the behavioral sciences literature can support the identification of the mechanisms behind intervention components that modify behavioral objectives supporting the design of prevention strategies. The operationalization of the use of all four types of evidence highlighted in this model includes a process of on-going evidence gathering, synthesis, critical appraisal, prioritization, mobilization and evaluation.

There are other important features of the framework. To optimize the successful impact of evidence-based strategies, the framework recommends that priority setting should be conducted following a review of evidence-based intervention options. This contrasts with the conventional approach of setting priorities following an assessment of burden. Because burden does not always correlate with availability of high-impact evidence-based intervention options, a priority-setting process that emphasizes burden and risk factors may miss opportunities to invest in evidence-based program options that have high impact potential.

The framework recommends that priority-setting processes draw on a form of multi-criteria decision analysis. To
generate a list of prioritized evidence-based strategies for solution mobilization. Intervention options can be compared across a number of important criteria including existing opportunities, impact potential, cost-effectiveness and equity. This is a process that can take into account the goals, principles, values and resources of an organization.

A second important feature of the evidence-synthesis framework is the acknowledgement of evidence gaps. There is a need for a strategy to draw attention to the types of information needed in injury prevention practice. While the process described in the framework prioritizes evidence, it leaves room for new and promising opportunities to address important risk and protective factors where there is an absence of evidence-based intervention options. A number of organizations have strived to outline proven evidence-based strategies. The evidence-synthesis framework is designed to expand this list and collect information that can be used to successfully mobilize evidence-based injury prevention strategies across Canada. It is recommended that for each prioritized evidence-based strategy, information should be provided on the burden of the injury problem and the underlying risk and protective factors, evidence on the overall effectiveness and cost-effectiveness of the strategy, and information to inform best practices around adaptation, implementation, fidelity and sustainability.

The final component of the evidence-framework is evaluation. The evaluation directions emphasized in the framework were meant to align with the organization’s focus on drawing attention to evidence-based strategies and the burden of injury in Canada (rather than program design and implementation). The levels of uptake and application of evidence-based strategies that have been mobilized can directly inform the success of the organization’s prevention efforts. To align with efforts to mobilize Canadians to adopt solutions, there is a focus on providing evaluation resources to communities and organizations.

Facilitators of the development process

There are important features of the organizational environment that supported the development and implementation of an evidence-synthesis framework. Leadership has been recognized as an important condition that can support evidence-based decision-making by influencing the organizational culture and use of finite resources. As outlined in the introduction, to support the amalgamation, there was an attempt to recruit leadership that was committed to an evidence-based approach. The transition was guided by a leader who had previous experience successfully integrating evidence into organizational processes with measureable outcomes.

One of the unique conditions that facilitated the integration of evidence into the decision-making structure of the organization was through a strategic commitment to be evidence-informed and a plan to operationalize the organization’s commitment. One of the core principles outlined in the organization’s first Strategic Plan was to ‘adopt an evidence-based approach to setting priorities, designing implementable and scalable solutions and evaluating impact’. Parachute was established from four legacy organizations that had strong connections to the research community. It was evident that this culture of research-practitioner collaboration was carried forward in the new organization. Establishing the evidence-framework early during the amalgamation provided an opportunity to build on the scope and activities of the organization and develop the capacity to support an evidence-synthesis framework.

As alluded to in the description of the setting, there was fertile ground for this project. Program staff were aware that a commitment to be evidence-informed would be challenging and overwhelming to follow without a process to actually define what it meant to be evidence-informed in practice. A shared optimism and support for the research-practitioner collaboration was also influenced by the staff’s perspective towards the value and utility of an evidence-informed approach. This commitment was viewed by staff as an opportunity to enhance the credibility of the organization. Staff felt more confident about meeting the organization’s goal to reduce injuries across Canada as they could see the connection between the strategies they would support and the prevention goals set by the organization.

Discussion

Main findings of this study

The Parachute evidence-synthesis framework is an example of how to ‘pull’ research in to inform decision-making. The evidence-synthesis framework has been influenced by established public health models. The Parachute framework gives priority to the identification and selection of intervention strategies that have strong evidence of effectiveness. The structures and products of the process outlined in the framework help bring attention to research gaps in available evidence-based strategies for well-defined risk and protective factors.

What is already known on this topic

Knowledge translation models have emphasized that researchers need to actively ‘push’ research out to users and users need to actively ‘pull’ in research to inform decision-making in public health practice. There have been a number of studies that have drawn attention to the barriers in the integration of evidence into practice.
What this study adds
The framework introduced in this study outlines a process that can be used to bridge the research-to-practice gap. The evidence-synthesis process provides an opportunity to use evidence in a strategic way to maximize the impact potential of national prevention strategies and bring attention to the need for more research to address gaps in our understanding of risk and protective factors, interventions and implementation best practices.

The evidence-synthesis framework is currently being pilot tested to prioritize evidence-based interventions for the prevention of motor vehicle injury in Canada. The success of the framework will be measured not only by its potential to mobilize evidence-based injury prevention strategies across Canada but also by its sustainability in the processes and priorities of the organization.

References