EVALUATING SCHOOL-BASED TOBACCO CONTROL PROGRAMS AND POLICIES: AN OPPORTUNITY GAINED AND MANY OPPORTUNITIES LOST

Scott T. Leatherdale
School of Public Health and Health Systems
University of Waterloo
Waterloo, Ontario

Abstract: In the domain of school-based tobacco control, there is a large gap between the research being performed and the type of research needed to inform school-based prevention activities. The Tobacco Module of the School Health Action Planning and Evaluation System is a data collection and feedback system designed to support school-based tobacco control planning and evaluation. Despite numerous opportunities to evaluate interventions and natural experiments that have been occurring within schools, school boards, provinces, and even nationally within the last few years, a lack of systematic data collection means that the impact of these initiatives has not been robustly evaluated.

Résumé :   Dans le domaine de la lutte contre le tabagisme dans les écoles, il y a un écart important entre les études qui s'effectuent et le type de recherches nécessaires pour orienter les activités de prévention à l'école. Le module concernant la lutte contre le tabagisme du *School Health Action Planning and Evaluation System* est un système de collecte de données et de rétroaction conçu pour faciliter la planification et l'évaluation des efforts de lutte contre le tabagisme dans les écoles. Malgré les nombreuses occasions qui se sont présentées ces dernières années pour l'évaluation d'interventions et d'expériences naturelles dans les écoles, les conseils scolaires, et les provinces, et même à l'échelle nationale, l'absence de collecte systématique de données fait que l'incidence de ces initiatives n'a pas été évaluée de façon robuste.

BACKGROUND

Age-related increases in smoking that occur among youth in Canada are cause for concern. Not only is this modifiable behav-

Corresponding author: Scott T. Leatherdale, School of Public Health and Health Systems, University of Waterloo, 200 University Ave West, BMH 1038, Waterloo, ON N2L 3G1; <sleather@uwaterloo.ca>

iour associated with increased risk of cancer outcomes (Adami, Day, Trichopoulos, & Willett, 2001; Colditz, DeJong, Hunter, Trichopoulos, & Willett, 1996; U.S. Department of Health and Human Services [US-DHHS], 2004), it is also associated with other chronic diseases, such as cardiovascular disease and chronic obstructive pulmonary disease (USDHHS, 2004). Considering that tobacco use tends to be established during childhood and adolescence (Health Canada, 2007; Stephens & Morin, 1996), it is critical to promote tobacco-free lifestyles among the school-aged population.

Traditional medical models and individual behavioural change strategies have demonstrated a limited impact on reducing tobacco use among youth (USDHHS, 1994). A population-level intervention approach that changes the environment surrounding youth may have greater potential to affect population-level reductions in youth smoking (Green & Kreuter, 2004; Rose, 1992)—changes that have greater long-term impact (USDHHS, 2000). Considering that the vast majority of youth spend large amounts of time at school (Manske, Brown, & Cameron, 1997), that the majority of smokers (approximately 80–90%) start smoking while they are students (Health Canada, 2007), and that there is substantial variability in smoking rates across schools (Aveyard, Markham, & Cheng, 2004; Leatherdale, Brown, Cameron, & McDonald, 2005; Leatherdale & Manske, 2005), the school environment represents an ideal environmental context for population-level interventions to reduce smoking among youth populations.

During the roughly 25 hours each week that students spend in school during the school year, they could be continually exposed to programs and policies (*interventions*) to prevent or reduce tobacco use. While schools are increasingly pressed to provide tobacco control prevention interventions (Botvin, 2004), there is a large gap between the type of research being done and the type of research needed to inform the school-based prevention agenda (Cameron, Riley, Campbell, Manske, & Lamers-Bellio, 2009). Much of the evidence available to guide schools' programming decisions is derived from artificially controlled research that does not align with the realities of "real world" practice within the school environment (Dusenbury & Hansen, 2004; Green, 2006; Ringwalt, Ennett, Vincus, Rohrback, & Simons-Rudolph, 2004) or provide insight that is amenable to informing school-based interventions when they are implemented in other settings (Hawe, Shiell, & Riley, 2004). For instance, even if an intervention has demonstrated effectiveness through a robust evaluation, it may still not be effective when implemented in another context where there are differ-

ent resources and staff experience available (Wang, Moss, & Hiller, 2005). Furthermore, many of the major tobacco control interventions targeted to youth are not amenable to randomization (e.g., tobacco taxes, policies banning smoking on school property), so researchers must take advantage of quasi-experimental designs to evaluate such natural experiments while policymakers and programmers implement such interventions (Petticrew et al., 2005). There is clearly a need to move from overly controlled efficacy research (e.g., randomized control trials; RCTs) to research that provides the evidence of effectiveness in real-world interventions (Nutbeam, 2001). One way this can be accomplished is through quasi-experimental research designs.

Quasi-experimental evaluation of natural experiments provides a complement to clinical trials for determining what works, with whom, and where, in essence generating "practice-based evidence" in youth tobacco control (Green, 2006; Speller, 2001), and would be highly relevant to stakeholders (Judd, Frankish, & Moulton, 2001). Although this evidence may be imperfect, it is more economical and relevant to the stakeholder community (Judd et al., 2001; Petticrew et al., 2005), can assist in the identification of effective interventions in real-world settings (Petticrew et al., 2005), and reflect the realities of intervention implementation (Ramanathan, Allison, Faulkner, & Dwyer, 2008). The detachment between research evidence and the needs of teachers, school administration, and/or public health practitioners working in schools may explain why fewer than 30% of schools implement evidence-based prevention interventions (Ringwalt et al., 2002). Evidence tends not to be utilized unless it is appropriate for local circumstances (Green, 2001; Green & Mercer, 2001).

The concept of evidence-based tobacco control requires that decision makers have the right information at the right time. However, it is all too common for decision makers to report that there is not enough timely and relevant research available to inform their decisions (Kiefer et al., 2005); school-based practitioners require timely and locally relevant data. The traditional system for moving evidence into practice is a "producer-push" system where research findings are marketed in a unidirectional fashion from researchers to practitioners (e.g., reports or journal publications). This approach is not only slow, but it is also ineffective at influencing the decision-making process (Dobbins, Ciliska, & DiCenso, 1998) and appears to have very little impact on the implementation of new intervention approaches (Grunfield et al., 2004; Lavis, Ross, McLeod, & Gildiner, 2003). A major challenge of moving research evidence

into practice is to strengthen the feedback loop between the researchers generating evaluation evidence and the practitioners responsible for implementing interventions (Speller, 2001). Knowledge exchange tools that provide schools with timely, context-specific research findings and recommendations for action may be more effective at incorporating research findings into school-based prevention practice (Cameron et al., 2007).

There is also an emerging consensus that evidence-based research-driven approaches alone may not be sufficient, but rather a combination of evidence-based practice and practice-based evidence may be required (Cameron et al., 2009; Green, 2006; Speller, 2001). According to the Canada's Chief Public Health Officer, Dr. David Butler-Jones, there is a need to develop more congruence between the needs of research users (practitioners) and the research questions being formulated and addressed by investigators; to improve linkages between databases of surveillance and research evidence; to develop explicit strategies, structures, and partnerships to facilitate knowledge uptake into practice and policy decision making; and to learn from practice (e.g., generate "practice-based evidence") (Butler-Jones, 2009). This approach to prevention requires a *system* that integrates evidence (surveillance, research, and evaluation) with action (policy and practice). For this approach to work, appropriate funding mechanisms must be in place to support the development and implementation of such systems (Cameron et al., 2009); however, at the present time in Canada such funding mechanisms are not readily available (Riley et al., 2009). As a result, opportunities to generate evidence about the effectiveness of school-based tobacco control interventions are continually lost as programs and policies are implemented without an embedded surveillance system to track and evaluate the impact of such natural changes over time (Ramanathan et al., 2008).

Schools in Canada are also experiencing unprecedented requests for data collection with their students. For instance, national and provincial surveys have been unable to collect any data in certain major metropolitan areas because of the response burden being placed on schools (Health Canada, 2005). Clearly, coordination and collaboration among surveillance agencies or research groups is one part of the solution, but another part is being relevant to the education system. Much of the tobacco control research currently performed in schools is funded by stakeholders responsible for health (e.g., Health Canada, the Ontario Ministry of Health Promotion) and not stakeholders re-

sponsible for education (e.g., Ministry of Education). This will likely continue to be a challenge unless the advancing health agenda also becomes more relevant to advancing the agenda of education stakeholders. In the meantime, considering that health-promoting schools can be empowered to take ownership of protecting the health of their student population according to their needs and priorities, rather than always having to be reactive to outside regulatory bodies (Rowling & Jeffreys, 2006), providing schools with timely and locally relevant data about their student population and recommendations for action that are relevant to their school context can be a viable solution for gaining access to schools.

Another challenge is that too often school-based evaluation research ignores the context of the school when evaluating program effectiveness (Rowling & Jeffreys, 2006). Understanding how different school contexts may be associated with intervention outcomes is critically important, as an intervention that has been demonstrated to be effective in one setting may turn out to be ineffective somewhere else, if it can or should be implemented there at all (Wang et al., 2005). We know that schools not only vary in terms of resources and skills for implementing programs, but also in the needs of their student population and the ability of the school to be innovative (Rowling & Jeffreys, 2006). Despite this knowledge, we continue to either use research designs (e.g., RCTs) that are not sensitive enough to detect these differences across school contexts (Rowling & Jeffreys, 2006), or we do not adequately measure school characteristics and/or incorporate those measures into appropriate statistical models for examining school-level effects on student outcomes (e.g., hierarchical statistical models). For instance, Cameron and colleagues (1999) used an RCT to evaluate the impact that a school-based social influences smoking prevention program had on the smoking behaviour of grade 8 students attending 100 elementary schools in Ontario. While they initially concluded that the intervention did not significantly prevent smoking uptake among students in intervention schools relative to students in control schools, when they performed more robust analyses controlling for school-level characteristics it was revealed that the intervention was in fact very effective at preventing smoking uptake among students in schools that were considered high-risk environments for smoking. School-based tobacco control prevention programming requires surveillance and evaluation systems that consider both student- and school-level characteristics in order to best understand what interventions work for whom, in what context, and under what circumstances.

Two examples of existing international school-based data collection systems relevant to tobacco control include the School Health Index (SHI) and the Health Behaviour in School-Aged Children (HBSC) study. The United States Centers for Disease Control and Prevention (CDC) developed the SHI Self-Assessment and Planning Guide as a tool for (a) enabling schools to identify strengths and weaknesses of their interventions, (b) enabling schools to develop action plans for improving student health, and (c) engaging stakeholders in promoting health-enhancing behaviours (Centers for Disease Control, 2009). The World Health Organization has also been promoting the HBSC study in student samples from over 30 countries with the aim to increase understanding of and monitor over time young people's health and health-related behaviours; gain insights into the influences the school, family, and other social contexts have on young people's lifestyles; increase understanding of how young people perceive health; influence the development of programs and policies to promote the health of young people; and promote cross-disciplinary research into young people's health and lifestyles through international networking of health researchers (Public Health Agency of Canada, 2009). Although the SHI is widely recognized in the United States for providing practitioners with general insight to inform programming decisions, and the HBSC provides some valuable data for making international comparisons, neither system has been designed to evaluate interventions, provide practice-based evidence, or engage stakeholders in the research enterprise. As stated previously, Canada requires a system that integrates evidence (surveillance, research, and evaluation) with action (policy and practice).

OPPORTUNITY GAINED

The School Health Action, Planning, and Evaluation System (SHAPES) is a school-based data collection system designed to move beyond developing only evidence-based practice to also developing practice-based evidence (Cameron et al., 2007; Leatherdale, Manske, Wong, & Cameron, 2009). SHAPES provides school stakeholders with the locally relevant real-world data required to inform prevention planning and provides researchers with the infrastructure required to systematically collect student- and school-level data to evaluate school-based prevention initiatives. Members of the SHAPES consortium include both researchers and practitioners who envision a future in which communities are supported by *system models* that enable them to pinpoint the best opportunities to improve youth health, identify best intervention approaches, ac-

cess intervention resources, and use a practical data collection and feedback platform to continuously guide, evaluate, refine, and learn from their work.

The development of SHAPES stemmed from previous research experience (Cameron et al., 1999; Manske et al., 1997), research highlighting the importance of local data (Green, 2001; Speller, 2001), and compelling considerations about the practical importance of engaging schools in developing initiatives that fit their local context and circumstances (e.g., the Precede-Proceed health promotion planning model of Green and Kreuter, 1999). A practical local data collection and feedback system was seen as having great potential to advance research and practice. SHAPES data collection tools were specifically designed to generate data that not only enable us to learn what works, for whom, and in what context, but also to create linkages between practitioners and researchers necessary to inform evidence-based practice and create practice-based evidence (Cameron et al., 2007; Leatherdale et al., 2009).

Taking into consideration the mutual needs of school stakeholders and researchers, SHAPES has been designed to (a) enable local health and education systems to plan, tailor, and evaluate local interventions; (b) engage researchers in real-world studies that generate practice-based evidence from evaluating natural experiments as interventions are mounted in schools and communities; and (c) provide a platform to support and study the processes and structures required for effective knowledge transfer and exchange in school settings (Cameron et al., 2007; Leatherdale et al., 2009). These aims are accomplished though an ongoing cycle that links research and practice. As illustrated in Figure 1, the conceptual model for SHAPES is a cyclical process that includes *Underlying Research* (ensuring the methods and tools used in the system are valid and reliable); *School Health Assessment* (data collection at both the student and school levels); *Feedback for Planning* (engaging school stakeholders by providing them with a timely synthesis of their school-specific student- and school-level findings and potential areas for action); *Action* (mobilizing local knowledge to address priority areas identified from recommendations and by stakeholders); *Evaluation and Adaptation* (adapting actions to local needs and evaluating the impact of any actions taken); and *Local Strategy and Contexts* (stakeholders and researchers working together to establish plans for learning from the actions taken and to identify any new issues to be assessed through the same cyclical process).

Figure 1
The School Health Action, Planning and Evaluation System (SHAPES) Conceptual Model
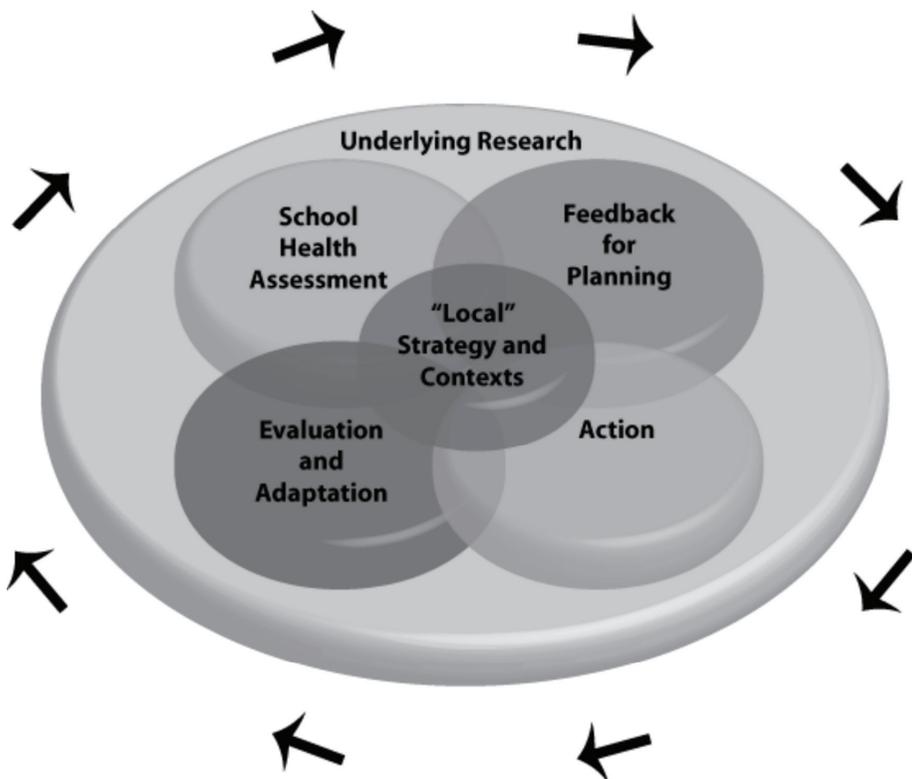
An additional strength of SHAPES is that not only does it operate at the local level (i.e., in a particular school), but the same conceptual model can also be extended to broader contextual levels (e.g., school district, provincial, national). As illustrated in Figure 2, the processes of surveillance, knowledge exchange, and evaluation encompassed within SHAPES activities can be applied at numerous different levels of context depending on design of the SHAPES activity and the needs of stakeholders involved in the activity. For example, in 2005 the SHAPES-Ontario study collected data from 69,511 students attending 81 secondary schools located within seven Public Health Regions within the Province of Ontario to inform the development of the Smoke-Free Ontario (SFO) strategy (www.shapes.uwaterloo.ca/projects/SHAPES-ON). The SHAPES tools and system created synergy from this work because schools were provided with their

knowledge exchange tools, the province was provided with data required to inform aspects of SFO, and the Public Health Units located within the seven Public Health Regions were also provided with the knowledge exchange tools and data collected from schools located within their jurisdiction to inform and facilitate their prevention program planning within the schools in their mandate. The synergy embedded in SHAPES allows for the needs of numerous stakeholders (e.g., schools, school districts, regional health authorities, provinces, or Canada as a whole) to be mutually addressed, as learning in one context also informs learning in other contexts in a continuous cycle of improvement (Leatherdale, 2008).

Figure 2
A Synergy Model for How the School Health Action, Planning and Evaluation System (SHAPES) Can Link Research and Practice at Multiple Levels of Context
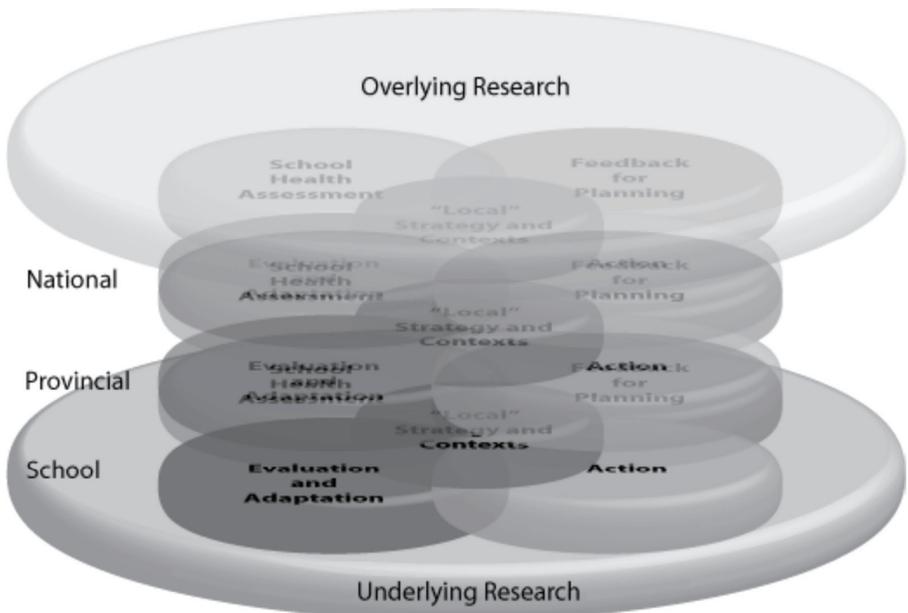
For tobacco control, the SHAPES Tobacco Module (TM) tools have been designed to provide practitioners and researchers with reliable and valid data about youth tobacco use and school-based tobacco control prevention programming (Cameron et al., 2007). The TM research tools have been developed and tested to collect tobacco use data at the student level (e.g., smoking behaviour, attitudes about smoking,

contextual influences for tobacco use, enabling factors within the school), and tobacco control program and policy data at the school level (e.g., strength and enforcement of policies, cessation program availability, location/proximity of tobacco retailers relative to the school). Knowledge exchange tools (i.e., customized school-specific feedback reports) have also been developed to provide schools (administrators, staff, and students) and community partners (e.g., public health officers, parents) with school-specific understanding of what is happening at the school (i.e., student tobacco use behaviours and beliefs, existing tobacco control programs and policies), and offer contextually appropriate suggestions for interventions designed to reduce tobacco use of their students. In essence, the TM creates an innovative linkage between research and practice by providing schools and school stakeholders with the evidence they need, when they need it, in a form that is useful and understandable for guiding and evaluating school-based tobacco control prevention programming. For example, at the local level the TM was used to evaluate the impact of the school-based tobacco industry denormalization smoking prevention program *exposé* Smoke-Free Youth Project implemented by Ottawa Public Health in a sample of Ottawa secondary schools (Zimmerman & Haimes, 2007). Data collected with the TM have been used at the provincial level to inform and support the development of Ontario Bill 69, which banned smoking in motor vehicles when youth were present (Leatherdale, Smith, & Ahmed, 2008) and at the national level to inform and support the development of Bill C-32, which banned the flavouring of cigars, cigarillos, and cigarettes (Canadian Cancer Society, 2008).

As mentioned previously, conducting school-based research and surveillance is becoming more difficult, as schools usually receive more requests from researchers than they can accommodate. However, it is clear that schools are more likely to grant access to researchers for data collection if either they can receive some value-added benefits (e.g., school-specific feedback to inform their prevention programming planning) or the data collection can also serve multiple purposes (e.g., planning, evaluation, and surveillance) (Cheadle et al., 1995). Considering that the TM can collect representative data pertaining to tobacco use from an entire school within a 20-minute classroom period, that those data are then returned back to schools to provide evidence for informing their programming decisions, and that the data are also used for research and evaluation activities within the research community, it is clear that the TM has purposefully been designed to be relevant to the education system. This is further evidenced by the fact that since 2000 the TM has been completed by over 400,000

students in more than 1,000 schools across Canada for projects initiated by both researchers and stakeholders, and the data are now used by schools, communities, provinces, and the federal government for planning, evaluation, (national) surveillance, and research in youth tobacco control; since 2004 the SHAPES TM has been the system used for the National Youth Smoking Survey (www.yss.uwaterloo.ca).

Given the significance of the school setting for influencing tobacco use (Cameron et al., 1999; Leatherdale, 2006; Leatherdale et al., 2005), and the urgency of implementing more effective initiatives to prevent and reduce tobacco use among youth (Leatherdale, 2006; Leatherdale & McDonald, 2007), researchers and practitioners need to work together to ensure that contextually appropriate tobacco control interventions are integrated into practice (Green, 2001, 2006; Green & Mercer, 2001). We believe that the necessary linkages between research and practice around tobacco control within the school context can be fostered with systems such as the SHAPES TM. For instance, the TM data collected from different schools can be combined to create databases that enable examination of natural experiments. By providing the ability to design and evaluate school-level interventions within SHAPES via the inclusion of appropriate school-level program and policy measures, we are able to identify the critical school-level characteristics for informing future tobacco control prevention activities, while also creating a multi-directional flow of knowledge between both stakeholders and researchers.

OPPORTUNITY LOST

Despite the potential opportunities afforded by the SHAPES TM, the real potential for this system has not yet been fully realized in Canada. Although the SHAPES TM has been used in smaller studies to evaluate the impact of specific school-level interventions (e.g., *exposé* Smoke-Free Youth Project [Zimmerman & Haimes, 2007]; SHAPES-Ontario [Leatherdale & McDonald, 2007], School Smoking Profile [Leatherdale & Manske, 2005]), it has not been implemented in a fashion that would allow for the systematic evaluation of a wide variety of ongoing interventions and natural experiments. At the present time, there is a lack of financial resources invested to support the ongoing systematic use of this system in a representative sample of "sentinel" schools across the country. As a result, a substantial number of evaluation opportunities have been lost. Current funding resources have only afforded the collection of SHAPES TM data in either one-time cross-sectional studies, or repeat cross-sectional studies

where students are not tracked over time. Although one-time studies can provide valuable insight for examining factors associated with smoking behaviour, they are insufficient for evaluating interventions or creating a system that engages both researchers and practitioners in a continual cycle of adaptive prevention practice.

In British Columbia, the *Action Schools! BC* program (Naylor, Macdonald, Reed, & McKay, 2006) provides an excellent example of how a well-funded system that integrates evidence (surveillance, research, and evaluation) with action (policy and practice) can have impact on promoting youth health in the domains of obesity prevention and physical activity promotion. Although the *Action Schools! BC* model required sustained financial support and substantial collaboration between researchers and stakeholders, this integrated system of school- and community-based interventions resulted in enhanced knowledge exchange between researchers and stakeholders, more supportive school and community environments, and improved outcomes among participating students (Naylor et al., 2006; Naylor, Macdonald, Warburton, Reed, & McKay, 2008; Naylor & McKay, 2009). A similar well-funded and integrated system that integrates evidence and action could add substantial value to the domain of tobacco control.

Numerous natural experiments have been occurring within schools, schools boards, provinces, and even nationally that have not been robustly evaluated due to the lack of existing data and research infrastructure. For example, without ongoing data collection in a sample of sentinel schools, the following opportunities have been lost:

- the ability to systematically identify and catalogue the various different tobacco control programs and/or policies that have been implemented in schools;
- the ability to evaluate the impact that different programs and/or policies (or combinations of programs and policies) have had on student smoking behaviour;
- the ability to evaluate how changes in programs and/or policies over time impact student smoking behaviour and if they have the same or differential impact on various student subpopulations;
- the ability to evaluate how changes in programs and/or policies outside of the school environment impact student smoking behaviour (e.g., removing tobacco powerwalls at retailers, smoke-free spaces, access restrictions).

A better understanding of how the school environment is associated with youth smoking would assist in creating school environments that facilitate smoke-free lifestyles among youth populations. Until researchers, funding agencies, school stakeholders, and decision makers work to establish a coordinated, pan-Canadian, adequately funded research platform to support ongoing data collection at both the school- and student-levels, we will be missing numerous opportunities to evaluate the impact of tobacco control prevention activities on student smoking behaviour.

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REFERENCES

Adami, H. O., Day, N. E., Trichopoulos, N. E., & Willett, W. C. (2001). Primary and secondary prevention in the reduction of cancer morbidity and mortality. *European Journal of Cancer, 37*, S118–S127.

Aveyard, P., Markham, W. A., & Cheng, K. K. (2004). A methodological review of the evidence that schools cause pupils to smoke. *Social Science & Medicine, 58*, 2253–2265.

Botvin, G. J. (2004). Advancing prevention science and practice: Challenges, critical issues, and future directions. *Prevention Science, 5*, 69–72.

Butler-Jones, D. (2009). Public health science and practice: From fragmentation to alignment. *Canadian Journal of Public Health, 100*, I1–I2.

Cameron, R., Brown, K. S., Best, J. A., Pelkman, C. L., Madill, C. L., Manske, S. R., … Payne, M. E. (1999). Effectiveness of a social influences smoking prevention program as a function of provider type, training method, and school risk. *American Journal of Public Health, 89*(12), 1827–1831.

Cameron, R., Manske, S., Brown, K. S., Jolin, M. A., Murnaghan, D., & Lovato, C. (2007). Integrating public health policy, practice, evaluation, surveillance, and research: The School Health Action Planning and Evaluation System. *American Journal of Public Health, 97*, 648–654.

Cameron, R., Riley, B. L., Campbell, S., Manske, S., & Lamers-Bellio, K. (2009). The imperative of strategic alignment across organizations: The experience of the Canadian Cancer Society's Centre for Behavioural Research and Program Evaluation. *Canadian Journal of Public Health, 100*, I27–I30.

Canadian Cancer Society. (2008). Media Release: High number of teenagers experimenting with cigarillos: Canadian Cancer Society calls for ban on flavoured cigarillos. Retrieved from http://www.cancer.ca/Ontario/About%20us/Media%20centre/OD-Media%20releases/High%20number%20of%20teenagers%20experimenting%20with%20cigarillos.aspx?sc_lang=en

Centers for Disease Control. (2009). *School Health Index, 2009*. Retrieved from https://apps.nccd.cdc.gov/shi/Default.aspx

Cheadle, A., Psaty, B. M., Anderman, C., Shultz, L., Curry, S., Wagner, E., … Wickizer, T. (1995). Evaluating the usefulness for school principals of feedback reports from a school based adolescent health survey. *Evaluation Reviews, 19*, 675–686.

Colditz, G. A., DeJong, W., Hunter, D. J., Trichopoulos, D., & Willett, W. C. (Eds.). (1996). Harvard report on cancer prevention. Volume 1: Causes of Human Cancer. *Cancer Causes and Control, 7*(Supplement 1), S3–S58.

Dobbins, M., Ciliska, D., & DiCenso, A. (1998). *Dissemination and use of research evidence for policy and practice: A framework for developing, implementing and evaluating strategies*. Ottawa, ON: Canadian Nurses Association.

Dusenbury, L., & Hansen, W. B. (2004). Pursuing the course from research to practice. *Prevention Science, 5*(1), 55–59.

Green, L. W. (2001). From research to "best practices" in other settings and populations. *American Journal of Health Behavior, 25*, 165–178.

Green, L. W. (2006). Public health asks of systems science: To advance our evidence-based practice, can you help us get more practice-based evidence? *American Journal of Public Health, 96*(3), 406–409.

Green, L. W., & Kreuter, M. W. (1999). *Health program planning: An ecological and educational approach* (3rd ed.). Toronto, ON: Mayfield.

Green, L. W., & Kreuter, M. W. (2004). *Health program planning: An ecological and educational approach* (4th ed.). Boston, MA: McGraw-Hill.

Green, L. W., & Mercer, S. (2001). Can public health researchers and agencies reconcile the push from funding bodies and the pull from communities? *American Journal of Public Health, 91*, 1926–1929.

Grunfeld, E., Zitzelsberger, L., Hayter, C., Berman, N., Cameron, R., Evans, W. K., & Stern, H. (2004). The role of knowledge translation for cancer control in Canada. *Chronic Diseases in Canada, 25*, 1–6.

Hawe, P., Shiell, A., & Riley, T. (2004). Complex interventions: How far 'out of control' should a randomized control trial be? *British Medical Journal, 328*, 1561–1563.

Health Canada. (2005). *2004 Youth Smoking Survey technical report*. Ottawa, ON: Minister of Supply and Services Canada.

Health Canada. (2007). *Canadian Tobacco Use Monitoring Survey (CTUMS): Annual results 2006*. Ottawa, ON: Tobacco Control Program.

Judd, J., Frankish, C. J., & Moulton, G. (2001). Setting standards in the evaluation of community-based health promotion programmes: A unifying approach. *Health Promotion International, 16*, 367–380.

Kiefer, L., Frank, J., DiRuggiero, E., Dobbins, M., Manuel, D., Gully, P. R., … Mowat, D. (2005). Fostering evidence-based decision-making in Canada: Examining the need for a Canadian population and public health evidence centre and research network. *Canadian Journal of Public Health, 96*, I1–I20.

Lavis, J., Ross, S., McLeod, C., & Gildiner, A. (2003). Measuring the impact of health research. *Journal of Health Services Research and Policy, 8*(3), 165–170.

Leatherdale, S. T. (2006). School-based smoking cessation programs: Do youth smokers want to participate in these programs? *Addictive Behaviors, 31*, 1449–1453.

Leatherdale, S. T. (2008). *Population-level data collection and knowledge exchange systems: Current systems and emerging opportunities for tobacco control*. Toronto, ON: Transdisciplinary Tobacco Rounds, Centre for Addiction and Mental Health (CAMH).

Leatherdale, S. T., Brown, K. S., Cameron, R., & McDonald, P. W. (2005). Social modelling in the school environment, student characteristics, and smoking susceptibility: A multi-level analysis. *Journal of Adolescent Health, 37*, 330–336.

Leatherdale, S. T., & Manske, S. (2005). The relationship between student smoking in the school environment and smoking onset in elementary school students. *Cancer Epidemiology, Biomarkers & Prevention, 14*(7), 1762–1765.

Leatherdale, S. T., Manske, S., Wong, S., & Cameron, R. (2009). Integrating research, policy and practice in school-based physical activity prevention programming: The School Health Action, Planning and Evaluation System (SHAPES) Physical Activity Module. *Health Promotion Practice, 10*, 254–261.

Leatherdale, S. T., & McDonald, P. W. (2007). Youth smokers' beliefs about different cessation approaches: Are we providing cessation interventions they never intend to use? *Cancer Causes and Control, 18*(7), 783–791.

Leatherdale, S. T., Smith, P., & Ahmed, R. (2008). Youth exposure to smoking in the home and in cars: How often does it happen and what do youth think about it? *Tobacco Control, 17*, 86–92.

Manske, S. R., Brown, K. S., & Cameron, A. J. R. (1997). School-based smoking control: A research agenda. *Cancer Prevention & Control, 1*(3), 196–212.

Naylor, P. J., Macdonald, H. M., Reed, K. E., & McKay, H. A. (2006). Action Schools! BC: A socioecological approach to modifying chronic disease risk factors in elementary school children. *Preventing Chronic Diseases: Public Health Research, Practice and Policy (CDC), 3*, 1–8.

Naylor, P. J., Macdonald, H. M., Warburton, D. E. R., Reed, K. E., & McKay, H. A. (2008). An active school model to promote physical activity in elementary schools: Action Schools! BC. *British Journal of Sports Medicine, 42*, 338–343.

Naylor, P. J., & McKay, H. A. (2009). Prevention in the first place: Schools a setting for action on physical inactivity. *British Journal of Sports Medicine, 43*, 10–13.

Nutbeam, D. (2001). Evidence-based public policy for health: Matching research to policy need. *Promotion & Education, 2*, 15–19.

Petticrew, M., Cummins, S., Ferrell, C., Findlay, A., Higgins, C., Hoy, C., … Sparks, L. (2005). Natural experiments: An underused tool for public health? *Public Health, 119*(9), 751–757.

Public Health Agency of Canada. (2009). *Health behaviour in school-aged children*. Retrieved from http://www.phac-aspc.gc.ca/dca-dea/7-18yrs-ans/hbschealth-eng.php

Ramanathan, S., Allison, K. R., Faulkner, G., & Dwyer, J. J. M. (2008). Challenges in assessing the implementation and effectiveness of physical activity and nutrition policy interventions as natural experiments. *Health Promotion International, 23*, 290–297.

Riley, B. L., Stachenko, S., Wilson, E., Harvey, D., Cameron, R., Farquharson, J., … Taylor, G. (2009). Can the Canadian Heart Health Initiative inform the Population Health Intervention Research Initiative for Canada? *Canadian Journal of Public Health, 100*, I20–I23.

Ringwalt, C., Ennett, S. T., Vincus, A. A., Rohrback, L. A., & Simons-Rudolph, A. (2004). Who's calling the shots? Decision-makers and the adoption of effective school-based substance use prevention curricula. *Journal of Drug Education, 34*(1), 19–31.

Ringwalt, C., Vincus, A. A., Ennett, S. T., Rohrbach, L. A., Hanley, S., & Bowling, J. M. (2002). The prevalence of effective substance use prevention curricula in U.S. middle schools. *Prevention Science, 3*(4), 257–265.

Rose, G. (1992). *The strategy of preventive medicine*. London, UK: Oxford University Press.

Rowling, L., & Jeffreys, V. (2006). Capturing complexity: Integrating health and education research to inform health-promoting schools policy and practice. *Health Education Research, 21*, 705–718.

Speller, V. (2001). The next challenge: Getting evidence into practice. *Promotion & Education, 2*(1), 20–23.

Stephens, T., & Morin, M. (Eds.). (1996). *Youth smoking survey, 1994: Technical report*. Ottawa, ON: Minister of Supply and Services Canada.

U.S. Department of Health and Human Services. (1994). *Preventing tobacco use among young people: A report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health

Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office of Smoking and Health.

U.S. Department of Health and Human Services. (2000). *Reducing tobacco use: A report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office of Smoking and Health.

U.S. Department of Health and Human Services. (2004). *The health consequences of smoking*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office of Smoking and Health.

Wang, S., Moss, J. R., & Hiller, J. E. (2005). Applicability and transferability of interventions in evidence-based public health. *Health Promotion International, 21*, 76–83.

Zimmerman, L., & Haimes, K. (2007). *Final evaluation report, exposé Smoke-Free Youth Project*. Ottawa, ON: Ottawa Public Health.

Scott Leatherdale, Ph.D., is an Associate Professor and Cancer Care Ontario Research Chair in Population Studies in the School of Public Health and Health Systems at the University of Waterloo. Dr. Leatherdale has expertise in ecological models of health, system-level approaches to prevention programming, evaluation, and research design and methods. The focus of his research is twofold: understanding the association between environment contexts (both social and physical environments) and cancer risk behaviour, and developing systems to improve the uptake of evidence-based practices in population-based cancer control prevention programming.