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Implementing an evidence-informed public health approach to health promotion around substance use and preventing substance-related harms among youth aged 15-24 years in Ontario

Dr. Rim Zayed

Grey Bruce Public Health

AHRC
APPLIED HEALTH RESEARCH CENTRE

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Core Project Team:

Health Units

Grey Bruce Public Health (GBPH) – Lead Public Health Unit

- Dr. Rim Zayed (Lead Investigator)
- Lami Sadare
- Lindsay MacDermid
- Alexis Cook
- Nelson Phillips
- Tim Duivesteyn
- Kelsey Mighton
- Trudy Tran

Simcoe Muskoka District Health Unit (SMDHU) – Co-applicant Public Health Unit

- Dr. Lisa Simon
- Mia Brown
- Dr. Emil Prikryl - NOSM PHPM resident

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Abstract/ Summary

Introduction

Several recent studies have reported a decline in Canadian youths' mental health and a subsequent increase in substance use following the COVID-19 pandemic. Opioid use and associated harm among youth aged 15 to 24 years in Ontario is particularly concerning. The COVID-19 pandemic has exacerbated risk factors, with disproportionate socio-economic impacts on Indigenous people, other racialized families, and families with low income. This study set out to document evidence-based strategies aimed at preventing substance use and related harms among youth aged 15 to 24 years, to create a robust taxonomy on strategies that address drug use at primordial and primary levels. The study also aimed to develop an inventory of evidence-based strategies currently implemented in Ontario's public health units and identify indicators for monitoring and evaluating the effectiveness of identified evidence-based strategies.

Methods

The study conducted a literature review of English language-published peer-reviewed articles (from 2018 to the end of 2022) of meta-analysis, systematic, rapid, and scoping reviews of a) risk and protective factors associated with youth substance initiation and use, and b) primary and primordial substance use prevention strategies. From an initial 1498 studies, 26 articles for risk and protective factors and 19 studies for interventions were selected for full review using AMSTAR-2 review and GRADE (Grading of Recommendations Assessment, Development, and Evaluation) evaluation methods.

The study also conducted a survey followed by a qualitative in-depth interview of public health units in Ontario. Twenty-two (n=22) of Ontario's 34 public health units participated in the study. These health units cut across diverse geographic regions, population sizes, and rural-urban divides. The health units reported a total of 99 interventions targeted at youth substance use prevention.

Results

This study found that several factors impact substance use prevention efforts, including: program planning, delivery, and evaluation; the role of community partnerships, public health, and youth engagement; complex and multidimensional nature of risk and protective factors; and contextual factors such as priorities, policies, and funding.

The prevention of youth substance use is a complex and multi-dimensional challenge, deeply connected to and impacted by individual, family, school, community, and societal risk and protective factors. Addressing risk and protective factors, including primordial interventions addressing Adverse Childhood Experiences (ACEs) and social determinants of health (SDOHs), is increasingly acknowledged as an essential strategy to effectively prevent substance use amongst youth. In practice at the level of local public health units (PHUs), many primordial interventions are in nascent stages of implementation, and monitoring indicators of evaluation and sharing lessons learned and best practices will be important to ensure continuity, future funding, and support.

There are promising models identified, but these would benefit from further research as to their applicability in Canadian contexts. Efforts to address underlying influences of substance use prevention will require a systems-level and integrated community-wide approach.

Background

During the COVID-19 pandemic, Canadians experienced prolonged public health measures, which were essential for containing the spread of the disease but also contributed to unintended consequences, such as a decline in mental health[1]. Youth were significantly affected, with Statistics Canada indicating a notable decrease in the proportion of youth reporting excellent or particularly good mental health pre- and post-COVID-19 compared to other age groups[2]. Surveys conducted by the Canadian Centre on Substance Use and Addiction (CCSA) and the Mental Health Commission of Canada (MHCC) have indicated that young people aged 16 to 24 in Canada were more likely to report mental health and substance use concerns, as well as greater difficulty managing pandemic stress, compared to the general population.[3] Approximately 45% of youth in this age group reported moderate to severe anxiety symptoms, and about 40% of those who use alcohol and/or cannabis reported an increased use in the past month and reduced ability to handle pandemic stress. In contrast, older adults (65+) showed signs of better mental health, less problematic substance use, and stronger coping skills[3].

Furthermore, there has been a concerning increase in opioid-related deaths among youth aged 15 to 24 in Ontario, which has risen nearly 7-fold between 2003 and 2020[4]. The prevalence of substance-related harms, including among youth, has exhibited a concerning upward trend, which has been further exacerbated by the unprecedented challenges posed by the COVID-19 pandemic. Notably, there has been a substantial escalation in opioid-related fatalities among the youth demographic in Ontario, with a seven-fold increase from 1.4 to 9.7 per 100,000 individuals between the years 2003 and 2020[4].

Recognizing that problems related to youth substance use are multifactorial, preventive strategies need to address a range of factors across the Socio-Ecological Model (SEM). Factors such as Adverse Childhood Experiences (ACES) and inequities in the Social Determinants of Health (SDOHs) are associated with significant health, economic, and societal costs[5]. The COVID-19 pandemic has exacerbated these risk factors, with disproportionate socio-economic impacts on Indigenous people, other racialized families, and families with low income[6,7].

To reduce harm related to substance use, public health, and multidisciplinary partners are implementing diverse preventive strategies. These evidence-based strategies encompass approaches across primordial, primary, secondary, and tertiary prevention.[8]

The current project by the COMOH (Council of Ontario Medical Officers of Health) Drug/Opioid Poisoning Crisis Working Group's (DOPC-WG) Prevention Subgroup Committee aims to conduct an environmental scan of evidence-based strategies and potential indicators for monitoring preventive programs related to substance use in Ontario. The project examines the current practice in public health units and their stakeholders across Ontario, considering real-life complexities and contextual factors. It includes information on program barriers and facilitators, as implementation factors can influence outcomes. The project aims to provide an understanding of the current implementation of evidence-based strategies across public health units and key stakeholders, with a specific focus on primordial prevention (SDOHs, ACES), and primary prevention (e.g., school-based, and non-profit organization programs)[9]. As of June 2020, substance use and related harms in the context of a pandemic remained largely uninvestigated[9].

More understanding is needed to identify areas of future research into problematic substance use and related harms in the context of Covid-19 as a means of coping, changes in social support and networks, availability and accessibility of services, and increased risk of severe outcomes.

Considering these disconcerting developments, it is imperative to acknowledge the pivotal role that public health units in Ontario play in promoting the health and well-being of the population, specifically in the context of substance use prevention. The effectiveness of their practices necessitates a comprehensive understanding of the most current and evidence-based approaches, as well as an awareness of the existing variations in practice across different regions of Ontario. By gaining such insights, this project seeks to enhance the knowledge base and inform strategies that can effectively address substance-related harms within the province's diverse communities.

Objectives

The objectives for this project are to:

1. Conduct a comprehensive review of the existing literature to create a robust taxonomy of evidence-based strategies aimed at preventing substance use and substance-related harms among youth (aged 15 to 24) in Ontario. This taxonomy will specifically focus on strategies addressing drug use, while also exploring their impact on alcohol, tobacco, and cannabis use/ harms.
2. Develop an inventory of evidence-based prevention strategies currently implemented by public health units (PHUs) and key stakeholders within Ontario. The objective is to identify strategies that effectively influence substance use patterns and outcomes in youth. This inventory will provide a comprehensive overview of the strategies being utilized and their respective contexts within the province.
3. Compile a concise summary of indicators commonly used for monitoring and evaluating the effectiveness of the identified evidence-based strategies. This summary will highlight the key metrics and measurements employed by PHUs and stakeholders to assess the impact of prevention efforts on substance use and related harms among youth.
4. Prepare a comprehensive report that outlines the current practices aligned with evidence-based strategies across public health units in Ontario. The report will identify areas of strength and opportunities for improvement in the implementation of evidence-based practices, to enhance the overall effectiveness of substance use prevention efforts and address any existing gaps.

By accomplishing these objectives, this study seeks to enhance the understanding of evidence-based strategies for preventing substance use and substance-related harms among youth in Ontario. The findings will contribute to the development and refinement of preventive interventions, enable better monitoring and evaluation of strategies, and provide valuable insights to public health units and key stakeholders for strengthening their practices and optimizing outcomes in substance use prevention.

Research Questions

1. What are the evidence-based programs and strategies that are implemented across the socio-ecological model (SEM) that aim to promote health around substance use and decrease related harms in youth?
2. How are prevention programs implemented among Public Health Units (PHUs) across Ontario, including their adaptation to diverse settings and culturally appropriate engagement of diverse populations? How do the interventions work in the real world and how do PHUs ascertain they produce the intended effects?
3. What indicators do public health units and key stakeholders use to monitor or evaluate the existing practice, including representing diverse perspectives and assessing gaps in implementation?

Scope

The scope of our study will primarily concentrate on substances other than tobacco, alcohol, and cannabis, to identify opportunities for public health interventions that can effectively address the ongoing opioid/overdose crisis. However, we will also explore strategies that have potential additional benefits for addressing tobacco, alcohol, and cannabis use when relevant information is available.

In terms of harms, our focus will be on the direct harms to individuals that are directly attributable to substance use, such as substance-related poisoning, rather than indirect harms (e.g., sexually transmitted infections) or harms inflicted on others (e.g., violence).

This focus is driven by the need to prioritize the urgent concerns surrounding the overdose crisis while considering the feasibility and scope of the study.

By maintaining this scope, our study will provide valuable insights into evidence-based strategies specifically tailored to address the overdose crisis and associated substance-related harms. We recognize the importance of targeting interventions that have a direct impact on individuals affected by substance use, thereby contributing to the development of effective public health actions and interventions in this critical area.

Methodology

The study design consisted of two main components:

- Phase I, involved a literature review, and
- Phase II, focused on reviewing locally implemented preventive strategies by Public Health Units (PHUs) through a mixed-methods approach (survey and qualitative semi-structured interviews).

Phase I – Methods

The researchers employed rigorous evaluation processes, including AMSTAR-II (Assessing the Methodological Quality of Systematic Reviews) and GRADE (Grading of Recommendations Assessment, Development, and Evaluation), to ensure the selection of high-quality studies and the synthesis of comprehensive evidence. Phase 1 was conducted using the following approach:

1. Literature search

The Locally Driven Collaborative Project (LDCP) team requested support from the Public Health Hub Librarian through the Shared Library Services Partnership to conduct a literature search in November 2022. Five databases (Ovid MEDLINE, APA PsycINFO, CINAHL Complete, Cochrane Database of Systematic Reviews (SRs), and Epistimonikos) were searched with search terms including two main concepts (**table 1**):

a. opioids/illicit drugs, and
b. primary/primordial prevention strategies.

Table 1: summary of database selection using the search terms

Resource/Database searched on November 4, 2022	Initial Results	Results after duplicates removed
Ovid MEDLINE	790	789
APA PsycINFO	423	280
CINHAL Complete	532	306
Cochrane Database of Systematic Reviews	51	44
Epistimonikos	108	79
Total	1904	1498

The evidence base for this literature summary was limited to published, peer-reviewed, synthesized literature including systematic reviews, meta-analysis, integrating both randomized controlled trials and synthesized observational studies, rapid reviews, and scoping reviews. Single studies and grey literature were excluded. Search criteria also limited articles to those focused on the youth population of interest (ages 15-24) in terms of outcome. Inclusion and exclusion criteria were outlined (**Appendix 1**).

Search criteria limited articles to those in the English language published from 2018 to the end of December 2022. The decision to undertake this review stemmed from a principled and sequential approach, as a follow-up to a prior rapid review conducted by Public Health Ontario concerning youth substance use primary intervention strategies in the literature, initially published in 2016 and subsequently revised in 2018[10,11]. The motivation for conducting this subsequent assessment is to understand how the existing body of literature has evolved and what new insights have emerged considering the Covid-19 pandemic.

2. Selection

1498 studies were selected after the removal of the duplications and single studies. Of those, 72 studies were selected for assessment of risk/ protective factors and 39 articles were selected for primordial/primary prevention strategies.

3. Extraction

Abstracts were primarily scanned, using AMSTAR-II for inclusion by two independent reviewers, and a third reviewer to reach a consensus, using the same pre-established criteria to ensure they either analyzed the risk and protective factors associated with youth substance use (either exclusively for opioid and illicit drugs, or shared inclusively with other substances like tobacco, cannabis, and alcohol) or addressed primary/primordial prevention strategies to prevent substance use in youth. The abstract screening of the 1498 reviews resulted in a selection of 47 studies related to preventive interventions and 72 studies related to risk/protective factors for full-text assessment.

4. Full-text exclusion

The selected studies underwent a strict selection process based on predefined inclusion and exclusion criteria, then the rating of the final included articles was performed using AMSTAR-II.

The GRADE approach was employed to further evaluate the quality and strength of evidence from the selected studies that led to further exclusion. This systematic and transparent process ensures that the synthesized evidence is assessed and graded based on specific criteria. The GRADE framework considers five criteria including study design, inconsistency (heterogeneity), precision of estimates, and indirectness, in addition to other considerations evaluated for each outcome within SR (Systematic Reviews) to assess the overall quality of evidence. If there was 'serious' grading in multiple criteria, the quality of RCT was downgraded. Observational studies were upgraded if there is a large effect, dose -response effect, and/or an adjustment of plausible confounding factors. The GRADE methodology allows for a rigorous assessment of the certainty of evidence and facilitates the development of reliable recommendations. Two independent readers initially reviewed the full texts of the articles, followed by a third reader to reach a consensus. This process ensured a thorough and unbiased evaluation of the evidence. Full-text reviews by GRADE resulted in the final selection of 19 reviews for interventions and 26 reviews for risk/protective factors. **(Figure 1)**

Figure 1: Diagram of Systematic Search of database from 2018-2022

ABSTRACT REVIEW	
ABSTRACTS REVIEWED N=1904	
ABSTRACTS SCREENED AFTER DUPLICATE REMOVAL N=1498	
FULL TEXT SCREEN-AMSTAR II	
INTERVENTION ARTICLES SELECTED N=39	RISK AND PROTECTIVE FACTORS N=72
FULL-TEXT SCREEN-GRADE	
INTERVENTION ARTICLES SELECTED N=19	RISK AND PROTECTIVE FACTORS N=26

5. Literature synthesis

Based on the GRADE assessment, the selected studies were graded as moderate or high quality, indicating a higher level of confidence in the findings. This approach allowed for the identification of reliable and robust evidence to support the effectiveness of intervention methods and the certainty of risk and protective factors related to substance use prevention. This approach allows for the identification of reliable and robust evidence to support the effectiveness of intervention methods and the certainty of risk and protective factors related to substance use prevention.

Articles were excluded based on rating. We only included studies graded as moderate to high quality. The selected studies provided substantial evidence/ certainty vs. quality.

Phase II – Methods

The second phase involved a mixed-methods approach with the development, distribution, and analysis of an electronic online survey (phase II-a) and the design and conducting of a qualitative sub-study through semi-structured interviews (phase II-b) to describe and review the locally implemented preventive strategies by Public Health Units in Ontario.

Informed consent was obtained from participating PHUs during phase II-a via online surveys, and verbal consent was also obtained for interview participants prior to the interviews. Ethics approval was received from the Public Health Ontario ethics review board, as well as the Unity Health Toronto Research Ethics Board.

Phase II-a: A review of locally implemented preventive strategies conducted with Public Health Units

The project was tested in five health units: Grey Bruce Public Health (GBPH); Simcoe Muskoka District Health Unit (SMDHU); Kingston, Frontenac, and Lennox & Addington Public Health (KFL&A); York Region Public Health; and Porcupine Health Unit. Public Health Ontario and the Ministry of Health provided advisory support to the project. The project design and pilot testing involved input from co-applicants and knowledge users through consensus-building discussions. A descriptive quantitative analysis was performed for health units' demographic profiles, while qualitative responses were summarized thematically. This phase involved the following steps:

- Grey Bruce Public Health (GBPH), the lead health unit, developed the survey. The questionnaire was tested and synthesized in consultation with co-applicants of the project (**Appendix 2**)
- The survey distribution plan: The survey was sent via email to the Council of Medical Officers of Health of Ontario (COMOH) members. The invitation aimed for participation from relevant program leads in various areas, which was sent by e-mail along with a letter of information and Frequently Asked Questions (FAQs) to guide participation (**Appendix 3**). We aim for the participation of program leads from School Health, Substance Use Prevention, Healthy Growth

and Development, Healthy Babies Healthy Children, Foundational Standards, and Harm Reduction.
- Survey follow-up: Participation was encouraged from PHUs of different populations size and geographic locations for adequate sociodemographic representation. Survey reminders were sent 2 and 4 weeks after the initial invitation. The responses were collected in a password protected database with access to team members involved with the analysis.
- We followed a protocol approved by the ethics research board (ERB) of PHO (Public Health Ontario).
- A standardized data collection form was used to gather information on evidence-based strategies, program characteristics, lead and partner organizations, program operation details, program indicators, and outcomes.
- Implementation issues, contextual factors, and culturally appropriate community engagement were also explored.

Phase II-b: qualitative study through semi-structured interviews

The Applied Health Research Center (AHRC) at St. Michael Hospital, Unity Health Toronto, conducted a qualitative study to understand and collect in-depth data on the strategies, programs, partnerships, context, and further details on the activities conducted at each Public Health Unit targeting youth. The interviews were conducted through a conferencing platform (Zoom®) with staff from the corresponding units who had the relevant knowledge and experience. The interviews were conducted by expert qualitative researchers and interviewers using a semi-structured interview guide developed by the project team (**Appendix 4**). The interview guide was piloted and modified accordingly to incorporate the feedback and improve the flow of the interviews' dynamics.

Quantitative analysis (Phase II-a)

Demographic information and program themes of the participating health units were analyzed quantitatively, and the results were presented in a tabular format to offer an overview of the participating health units. The data was collected through surveys completed by the public health units (PHUs).

Qualitative Study (Phase II-b)

Data generation

During phase II-b, researchers from the Qualitative and Patient Engagement in Research Team (QualTeam) at the Applied Health Research Centre conducted qualitative interviews with public health practitioners to understand their perspectives and experiences on the programs, strategies, interventions, and partnerships that their unit delivers, including key elements of the programs and interventions, as well as their contexts, potential impacts, and key elements that affect the implementation and delivering. Participants were employees at one of the 34 public health units (PHU) in Ontario, with knowledge in one or more relevant program areas (e.g., school health, substance use, healthy babies/healthy children, chronic diseases and injuries prevention, foundations standards, and harm reduction). Individuals identified in the online survey (phase I) whether they consented to be contacted for a follow-up qualitative interview; all individuals who gave their consent were contacted to arrange an interview and they identified the programs and interventions that could potentially fulfill the inclusion criteria.

Purposive sampling strategies were employed to select programs for in-depth discussion and exploration during qualitative interviews.12 Programs were purposively selected to examine and reflect diversity across intervention topics, target populations, stages of implementation, and types of intervention or initiative (e.g., primordial versus primary prevention programs). Interviews focused on one to two programs or strategies led by public health or community partners. Eligible programs were currently being implemented or were in planning phases intending to initiate implementation in the next six months.

Qualitative semi-structured interviews were conducted with 20 public health units across all regions in Ontario from March to May 2023 (**Table 4**). Interviews involved participation from one to three public health staff (e.g., program managers, public health nurses, directors, policy advisors, or health promoters) and ranged from 30 to 92 minutes in length (lasting on average 55 minutes). Interviews were audio-recorded and transcribed using the Zoom Healthcare caption system. All transcripts were reviewed, and quality checked by the ARHC study team.

Data analysis

Reflexive thematic analysis of interview transcripts was employed; reflexive thematic analysis is an inductive and data-driven analytical approach

with a continuous reflexive component done by the analysts.[13,14] This process involved:

i. a thorough reading of interview transcripts to increase familiarity and data immersion;
ii. generating a preliminary list of codes;
iii. critically examining codes for identification of patterns and contradictions to begin grouping into categories and themes;
iv. hierarchical and relational organization of themes and reviewing themes to consider the alignment between initial codes and overarching themes;
v. defining and naming all themes and sub-themes; and
vi. interpretation of the themes and production of a scholarly report.[13] Analytic summaries were produced for each interview, as well as a codebook to document the evolution of codes, categories and themes definitions, examples, and further analytic notes.[14,15] Qualitative software NVivo 14 was employed to support data management and facilitate the coding process.

Results

Phase I – Results

General considerations

Systematic reviews assessing the association between risk and protective factors and substance use (n=27), including seven metanalysis studies

These reviews present evidence on the association between substance use among adolescents and the risk factors including sexting[16], social media use[17], bullying perpetration and bullying victimization[18,19], death of a family member during childhood[20], and not in education, employment, or training (NEET)[21]. The protective factors that were examined in the studies were self-regulation[22] and school connectedness during childhood[23]. Individual studies that were downgraded observational studies, including cross-sectional or longitudinal study designs, were graded starting at 'low' quality. Observational studies can be upgraded if there is a large effect, dose-response effect, and/or and adjustment of plausible confounding.

Risk of bias

The risk of bias was assessed in five studies using a variety of tools such as 9-point assessment[24], AXIS tool[25], and Newcastle-Ottawa scale[24]. Most studies were affected by a 'serious' risk of bias, which resulted in downgrading the overall certainty.

Inconsistency

There is substantial evidence of heterogeneity in all reviews (n=7) due to large and significant p-value for heterogeneity (p-value<0.05).[16,17,21]

Indirectness

Most studies were conducted in high-income countries. The age range was greatly varied between the reviews. Some reviews included longitudinal studies which collected data on the exposures during childhood (i.e., childhood self-regulation, bullying, or death of a family member during childhood) and assessed the outcome of substance use during adolescence or adulthood. However, we did not downgrade the quality of evidence because our purpose was to report on the overall impact of risk and preventative factors rather than the effect of these factors in particular settings, geographical areas, or age groups.

Imprecision

While most studies used the ORs to measure the effect,[16,17] others used Pearson correlation[15,16] and Hedge's.[20] We have excluded studies with the pooled effect of the study not adjusted due to the small number of events and the 95% CI including appreciable harm or benefit.

Other considerations

Most studies performed funnel plots to assess publication bias for outcomes with more than 10 included studies; however, there was no publication bias detected. Studies adjusted the possible confounders when calculating the pooled effect. Thus, the quality of these studies was potentially upgraded by one or two levels.

The overall quality of evidence

As all the systemic reviews (SRs) assessing risk and protective factors are observational studies, the ROB is generally higher than RCTs.[25] These studies were also subject to inconsistency due to large and significant p-value for heterogeneity (p-value<0.05). We excluded studies with a 'low' or 'very low' level of certainty. The 'moderate' or 'high'-level of certainty was only found in a few metanalyses such as the association between bullying in childhood and later general substance use in the study of Vrijen et al., 2022[19]. Well-conducted observational studies generally yield low-quality evidence. Nevertheless, we need to consider that grading the observational studies consistently as methodological weak and starting at the grade of "low" quality may not reflect our research context appropriately[26].

Systematic reviews assessing the effectiveness of interventions on substance use (n=19 including 6 meta-analysis studies)

All individual studies included in the reviews were either RCTs or quasi-experiments. The most common intervention assessed in the reviews is the universal intervention targeting multiple substance use risk behaviours rather than substance use in isolation. Thus, substance use as an outcome was often evaluated together with other risk behaviour outcomes including alcohol use, tobacco use, risky sexual behaviour, or antisocial behaviours. Other interventions included culturally adapted intervention and primary care-relevant intervention[27-36]

Risk of bias

Most reviews already conducted the assessment for ROB using the Cochrane ROB tool. Overall, most reviews are subject to "serious" levels of ROB due to the lack of blinding of participants and personnel and some other risk domains. Indeed, blinding is often not possible in the interventions of interest. Studies further excluded were affected by "very serious" ROB due to an elevated risk of sequence generation, allocation concealment, blinding of outcome assessment, and other domains.

Inconsistency

A 'serious' level of heterogeneity was evident in the majority of meta-analysis studies (n=5) (I2> 50% and p-value <0.05). Nevertheless, the heterogeneity was highly anticipated due to a large variation in the population, intervention, and comparison.

Indirectness

Most reviews that we included did not display any serious indirectness. Studies aimed to assess the overall effectiveness of interventions targeting multiple risk behaviours, rather than the impact of these interventions on different geographical regions.

Imprecision

Imprecision was present in several studies. While a few studies calculated the pooled effect of relative measures using ORs, other reviews calculated the standardized mean difference. Imprecision was determined as 'serious' because the 95% of CIs include no effect (OR=1) and appreciable benefit or harm. In other instances, the 95% CIs included no mean difference (Hedge's g=0), and the sample sizes are small.

Other considerations

The funnel plot was used across SRs to examine the study effect size against sample size to detect publication bias or small-study effect size. However, all related outcomes in these reviews have fewer than ten studies, which is not indicated for the use of funnel plots to assess publication bias. Furthermore, the study of Skeen et al., did not formally test publication bias as publication bias is yet understood in the context of robust variance estimation meta-analysis which was used in this review. The publication bias was deemed as "undetected" in these studies.

The overall quality of evidence

In most reviews, there is 'very low' to 'moderate' quality evidence that these interventions have a small beneficial effect for preventing substance use in adolescents. Other reviews showed the opposite direction of the association. The low level of certainty was due to several factors. First, many studies were subject to a high ROB due to a lack of blinding, lack of sequence generation, and lack of allocation concealment. As mentioned previously, it is not always possible to blind complex public health interventions such as those included in these reviews. Second, we downgraded the quality of evidence based on inconsistency when there was substantial evidence of heterogeneity (large I2 and p-value of heterogeneity <0.05). Third, the imprecision of the effect estimates was evident as the 95% CIs include no effect and appreciable benefit or harm[35-37].

Risk and Protective Factors – Results

Comprehending the risk and protective factors associated with youth opioid and unregulated drug use necessitates a comprehensive socio-ecological approach. The socio-ecological model (SEM) comprehensively examines multiple levels of influence, encompassing individual to societal factors. This literature review provides a comprehensive overview of risk and protective factors across various levels of the socio-ecological model that were most significant based on our literature review.

Table 2: Comprehensive overview of risk and protective factors across the SEM

SEM Level (N=# of studies)	Risk factors	Protective factors
Individual (N=17)		
• Genetics • Mental health: Internalizing and externalizing factors (one study) • Impulsivity • Self-control • Low self-esteem • ACES (Adverse Childhood Experiences) • History of trauma • Parental separation before the age of 18 years • Cumulative effects of ACES	• Genetic predisposition or family history of substance use disorders • Mental health conditions, such as depression, anxiety, or conduct disorders • Impulsivity and sensation-seeking tendencies in early years • Lack of knowledge about the risks associated with drug use • Low self-esteem or low self-worth	• Self-control/regulation in early years • Cultural identity • Ethnic identity • Reflective process • Reasons for life • Individual mastering • Optimism
Interpersonal /peer (N=3)		
• Peer drug use • Prosocial network • Communication skills • Peer pressure	• Association with peers who engage in drug use or have positive attitudes toward drug use • Peer pressure and influence to experiment with drugs • Lack of positive social support or prosocial peer networks • Inadequate communication and conflict resolution skills	• Peer influence (discouraging risky behaviour) • Prosocial peer network against bullying

SEM Level (N=# of studies)	Risk factors	Protective factors
Microsystem (school, family) (N=5)		
• Academic performance • Parental substance use • Parental supervision • School environment • Exposure to bullying or violence	*School* • Poor academic performance or school disengagement • Exposure to violence or bullying in school or community settings • Lack of positive school environment and engagement • Homework completeness *Family* • Parental substance use or drug availability within the household • Inadequate parental supervision or inconsistent discipline or regulation impairment • Neglect • Household trauma and/or abuse • Maternal factors e.g., prenatal maternal smoking; poor maternal psychological control • Low parental education • Uncontrolled pocket money for youth in high-income families • Prolonged/ uncontrolled screen time • Alexithymia associated with difficulties in attachment and interpersonal relations	School • Strong social support networks, and participation in extracurricular activities. *Family* • Positive family relationships • Parental involvement • Family role and parental monitoring • Intact families with warmth and predicted social ties • Family socioeconomic status • Residential stability
Macrosystem (community and society) (N=4 (community), 2 (society))		

Neighbourhood characteristics
• Cultural norms
• Media portrayal of drug use
• SDOH:
  • Education
  • Housing
  • Employment
  • Recreation
  • Culture
  • Ethnic background
	• Neighborhood poverty, crime rates, and availability of drugs
	• Limited access to education, employment, and recreational opportunities
	• Cultural norms and attitudes that tolerate or glamorize drug use.
	• Inadequate drug prevention and treatment resources in the community
	• Media portrayal of drug use as normative or desirable
		• Community monitoring
		• Community support

It is important to note that these factors interact with each other and can have cumulative effects on youth substance use, with certain upstream risk and protective factors increasing or decreasing the likelihood of experiencing later compounding factors. Identifying and addressing risk factors while promoting protective factors can help prevent and reduce the likelihood of youth engaging in opioid and unregulated drug use.

The literature review presents an extensive compilation of risk and protective factors within the socio-ecological model (SEM) framework, offering valuable insights into the complex interplay of factors influencing opioid and substance use among youth.

Specific risk and protective factors contextual situations

While Table 2 provided a comprehensive overview of the general risk and protective factors, we acknowledge the importance of outlining specific contexts to gain a deeper understanding of the issue in various situations. Examining particular conditions within their unique contexts will enable a more complete and nuanced perspective to inform collaboration and intervention.

1. Risk and protective factors across the SEM among Indigenous nations[37]

Indigenous youth persistently encounter inequities in SDOH (Social Determinants of Health) and are confronted with the enduring consequences of intergenerational trauma, reflective of the lingering impacts of colonialism. These disparities significantly contribute to elevated rates of morbidity and mortality associated with opioid, alcohol, and other substance use among Indigenous communities. The literature review has shed light on a plethora of protective and risk factors, intricately interwoven within the Social Ecological Model (SEM) framework, that pertains to Indigenous communities in Canada and the US (United States). Notably, the spiritual connections of Indigenous youth play a pivotal role in nurturing their wholesome development since birth. Any disruption in these connections can profoundly affect their spiritual well-being. Moreover, the systematic review highlighted a crucial unifying factor among these various systems: the influential presence of a supportive relationship with a prosocial adult, who fosters future aspirations and cultivates a positive cultural identity. Such nurturing relationships emerge as a cornerstone for the well-being and resilience of Indigenous youth in the face of adversities.

2. Self regulation[22]

Self-regulation has been proven to have an association with multiple childhood trajectories. In terms of substance use, there is a positive association between self-regulation from early childhood to late childhood and late childhood to adulthood to prevent substance use.

3. Neurobiological pathway[38]

The influence of childhood experiences on the risk of drug use later in life has been extensively studied, with a specific focus on the individual level within this pathway. Various risk factors have been identified, including early life stress, exposure to five or more adverse childhood experiences (ACEs), child maltreatment before the age of 11 years, and peer pressure. These factors can significantly increase the likelihood of developing substance use disorder.

Notably, neurobiological changes associated with early life stresses have been observed in distinct brain regions. During the ages of 3 to 5 years, the hippocampus undergoes alterations, followed by changes in the amygdala at 10-11 years, and finally, the prefrontal cortex at 14-16 years. These brain regions play crucial roles in emotional regulation, memory formation, and decision-making processes.

Moreover, it is important to consider the effect of brain plasticity on health and recovery from ACEs. The brain's remarkable ability to adapt and reorganize itself in response to experiences is known as brain plasticity. Positive experiences, interventions, and support systems can harness brain plasticity to promote healing and resilience in individuals who have faced adversity during childhood. Understanding how brain plasticity can be harnessed effectively offers valuable insights into developing targeted interventions for those affected by ACEs and substance use issues.

Additionally, drug use itself has a profound impact on the brain's reward system, leading to an increase in dopamine release. This reinforces the association between drug use and pleasurable sensations, making individuals more susceptible to addiction.

In conclusion, recognizing the neurobiological pathway connecting childhood experiences, drug use, and brain plasticity provides essential insights for designing effective interventions to mitigate the impact of ACEs and facilitate recovery from substance use disorders. Harnessing the brain's plasticity can be a key component in promoting long-term health and well-being for individuals who have faced adversity in their early lives.

4. ACES cumulative effect[39]

A scoping study was conducted to examine the cumulative impact of Adverse Childhood Experiences (ACES), encompassing household dysfunction, neglect, and abuse, in their capacity as moderators that interact with adult life stressors to augment the vulnerability to substance use.

5. Screening, Empowerment, Education (SEE) Model[40]

A study of recurring themes of risk factors for developing substance use across age groups that can be a basis for screening below 18 and from 18-26 years of age including ACES, social and emotional trauma, loss/grief, SDOH either demographic or socioeconomic, environmental factors (peer pressure), family history (genetic inheritance or substance use exposure), chronic physical conditions, college students and military service (both between 18-26 years).

6. Bullying[18,19]

Reviews have substantially enhanced our understanding of the link between bullying and substance use. The prevalence of young people affected by bullying perpetration or victimization worldwide ranges from 10% to 65% and the worldwide rate of school adolescents aged 13–15 is approximately 25% for alcohol use, 20% for tobacco use, 5% for cannabis, and below 1% for amphetamine-type stimulants. Extant studies have documented that bullying behavior is a significant risk marker for risk-taking behaviors, most notably, alcohol, tobacco, and illicit drug use. Bullies are likely to experience negative outcomes, such as elevated rates of mental health problems, conduct problems, internalizing and externalizing problems, and emotional dysregulation—all of which can heighten their risk of engaging in alcohol and drugs. individual risk factors for bullying behavior, which can reinforce risk behaviors (e.g., substance use) such as low school performance, psychiatric conditions and emotional distress, and hyperactivity. These individual factors can adversely affect children's relationships and socialization in school.

School and family risk factors involve the study of peer dynamics, peer ecologies of adolescents, peer groups, friendships, and rival relations in the classroom and in school as well as family dynamics.

7. Young people not in education, employment, or training (NEET)[21]

NEET posits a substantial correlation between the mental health of adolescents and the occurrence of substance use issues, particularly concerning their status as individuals not in education, employment, or training

8. SDOH effect on mortality and morbidity of people who use drugs[41]

An empiric study highlighted the trend of drug overdose morbidity and mortality in the United States by major socioeconomic groups as well as patterns of disparities in opioid-related pain management and treatment outcomes. Substantial geographic, racial/ethnic, gender, and socioeconomic disparities in drug overdose mortality exist.

9. Impact of other drugs or substance use/ exposure on opioid use in adolescents and youth[42]

Cannabis policy bundles and opioid drug use is complex and influenced by multiple variables. More extensive and rigorous studies are needed to fully understand the potential impact of cannabis policies on opioid use and related outcomes.

Energy drinks[43]: Significant association between energy drinks consumption and use of cannabis, nonprescription opioid, amphetamine, and cocaine[44]. Limited longitudinal study for only one study. One study shows a significant association in girls.

Nicotine gateway effect[45]: Substantial epidemiological data suggest that teenagers are more vulnerable than adults to nicotine dependence following minimal tobacco exposure (fewer than seven cigarettes in one month). Event-related functional neuroimaging studies in children, adolescents, and adults suggest that children and adolescents have over-reactive reward responses and improved task performance when earning rewards, suggesting enhanced engagement in behaviors that result in immediate gratification. Such factors make adolescents more vulnerable to drug use and abuse.

10. Multifactorial risk and protective factors during adolescence[46,47]

Currently, the growing use of tobacco products and electronic cigarettes among teenagers represents a major public health concern. Adolescent exposure to tobacco or nicotine can lead to subsequent abuse of nicotine and other substances, which is known as the gateway hypothesis. The review emphasized that the effects of nicotine are highly dependent on the timing of exposure, with a dynamic interaction of nAChRs with dopaminergic, endocannabinoid, and opioidergic systems to enhance general drug reward

and reinforcement. Through a comprehensive analysis of relevant studies, a range of factors that contribute to the increased likelihood of drug use in adolescents were identified.

These factors included:

- Individual characteristics: for example, gender, age, and mental health issues
- Family dynamics such as parental substance use and poor parental monitoring, peer influences
- Broader societal factors such as the availability and accessibility of drugs. Conversely, protective factors that were found to mitigate the risk of drug abuse included positive family relationships, parental involvement, strong social support networks, and participation in extracurricular activities

The review presents an enormous collection of clinical and preclinical evidence that adolescent nicotine exposure influences long-term molecular, biochemical, and functional changes in the brain that encourage subsequent drug abuse.

Preventative interventions – Results

A Systematic and in-depth review of the literature exploring prevention themes across the SEM uncovered five primordial prevention interventions that address SDOH and ACEs and 14 studies primarily focused on school settings, with or without family involvement. Varied levels of prevention focusing on youth in eight reviews, children in four reviews, children, and youth in two reviews, family in two reviews, and community in three reviews (**Table 3**). Effective prevention efforts often involve comprehensive strategies addressing multiple levels of influence within the socio-ecological model.

Table 3: Summary of evidence-based preventive interventions

Approach /theme	Population and impact	Setting (SEM)	Outcome
Teacher-provided placed emphasis on 5 learning modalities[48] 1. parent skills 2. using school-based and multiple prevention strategies 3. implementing booster sessions 4. developing healthy peer-refusing skills early in the adolescent's life, and 5. targeting common risk and protective factors for multiple problem behaviours Examples of these family/ caregiver-focused interventions:	Youth and problem behaviours Caregivers to children from preK-12th grade 10 studies utilizing 11 preventive intervention programs including the three categories: 1. universal (all youth) 2. selective (youth with elevated risk) 3. indicated preventive programs focused on youth (youth exhibiting early behavioural problems)	School-based Universal and targeted The distinctive criteria of these studies are: • Include parents and or caregivers • Use Society for Prevention Research (SPR) criteria • Measure short-term impact (6m-1yr) and longer-term impacts (3 years or more past baseline) i.e., tracking intervention effect	Substance initiation index measurement for alcohol, tobacco, and all other substance use (SU) in addition to sexual protective/ risk behaviours (e.g., use of condom in the intervention group) in youth Family adaptability substance initiation index; ATOD (alcohol, tobacco, and other drugs) Key outcome findings:

Approach /theme	Population and impact	Setting (SEM)	Outcome
• Iowa Strength Family Prevention (ISPF) • Linking the Interests of Families and Teachers (LIFT (Linking the Interests of Families and Teachers) (Linking the Interests of Families and Teachers)) • Families and Schools Together (FAST) • Preparing for the Drug Free Years (PDFY) • Incredible Years BASIC (IYB) • Parent Training Program • Positive Parenting Program (Triple P) • Early Risers Conduct Problems Preventive Intervention (ER) • Management Training-Oregon Model • Family Check-Up (FCU) • Familias Unidas (FU)		• They do not measure only initiation and misuse of alcohol but also measure initiation and rate of tobacco, drugs and some interventions include other risk behaviours like sexual health risks. • They measure the effect from early years to high school (from K-12 grade)	• ISFP's level of significance was stronger for each of the outcomes; direct effects: ISFP and PDFY had a significant effect on lifetime STD (Sexually Transmitted Disease), but only ISFP had a significant effect on SU and sex. • Tobacco initiation, 10% reduced risk • Alcohol initiation, 9% reduced risk • Reduced rates of growth in the use of tobacco and illicit drugs for girls • Reductions in playground aggression during fifth grade Substance Initiation Index (SII) showed significant small intervention effects on 12th grade for both the LST (12th grade) and the LST and SFP for intervention conditions versus the control FAST participants exhibited better reduction in externalizing behaviors on the follow-up Child Behavior Checklist (CBCL) and Parent Rating Scale PMTO group associated with reductions in average levels of deviant peer association and reduction and significant delay in the timing of police arrests for youth in the PMTO group as compared to the control group. Youth from families engaged in the FCU intervention reported lower rates of antisocial behavior and SU

Approach /theme	Population and impact	Setting (SEM)	Outcome
Computer technology and theory-based targeting primary prevention and designed as part of the school-based curricula[49] facilitated by teachers and or social workers. It is a promising field that had progressed immensely in the last couple of years and requires further evaluation.	29 reviews using serious games (digital interventions most supported focused on prevention providing information, computational techniques addressing: 13 studies alcohol, drugs-7 studies (methamphetamines, inhalants, cannabis, Lysergic acid diethylamide, cocaine, and heroin). 7 studies combined use and 2 studies on comorbidities (violence, depression)	School-based	Improved resilience for primary prevention In addition to successful outcomes for harm reduction as secondary prevention Prolonged use of intervention was associated with stronger effects and more significant knowledge gain and more likelihood to implement protective factors
School-based intervention targeting multiple risk factors of ACES[50],	Adolescents from 11-18 years 36 studies in high-income countries 13 studies for high-risk For alcohol, tobacco, cannabis, and other substances	School-based	Small equity-based interventions with a wide impact on resilience and awareness for alcohol, tobacco, and drug use. Universal intervention proved more effective than targeted interventions • Low to moderate effect on use for short-term intervention (<1 year) for universal programs. • No or small effect on long term (more than a year) • Combination of small universal interventions may have high public health benefits.
An approach using three models: Institute of Medicine (IOM) Model, Public Health Model and Center for Substance Abuse Prevention (CSAP) Model	Youth and children from 6-24 years in addition to all caring adults may have a long ongoing relationship with the child including primary care providers. Assessment includes multiple venues:	A multifaceted approach to SUD (substance use disorders) prevention, integrating evidence-based strategies and addressing underlying social determinants of health.	collaboration between healthcare providers, educators, policymakers, and communities. Integration of policy and environment in primary prevention.

Approach /theme	Population and impact	Setting (SEM)	Outcome
These three models offer different perspectives and approaches to substance use disorder prevention, with each model providing valuable insights and strategies to inform effective prevention efforts[51].	family programs, community programs, policies and laws, schools and high-quality anti-substance programs disciplinary settings, mentoring programs, child protective services, clubs, and sports in the context of primary, secondary, and tertiary interventions		
A coordinated approach across a variety of systems in the form of comprehensive community initiatives (CCI), geographically bounded, multisectoral to build local capacity. The CCI includes school reform efforts and healthy activity campaigns.[52]	Comprehensive community initiatives (CCI). 25 studies Short term 1 year after intervention as early as grade 7 and sustained intervention up to 7 years post interventions	Community-based Targeting ACES and SDOH	The conflation of population-level behavioural outcomes
Cultural adaptation or tailoring to specific populations using scripting drug refusal strategies to incorporate ways of being and knowing. The tailoring of the intervention to understand the root cause and culture is important to address risk factors.[52,53]	1. Indigenous preteens (7-13 years) scoping reviews -elementary school-based interventions for preventing substance use -11 studies (7 in the US, 3 in Canada, 1 in Australia) 2. Black adolescent girls (15 interventions addressing sexual health and drug use		
Multimodal with four themes of effective interventions: 1. the developmental ecology of the child. 2. a family and community focus 3. a focus on access and opportunity; and 4. multi-modal strategy recognising the need for systems integration[54]	Intervention to prevent volatile substance misuse (VSM) including adhesives, solvents m gases to achieve intoxication leading to perceived change in mental state use among children. The VSM is reported to be a bio-psycho-social escape from the emotional pain of adverse life experiences. 12 interventions aimed at community-based VSM interventions aimed at children for the 10-year period (2010-2019)	Multi-modal family and community	Community mobilization involving key government and nongovernmental systems.

Approach /theme	Population and impact	Setting (SEM)	Outcome
Integration of theory-based, health, and developmental interventions[55]. Holistic intervention to develop programs addressing two or more of the following development domains: 1. Sexual and reproductive health (SRH) 2. Education and employment 3. Substance use 4. Violence A theory or framework was specified e.g., social learning theory, empowerment theories used among girls and low/medium income countries (LMIC), social development theory, and the theory of triadic influence	Review of 23 articles reporting 21 theory-based interventions that integrated multiple health and developmental domains. Two interventions included participants younger than 10 years, three interventions included youth older than 18. Sample sizes ranged from 100-5000 youths	Empiric intervention (9 programs) High-risk approach specific racial or ethnic groups (5 programs) Special populations such as girls at risk of poor health or education (5 programs) Youth dropped out of school (1 program), youth in juvenile detention (1 program)	Empowerment and healthy choices to thrive. Behavioural change is not merely a change in knowledge or attitudes
Adolescent mental health: empiric program helping adolescent thrive components[56]	158 studies were included of universally delivered psychosocial interventions to adolescents aged 10-19 between 2000-2018	Community Universally delivered interventions to improve adolescent mental health and reduce risk behavior	Build resilience and empowerment against violence, substance use, and bullying Positive mental health. Of 7 components with consistent signals of effectiveness, 3 had significant effects over multiple outcomes (interpersonal skills, emotional regulation, and alcohol and drug education)
Evaluation of existing programs Life Skills Training (LST), DARE Strengthening Family Program (SFP) using RE-AIM approach[57]	Studies published until March 31, 2020. The reviews look at preventive programs for school-aged children and youth. 90 studies represented 16 programs that met the eligibility criteria:	Community population approach to children and youth	It is challenging to assess the effectiveness of all programs because of high heterogeneity

Approach /theme	Population and impact	Setting (SEM)	Outcome
	1. designed for general population of children and youth. 2. delivered to general population. 3. targeting children and youth 4. included a control group		It is important to evaluate the outcome based on what each program indicators are offering related to general life skills, intra- and interpersonal life skills, substance-specific skills, resistance skills, self-concept, problem-solving, stress, and anxiety management. Programs are evaluated based on duration from 6 months to 9.5 years. Caution should be exercised in generalizing program effects found in previous cohorts to today's children and youth. Also, the continued implementation of any program without compelling evidence is problematic given the potential for ineffective resource use and missed prevention opportunities.
Youth participatory approach [58] An approach that provides a youth perspective to the research and community. It holds promise to influence the prevention outcome	15 studies of peer-reviewed literature from 1998- April 30, 2018, by using reliability testing guidelines for assessing participatory research projects	The empiric community-based approach provides youth with the opportunity to study social problems affecting their lives and action to solve these problems	Youth engagement in social action in the school and community at the policy level in addition to peer support
Universal family-based preventive programs focus on building preventive capacity with universal context that can be culturally adapted. Effectivity may involve encouraging interactions between children and parents. e.g., socio-educational strengthened family program. These programs have been adapted worldwide in over 22 countries[59].	19 studies to review 7 strengthened family programs (SFP) on the prevention of substance use. The program is made up of 7 sessions conducted once a week for 7 weeks followed by 4 booster sessions. Pre and post follow-up ranged between 6 months up to 4-6 years	Empiric family-based approach for parents and children	Significant positive Impacts measured over time include: 1. Behavioural problems (self-control) 2. Resistance to peer group pressure 3. Parental skills and family relations
Intervention programs focusing on children with parents with opioid disorders[60].	6 child focus programs dating from the 1990s-2000s and generalized to parents with substance use disorders (SUDs)	Community-based Child ACES focus intervention	Resilience and protective factors in the face of adversity as positive adaptation

Approach /theme	Population and impact	Setting (SEM)	Outcome
The programs focus on recruitment and retention strategies of high-risk children ranging from K-12 grades targeting multiple risk factors			achievement of adaptation by developing some individual characteristics Access resources
Clinical consideration for post-surgical pain management in children is defined as opioid stewardship. Optimal opioid stewardship is paramount for healthcare professionals caring for children who require surgery. It is a preventive measure guideline to prevent adolescence from accessing opioid substances[61].	Reviews of articles published from 1988-2019 of 217 articles with qualitative synthesis of 20 guideline statements.	Community-based High-risk approach for health care professionals with engaging families and patients	1. Knowledge of the risk of opioid misuse associated with prescription opioids 2. Nonopioid analgesic optimization in the perioperative period 3. Patient and family education regarding perioperative pain management and safe opioid use practices must occur both before and after surgery

PHASE II-a: Results – Survey

A synthesis of results generated from the online quantitative survey and qualitative interviews (phase II) is presented. A summary of survey quantitative results describes the types of interventions, target populations, and level of delivery. Further survey results are integrated alongside qualitative findings.

Table 4: PHUs demographic profile

PHU Characteristics	PHU Demographics	N =	%
Number of Participating PHUs	Participation	22 of 34	64.7
Health Unit Region	Central West	6	27.3
	Central East	4	18.2
	Southwest	4	18.2
	East	3	13.6
	Northeast	3	13.6
	Northwest	2	9.1
Health Unit Population Size	<100,000	3	13.6
	100,000 to 200,000	8	36.4
	200,001 to 1,000,000	9	40.9
	1,000,001 +	2	9.1
Health Unit Peer Group	Mainly Rural	4	18.2
	Sparsely Populated Urban-Rural Mix	3	13.6
	Urban Centres	3	13.6
	Urban-Rural Mix	12	54.6

Table 5: Types of PHU interventions, target populations, and level of program delivery

Characteristics of Interventions	Description of Interventions	N=
Overall Interventions	Total number of interventions	99
	Average number of interventions per PHU	4.5
Types of Strategies/ Interventions (n=82)	Universal/Empiric	21
	Targeted	22
	Mix of universal and targeted	39
Age Range of Target Group (n=99)	0-13 years	66
	14-18 years	79
	19-24 years	42
Health Unit Population Size	Others	21
Level of Intervention (n=99)	Individual	44
	Childcare-based	12
	School-based	57
	Family-based	39
	Community-based	57
	Digital	8
	Policy	27
	Others	7

Quantitative survey results indicated that almost all substance use prevention interventions among youth submitted (97%) aimed to address individual risk and protective factors. Many also focused on social factors, including:

- school/community factors (91.9%)
- family factors (72.7%)
- social determinants of health (77.8%).

Less than half aimed to address the impact of adverse childhood experiences (42.2%). Many of the interventions targeted toward individual factors focused on substance use prevention education and training (72.9%). Many also focused on resilience (78.1%), coping (67.7%), and improving mental health and wellbeing (55.2%). Interventions focused on school/community factors predominantly addressed social connectedness, such as community support (83.5%), social networks (63.7%), or school connectedness (44.4%).

Many also addressed peer pressure or peer delinquency (42.9%). Interventions focused on family factors mostly aimed to address family relations (77.8%), family support (65.3%), provide parental education (58.3%), or improve experience (55.6%). Interventions targeting social determinants of health addressed a wide variety of factors such as stigma and discrimination, inequality, access to health services, and socioeconomic status. Interventions targeted toward the impact of Adverse Childhood Experiences focused on factors such as family member substance abuse (76.2%), family member mental illness (64.3%), domestic violence (64.3%), adverse life events (54.8%), or child abuse or neglect (approximately 60%) **(Table 6)**.

Table 6: Risk and protective factors addressed in public health youth substance use prevention interventions

Risk and Protective Factors Interventions Aim to Address	Types of Factors	N=
Level of Risk and Protective Factors (n=99)	Individual	96
	School/Community	91
	Social Determinants of Health	77
	Family	72
	Adverse Childhood Experiences	42
Individual Factors (n=96)	Resilience	75
	Substance use prevention education and training	70
	Coping/Self-regulation	65
	Mental health and wellbeing	53
	Perceived risk of harm from substances	47
	Nurturing Childhood Environment	46
	Self-efficacy	40
	Self-Esteem	36
	Self-control, Impulsivity	32
	Physical activity	32
	Mental illness	31
	Exposure to violence (community/domestic)	29
	Spirituality	17
	Internalizing and externalizing symptoms	14
	Academic performance	12
	Others	9
	Previous medical prescription use	8

Risk and Protective Factors Interventions Aim to Address	Types of Factors	N=
School and Community Factors (n=91)	Community support	76
	Social network	58
	School connectedness	40
	Peer pressure/peer influence/peer delinquency	39
	Neighbourhood support	32
	Accessibility/availability of substances	22
	Built environment	21
	Others	11
Social Determinants of Health Factors (n=77)	Stigma and discrimination	56
	Inequalities	42
	Access to health services	37
	Diversity and inclusion	30
	Socio-economic status	20
	Housing	18
	Employment	14
	Others	12
Family Factors (n=72)	Family relations/connectedness	56
	Family support	47
	Parental education	42
	Parenting experiences	40
	Family socio-economic status	17
	Others	10
Adverse Childhood Experiences Factors (n=42)	Parent/family member substance use	32
	Domestic violence	27
	Parent/family member(s) mental illness	27
	Neglect: Emotional	26
	Neglect: Physical	25
	Abuse: Emotional	24
	Abuse: Mental	24
	Abuse: Sexual	24
	Abuse: Physical	23
	Adverse life events	23
	Parental separation/divorce	22
	Parental incarceration	19
	Others	9

PHASE II-b: Results – Qualitative study

The reflexive thematic analysis examines key factors shaping the design, implementation, and evaluation of public health substance use prevention interventions among youth in Ontario. The analysis identified a diversity of factors around.

i. experiences in program planning, delivery, and evaluation;
ii. roles of partner, public health, and youth;
iii. contextual factors; and
iv. the importance of risk and protective factors to youth substance use. In addition, the analysis allowed for the identification of promising approaches to substance use prevention, which are outlined in this report.

In the next pages, we provide a detailed description of the four main groups of factors; each section contains a descriptive summary of the factors and is illustrated by a sample of quotes (raw data) that facilitate the understanding of the complexities surrounding the implementation of the studied strategies and programs. The survey results have been integrated into the results of the qualitative interviews for a more comprehensive and detailed understanding. At the end of the report, in Appendix 5, there is a more exhaustive representation of quotes for each assigned group and sub-group of factors.

Figure 2: Main factors impacting the design, implementation, and evaluation of substance use prevention interventions for youth in Ontario.

I. Experiences of program planning, delivery & evaluation

Survey results and qualitative interview analysis highlighted challenges encountered by public health staff related to the design, implementation, and evaluation of the interventions, including constraints to understanding the local burden of substance use issues among youth, data availability, and methods and data to measure intervention success. In particular, the results of the interviews showed the importance of understanding each local context, the need to access diverse types of data that demonstrate the health risks of the youth living in that geographical and social location, and the significance and challenges of assessing the impact of their programs in a short time.

Understanding local burden of substance use among youth

Alcohol, tobacco, and vaping were identified by study participants as the primary substances used by youth in their respective regions, and many offered comparisons across substance use rates for their region to provincial averages. Although many participants shared that the opioid crisis (both provincially and in their public health regions) represented an important concern in general, few participants indicated that opioid or illicit drug use was represented as a key concern for youth in their area, specifically.

> *For us - obviously, alcohol use within secondary students is a concern… Alcohol, cannabis, vaping is a concern that gets brought up quite a bit from our local schools just because kids are vaping within the school setting, within classes, within bathrooms, and all that kind of stuff. That's probably what comes up the most. There is some level of concern about opioid use, but not as great as I would say the others. (PHU 03)*

However, many participants emphasized that the lack of recent population-level data due to disruptions from COVID-19 has severely hindered their understanding of the local and current substance use issues experienced by youth. Participants described the scarcity of data and its impact on their knowledge and capacity to plan substance use prevention programs to adequately address relevant needs among youth:

> *We do rely a lot on the Ontario Drug Youth and Health Survey data, the challenge being we don't always get local data. So, we're sometimes making assumptions that we're similar to the provincial trends. (PHU 04)*

In the absence of recent data, many interviewees shared examples of relying on anecdotal evidence to understand key substance use challenges experienced by youth in their regions, primarily as indicated by community or school partners.

Availability & sources of data for program planning, delivery & measuring success

The quantitative survey also explored key evaluation indicators and sources of evidence used to inform planning and evaluation processes for interventions. Almost all the interventions (97%) had defined goals and objectives, but while many identified evaluation outcomes (65.7%), less than half identified outcome indicators (48.5%) to operationalize the outcomes. About two-thirds of interventions had identified process indicators (65.7%) for evaluation.

Most of the interventions were planned or evaluated using one of the following methods:

- environmental scan (44.4%)
- community needs assessment (30.3%)
- health equity impact assessment (21.2%)
- health impact assessment (6.1%).
- Logic model for planning and evaluation purposes (43.4%).

The primary sources of evidence used to support interventions were qualitative data gathered through field testing in the community via surveys, focus groups, or interviews (64.7%), followed by grey literature (57.6%) and environmental scans (49.5%). Systematic reviews or meta-analyses were used to inform 38.4% of interventions, whereas 19.2% of programs were based on primary interventional or quasi-interventional studies, such as a pre-post study with a control group.

According to survey results, less than half of interventions (43.2%) had been evaluated at the time of the survey, with intentions to evaluate interventions in the future highlighted for approximately one-third of interventions (37.9%) (**Table 7**).

Table 7: Planning and evaluation of interventions

Intervention Planning and Evaluation	Type	N=
Components of Planning and Evaluation (n=99)	Goals and Objectives	96
	Outcomes	65
	Process Indicators	65
	Service Plans / Work Plans	59
	Outcomes Indicators	48
	Environmental Scan	44
	Logic Models	43
	Community Needs Assessment	30
	Others	24
	Health Equity Impact Assessment	21
	Project Charter	19
	Health Impact Assessment	6
Sources of Evidence to Support Intervention (n=99)	Primary Qualitative Data	64
	Grey Literature	57
	Literature Review	49
	Environmental Scan	49
	Theory-based	42
	Systematic Review or Meta-Analysis of Various Study Types	38
	Others	23
	Primary Intervention or Quasi-Intervention Research	19
	Narrative Review	16
	Indigenous Oral History	2
	Critical Ethnography	1
Evaluation of Intervention (n=95)	Intervention was an evaluation	41
	Intervention was not evaluated, but there are plans to evaluate it in the future	36
	Intervention was not evaluated, and there are no plans to evaluate it in the future	9
	Don't know	8
	Not applicable	1

During the qualitative interviews, participants described a wealth of diverse supporting data sources to demonstrate that initiatives were grounded in robust evidence and best practices. Key examples include:

- Conducting environmental scans and reviews of grey/peer literature and survey data (e.g., the longitudinal COMPASS or Ipsos surveys).
- Provincial population data (e.g., the Ontario Student Drug Use and Health Survey).
- Local programs (e.g., resilience training modules or substance use toolkits).
- National examples (e.g., the Alberta Family Wellness Initiative's Brain Story, Strengthening Parents Programs, and the Healthy Baby Health Children Program).
- International best practices (e.g., the Nurse-Family Partnership and the Planet Youth Icelandic Prevention Model).
- Communities of practice (e.g., for adverse childhood experiences (ACEs) or Planet Youth in Ontario).
- Evidence-based frameworks or models (e.g., the Search Institute 40 Development Assets, Hart's ladder of youth participation, the Asset-based community development model, or the Flourishing Life framework), provincial government frameworks (e.g., SteppingStones and Stepping Up Frameworks, and Comprehensive School Approaches); and
- Provincial, national, and international public health guidelines (e.g., the Ontario Public Health Standards, Health Canada's Four Pillar framework, or the Ottawa Charter for Health Promotion)[62-73]

Conducting pilot studies or programs was also recognized as a supporting strategy and source of preliminary evidence to document the impact of programs and to help PHUs solicit more sustainable funding for scaling up programs. In addition, learning from and integrating the lived experiences of individuals with substance use, and drawing upon community engagement strategies, are examples of other strategies to show that interventions were youth- and community-centred.[74-79]

Measuring success: Metrics & challenges

Interview participants emphasized that although the primary goal for many interventions was to decrease substance use rates among youth, evaluation plans relied heavily on using process indicators to document the level of engagement or attendance in interventions as a measure of success. Examples of process indicators shared include the number of youth or adult participants engaged in activities, registration for events or training, number of activities or events held, establishing terms of reference with partners, or social media or website metrics (e.g., website visits or number of comments/shares/'likes'). Participant feedback surveys, including those conducted pre- and post-interventions, were also frequently employed to analyze changes in knowledge or attitudes related to substance use among youth, or individuals' experiences of participation in trainings, presentations, or events. One participant described tracking "everything":

> *We make sure everything is tracked. So, every workshop, every school, every student, staff members, tracked. For example, they went to 7 classes and 200 students were reached through programming. We have like 150 students reached through the tobacco and vaping presentations completed as well, and up to 638 students reached through the nicotine and tobacco programming for high schools. (PHU 15)*

However, measuring the impact of interventions on broader health outcomes also represented a key challenge. The multidimensional nature of substance use prevention programs, lack of accessible data, difficulty quantifying or tracking certain measures (e.g., connections to community partners or services or health inequities), as well as the limited capacity of PHUs to adequately claim that changes in substance use patterns are attributed to one specific public health program were outlined by participants:

> *It's always a challenge for public health to prove outcomes when it's multiple organizations, and initiatives, and society in general who contribute to health issues or social determinants of health. So, it's very difficult for us often to isolate our particular program or intervention as being the 'be all, end all' right, of impacting a specific outcome. So that's always a challenge for us. We actually try often to focus more on capacity building or actual physical or social factors. We can quantify, or tell a story about, or something versus the actual increases in income in the neighborhood. It's very challenging always to measure outcomes at a particular level. (PHU 07)*

The lack of capacity of PHUs to collect and analyze their own data, challenges with data-sharing between partners and an overall reliance on receiving data from other sectors to inform program planning and evaluation were additional obstacles shared by participants. For example, public health units often rely on the OSDUHS survey from the Ministry of Education. COVID-19 further hindered evaluation efforts across many PHUs, as interventions are being re-introduced or implemented, but have not yet been evaluated.

II. Role of partners, public health, and youth

An extensive network of partnerships was highlighted in both the survey responses and interviews. The critical importance of partnerships, diverse roles, and responsibilities of PHUs, as well as engaging youth and priority populations shape the planning and delivery of substance use programs. The participating units explained how partnering or collaborating with community organizations, schools, members of the community, Indigenous peoples, government, and other stakeholders is essential to design and successfully implement programs and interventions. These partnerships and collaborations require the public health units to have different roles, from supporting actors to providing resources and knowledge. Lastly, the value of engaging youth in each step of the process was highlighted as a vital component of the design and implementation of any strategy, program, or intervention.

Partners & collaboration

Participants described extensive partnerships and collaborations with diverse stakeholders in public health and other sectors in both the survey and interview phases of the study. In the survey analysis, most interventions (89.7%) included the presence of a partnership. Of these, most were informal partnerships with other departments within the PHU (70.5%). Some were also informal partnerships with mental health organizations (50.0%), school boards (46.1%), healthcare agencies (39.7%), Indigenous communities (38.5%), or local social services agencies (33.3%) (**Table 8**).

Table 8: Description of partnerships across interventions

Types of Partners	Description of Partnership	n=	Total N
Existence of Partnership for Intervention (n=99)	Yes	78	**90**
	No	9	
	Missing/unknown	3	
Another Department or Program within the PHU	Formal Partnership	1	**56**
	Informal Partnership	55	
Another PHU	Formal Partnership	3	**25**
	Informal Partnership	22	
Another Municipal Department	Formal Partnership	6	**35**
	Informal Partnership	29	
Government (Federal/ Provincial)	Formal Partnership	11	**19**
	Informal Partnership	8	
School/School Board	Formal Partnership	24	**60**
	Informal Partnership	36	
Mental Health Organization	Formal Partnership	8	**47**
	Informal Partnership	39	
Community Addiction Services	Formal Partnership	3	**24**
	Informal Partnership	21	

Types of Partners	Description of Partnership	n=	Total N
Local Social Services Agency	Formal Partnership	8	**41**
	Informal Partnership	33	
Healthcare Agency	Formal Partnership	9	**40**
	Informal Partnership	31	
Non- Governmental Organization	Formal Partnership	4	**27**
	Informal Partnership	23	
Community Action	Formal Partnership	0	**15**
	Informal Partnership	15	
Business	Formal Partnership	0	**15**
	Informal Partnership	15	
Indigenous Community	Formal Partnership	6	**36**
	Informal Partnership	30	
Police Service	Formal Partnership	4	**26**
	Informal Partnership	22	
Academic – College/ University	Formal Partnership	3	**21**
	Informal Partnership	18	
Other types of partnerships		18	**18**

Public health staff readily acknowledged the importance of collaborating with diverse local and community partners to successfully deliver youth substance use prevention programming. Establishing partnerships was essential to facilitating access to youth and other key populations (including individuals with lived experience of substance use), sharing resources and best/promising practices, as well as reducing or avoiding siloed or duplication of efforts.

However, several challenges related to collaboration and partnerships were highlighted, including balancing competing demands among partners (particularly educators and schools) or issues with sharing or accessing data generated by partners. Limited resources and staff shortages in schools, exacerbated by the COVID-19 pandemic, were identified by participants as key obstacles to implementing and evaluating substance use interventions. Experiences of engaging schools as partners varied, and a lack of formalized, reciprocal mandates was a hindrance. One participant shared "although we have a mandate to work with schools, schools, they don't have a mandate to work with us" (PHU 14). Formalizing partnerships with educational partners at the provincial level was recommended to facilitate collaboration between public health and other sectors. In addition, the breadth of addressing social determinants of health (SDOH) in communities, competition for finite resources between sectors, and concerns related to overlapping mandates with partners were identified as struggles when working with community partners on primordial interventions:

> *There is a divide between us, our partners, and social services; although we are all working towards the same end goal, it seems as though we are in opposite ends of the spectrum. This has been proven to be a challenge given we are all seeking for the same funding while there exists a scarcity of resources. When our partners have specific mandates that impact x, y, and z.*

We don't. The division between us, community partners and social providers has not always been clear cut so we should make sure we are not intruding on their space as our partners and providers may be on the defensive side to make sure that they keep within their objective. (PHU 14) [This quote was edited for clarity]

Despite challenges, many participants underscored that without the buy-in, close collaboration, and resources/support from diverse community partners, the implementation and evaluation of youth substance use interventions would not be feasible.

Role of public health

PHUs play a unique and pivotal role in coordinating and connecting diverse stakeholders across sectors to facilitate partnership development and address health inequities. Interviewees described a wide range of roles they occupy throughout the stages of implementing interventions - from acting as a supportive partner to other community organizations, helping youth and community members with system navigation and referrals, to championing or leading substance use prevention interventions. The flexible and multi-faceted role played by health units to address the underlying social determinants of health was highlighted by participants:

In public health we have a unique role looking at addressing root causes. And I think, having a collaborative approach to addressing those root causes is where we can see where we're going. Collaborating with the community, collaborating within divisions or within the department, I think looking at it from a similar lens, but also our different unique roles. I don't know that other health organizations are doing that - I think the term is primordial prevention. I think that's where we have a unique role. (PHU 07)

Advocacy at local, provincial, and national levels also represents an important role across PHUs. For instance, many described their role to increase awareness and knowledge of the public and other partners of the connection between risk or protective factors and lifelong health and wellbeing. Several participants described their contributions towards destigmatizing drug use and challenging victim-blaming stereotypes to improve community acceptance of substance use prevention and harm reduction initiatives.

There's a lot of misinformation, a lot of stigma, and a lot of discrimination. And so, in part […] you want to create initiatives that target that and deal with that. But those are also the barriers toward some of the work, if that makes sense, why you might get some push back, or people might not understand certain approaches. (PHU 13)

We are kind of the experts in prevention, and in those upstream approaches, and we try to bring that leadership to the community. That is sort of what we often call backbone support to try to support our partners to move in that direction as well, versus moving away - as [Name] was alluding to - from the deliverer of education, the deliverer of programs and all of that, to much more of that strategic thinking and strategic planning. I think that is the future. (PHU 18)

However, one PHU also indicated that being a government entity restricted their ability to engage in political advocacy around potentially political or polarizing issues, such as affordable housing or food security: "*we can't advocate in ways that we wish we could advocate for" (PHU 14)*.

Engaging youth & priority populations

The importance of engaging priority populations, particularly youth, in program design, delivery and evaluation was identified and emphasized by participants. Examples of engaging youth ranged from peer-led strategies of health promotion and increasing awareness in schools, youth civic engagement and leadership opportunities, as well as community- and youth-centred efforts to address health inequities and social determinants of health. Although public health staff recognized the importance of youth involvement, efforts to ensure active and meaningful youth participation in all stages of intervention planning, implementation, and evaluation varied widely across interventions and health units. This range of perspectives was highlighted by participants:

From my perspective, there has been very little, no involvement [of youth] in terms of development of the programming. We have done evaluation. We have student feedback from both boards. We have that data. But in terms of the creation and development of the program, it is very structured. And we haven't had our target population involved in providing feedback there. (PHU 12)

It was like the youth were the stars…at these meetings they were always wanting to hear from them, and kind of learn from them, and if the youth requested certain things. (PHU 04)

Despite limited or piecemeal engagement of youth in current substance use interventions, several participants indicated that moving forward involvement of youth and communities remains a priority, "*we know that [youth participation] is crucial and critical. But just again as this post-COVID*

renewal and direction that we would like to go, we're not there yet. That's part of our plan." (PHU 11). Participants described using targeted strategies to identify and provide increased support to youth or individuals living in communities at greater risk of health inequities and substance use (e.g., based on socioeconomic data or educational opportunity index). Examples of adaptations to interventions or materials to ensure they were culturally sensitive and relevant to specific community needs were also outlined by participants. However, challenges to adequately target at-risk youth in practice were acknowledged:

> *Generally, the people that are on those committees are not the people that you're trying to reach, right? They're the non-users, [laughs] right? So, they're the health promoters, and it's great with them. But you don't know necessarily if it's hitting the people that you want to target. (PHU 02)*

III. Contextual factors shaping substance use intervention planning, implementation, and evaluation

Multiple contextual factors also shaped the planning, implementation, and evaluation of interventions for preventing youth substance. Key factors identified included: the impact of public health measures during the COVID-19 pandemic, increased prioritization of risk and protective factors, vertical structures, and delivery of programs in public health, and the policy and funding environment. The participating public health units explained the uniqueness of the pandemic and post-pandemic period; they had to adapt to new behaviours and practices, as well as to new challenges and consequences of the COVID-19 pandemic. Related to these changes, they explained how the prioritization of downstream interventions has shadowed upstream interventions that target protective factors; moreover, systemic factors, such as funding priorities or the focus on urgent community needs negatively affect all aspects of substance use prevention in youth. In addition, they highlighted the opportunities to improve collaboration across PHU teams and with external organizations working on similar strategies and programs.

Impact of public health measures during COVID-19 pandemic & recovery on programs, partners & structures

The COVID-19 pandemic and post-pandemic recovery period represented both an opportunity and challenge for PHUs related to developing, implementing, and evaluating substance use prevention interventions targeting youth. Participants described significant disruptions and delays to programs as public health staff were redeployed to support the COVID-19 pandemic response in their regions, some of whom were only recently repatriated to their substance use portfolios. As a result, most substance use prevention initiatives were cancelled or paused throughout the pandemic:

> *Yeah, [COVID] completely disrupted. And not only from the staffing perspective, but all of our staff were also redeployed to support the COVID response within the … I shouldn't say all, the majority of our staff were [redeployed]. All our neighborhood groups were not running…for health and safety reasons, but also from the staff perspective of having to support the response. Our health and prenatal nutrition program did go to a virtual format. (PHU 12)*

The COVID pandemic also had a substantial impact on collaborations and partnerships due to competing priorities and demands. In particular, engaging education system partners (e.g., educators, schools, and school boards) was described by multiple participants as a key barrier to program delivery during and post-pandemic, as school partners have been slower to re-engage with public health programs: "*Schools are in the business of education, and they've really been pulled away from a lot of their routine functions for the past several years" (PHU 06)*. One participant indicated that schools remain in "*crisis mode" due to the "perfect storm" (PHU 20)* of challenges presented, such as high mental health needs amongst students and staff, and efforts to catch up post-pandemic. Prioritizing support for students in the transition to different learning formats, as well as regional shortages of human resources, were implicated in the delayed implementation or revitalization of substance use prevention initiatives by interview participants:

> *…the pandemic [made] it, challenging for many of our community partnerships to focus on substance use… they were really focused on helping the students with the online learning needs and with all the COVID protocols. That was the focus. And substance use prevention wasn't necessarily a priority during the height of the pandemic school. (PHU 06)*

Further, in the wake of the pandemic and redeployment of public health unit staff, re-connecting and re-engaging with partners remains an obstacle and pressing need for program delivery for PHUs. As such, public health and community partners continue to navigate a period of transition,

capacity building, and re-evaluation of broader system-level priorities and approaches catalyzed by COVID-19 and the post-pandemic response. This included substantial changes to public health organizational structures, practices, and approaches. However, despite demonstrable challenges, several participants proposed that COVID-19 has generated novel opportunities for public health collaboration and connection with community partners facilitated by increased accessibility and engagement via virtual meetings or networks. In addition, there was a perceived increase in community awareness, knowledge, and trust in public health units as reliable sources of information and support related to health issues.

Vertical structures & programs

Vertical or "siloed" approaches intrinsic to public health practices and collaboration with partners reflect an overarching limitation to planning, delivering, and evaluating upstream primordial youth substance use prevention initiatives both within, and beyond, PHUs. Several participants described that their PHUs have separate teams for "prevention" versus "harm reduction" strategies related to substance use, in line with the Ontario Public Health Standards, with extremely limited collaboration across teams. This was recognized as particularly challenging for adequately addressing cross-cutting issues, such as ACEs or SDOHs, which require substantial coordination and cooperation across diverse teams in PHUs, and other non-health sectors. Limitations posed by vertical program design and delivery were described by participants:

> *We have pretty robust planning processes at the organization, but I still find them 'siloed,' right…. we have plans designed for each team, and the teams are based on the Ontario Public Health Standards… some of these issues that we're tackling are relevant to more than one team. They're relevant to like - ACEs, for example, it's something that's relevant to healthy growth and development, but also chronic disease and schools, and even sexual health. So, how do we start to look at some of these issues as not being 'owned,' for lack of better words, by one team? But you know, being owned by the organization, we must start thinking about these as part of our strategic plans, for the organization to make sure that you know they belong to more than one team. (PHU 15)*

Approaches to address opioid and illicit drug use are distributed across multiple "pillars" in provincial and national guidelines, and perpetuated vertical approaches within PHUs to addressing substance use amongst youth Several gaps in knowledge among participants were highlighted, as individuals working primarily in prevention (e.g., implementing prevention efforts in schools) had limited knowledge of opioid and unregulated drug use among youth in their communities saying, "Oh, that's not…that's not my…that's not my area!" (PHU 02). Prevention efforts to address opioids were often categorized or considered to fall within the remit of "harm reduction" pillars, despite notable overlaps in risk and protective factors, as well as prevention strategies. Separation of prevention versus harm reduction efforts in PHUs may contribute to the fragmented implementation of interventions to prevent the use of opioids and unregulated drugs amongst young people. As a result, improved coordination may be necessary to ensure that prevention and delay of opioids and unregulated drugs are adequately captured within all primordial and primary prevention interventions and programs.

Public health priorities

Many PHUs emphasized the challenges of balancing competing priorities between fulfilling public health goals of health promotion and substance use prevention and the urgent harm reduction and treatment needs of their local communities. This tension was described:

> *I think it's just a balancing of priorities right now. We are really being pulled with some of the harm reduction policy work in the opioid emergency. And where we can continue to wrap in…. that looking forward piece as we continue to get movement, and community collaboration, and commitment on moving some of these little opioid strategic initiatives where we continue to weave and look at opportunities for prevention moving forward. I think we're just really at the cusp of moving some of our work for both definitely with the environmental protective factors, but some of the larger citywide opioid response pieces. (PHU 11)*

Despite significant advocacy for the prevention of youth substance use, its prioritization in practice varied across PHUs. Some participants highlighted that they are not currently engaged in any substance use prevention activities, as harm reduction and treatment services were prioritized amidst the COVID-19 pandemic response by their units:

> *About our prevention work, a lot of it was paused during the pandemic. So, that's not ideal, but in terms of resourcing, that pillar is less advanced than the harm reduction pillar at this point. (PHU 08)*

Prevention efforts were also siloed by substance 'type,' as participants described the challenges of weighing competing priorities and resources even within substance use prevention portfolios. These tensions were acknowledged as participants tried to prioritize multiple and evolving needs among youth

and in communities for mental health promotion and substance use prevention.

Policy & funding context

The policy environment and political priorities also inherently shaped public health priorities and the implementation of youth substance use prevention interventions. Several PHUs emphasized that local and provincial politics were underlying contextual forces that shaped their approaches and priorities related to preventing substance use. Recent local examples of increased prioritization of opioid and unregulated drug use were described, such as announcing a state of emergency in response to surges in overdoses. However, limited political will, funding, and resources to adequately address upstream factors and health inequities also represented an important system-level constraint identified by several participating units:

> *I think so much of it is being able to identify risk as early as possible and have the supports in place, and the programs in place, to support children as they're developing, and families, to prevent going down that path of substance use. And I think that the challenge with that is having the funding to be able to offer comprehensive children and youth programming in neighborhoods in our community, which would be wonderful, which we see in other countries. But that's not really something that we're able to offer here, and that is one of our biggest challenges, how are we going to be able to do that? (PHU 09)*

Many PHUs described the Icelandic Prevention Model as a promising intervention to address risk and protective factors to address youth substance use. A few PHUs confirmed they have already initiated consultations or plans to implement the Icelandic model in their region, whereas others continue to determine the appropriateness of applying this approach in Ontario. Although several PHUs emphasized the appeal of standardized tools, a clearly outlined process, locally generated data, and data analysis led by the Planet Youth team, other participants voiced substantial concerns around limited local evidence of its impact, and a vastly different political climate in Ontario (and Canada) as critical implementation considerations, which may circumscribe the ownership, uptake, and impact of this community-wide, multi-sector initiative:

> *I think that when we look at those models, we also have to be somewhat realistic in what can we learn that might be able to be applied into our community, recognizing we're not going to have the same outcomes that they would have had in Iceland, because that was adopted right across the country. And that took significant investments for them to be able to apply that model. (PHU 09)*

The policy context in Ontario, and in particular the political will at local, provincial, and federal levels, availability of funding or resources, and extensive stakeholder engagement and contributions required to implement primordial solutions, such as the Icelandic Prevention Model, represent key considerations among many PHUs.

IV. Individual, interpersonal & structural risk and protective factors

The complexities of prevention and primordial interventions were evident in PHUs experiences. The paradigm shift towards addressing social and ecological determinants of health, targeting risk and protective factors, and centering interventions on the needs of the specific community frames the new directions of the interventions being developed and implemented.

A paradigmatic shift: Momentum towards risk & protective factors

The connection between preventing youth substance use and individual (e.g., ACEs, coping skills, etc.), interpersonal (e.g., family support, supportive caregiver, parent-child relationships, etc.), and structural (e.g., social determinants of health) risk and protective factors was underscored by nearly all interview participants as essential to the primordial or "upstream" prevention of substance use among young people.

> *We know that when we talk about risk and protective factors. We know that there is poverty, housing access [issues], we know that we have a housing crisis across the country. Certainly [This region] has also been significantly impacted by that. So, it seems as you're trying to take one step forward, we're taking five giant steps back in terms of all of the other challenges that people are being faced with in our community. I would say that is our biggest challenge. (PHU 09)*

One participant underscored that reducing risk factors and promoting protective factors early in life is paramount to preventing substance use among youth:

> *I think by the time that somebody has already been exposed or is already having stress in their life […], I think it's a bit late. (PHU 06)*

The recognition of the importance of risk and protective factors on long-term health outcomes

and behaviours, including youth mental health and substance use, has gained significant traction, particularly amongst public health stakeholders. Acknowledging the underlying connection to youth substance use has transformed the way youth mental health, addiction, and substance use are conceptualized and dramatically altered public health programming and response. Some participants also described a move towards adopting a health equity and "community development approach" to ensure that program planning and implementation are deeply informed by and grounded in community needs and values. This was described as a "*cultural*" *or "seismic shift"* for public health practices and approaches, which some participants felt was catalyzed by the COVID-19 pandemic and a re-evaluation of priorities post-pandemic.

Despite the acknowledgement of the need to focus on risk and protective factors amongst public health staff, the linkages between exposure to risk factors during childhood and adolescence, and the impact on health, including substance use, remains inadequately understood by communities, community partners, and social service providers. One public health unit emphasized that further efforts to increase public awareness about the connection between risk/protective factors and health and well-being are needed:

> *We talk within public health, or people who do similar kinds of work to us, and we speak the same language. But when you move outside of people who do health-related or social service-related work, there's a real lack of understanding in the general population about lifelong health and the ways in which it can be influenced. So, there's a lot of work to be done in that particular area. (PHU 07)*

Efforts to address risk and protective factors were in very "early" stages of development across several PHUs at the time of conducting interviews. Many PHUs are currently in the process of developing strategies or plans to better understand and determine public health's role and approach in this domain. The progress to integrating risk and protective factors, including ACEs/PACEs, in public health interventions was outlined:

> *I think ACEs work, PACEs (positive and adverse CEs) [positive and adverse childhood events] work across the province is gaining some momentum, particularly within public health. There's the community of practice through Public Health Ontario, which is also very much at beginning stages. And if you ask any health unit, they at beginning stages as well about moving this forward. But people understand the importance of it. We did a baseline survey. People appear to know about ACEs, they may not know then how to apply it to their work, and that's part of what we'll look at for moving the initiative forward. So, this is a long-term strategy. (PHU 07)*

Several interventions identified by PHUs aimed to increase local knowledge and awareness of the role of risk and protective factors, particularly among service providers (e.g., health providers, social workers, educators, early childhood educators, etc.). For example, training modules on adolescent development, ACEs, and resilience were produced based on findings from a local population survey of the link between the long-term impact of exposure to ACEs and current health behaviours, including substance use and chronic disease. These capacity-building interventions seek to ensure *"as a community, [to] all be speaking the same language" (PHU 17)* and embed a trauma-informed lens across multiple stakeholders and sectors in the community.

Scope and impact of primordial interventions

Given the broad and all-encompassing scope of interventions targeting upstream influences of youth substance use, participants emphasized substantial challenges to developing, implementing, and evaluating primordial prevention initiatives. These interventions often extend beyond public health mandates, knowledge, scope, and capacity, and require an even greater level of inter- and multi-sectoral collaboration. The broad nature of primordial prevention interventions was outlined by several PHUs.

> *I think scope is one of our biggest challenges, because everything is a social determinant of health. (PHU 14)*

> *The best prevention measures often have nothing to do with substance use at all, while the ultimate goal is to reduce substance use and prevent youth from using substances...upstream efforts often seem unrelated to substance use, as opposed to like specific substance use policies or education. We're addressing substance use, without talking about substances at all. (PHU 20)*

Evaluating the impact of SDOH-focused interventions is particularly complex, as youth substance use is one of many potential long-term outcomes yet is often not directly targeted via program activities or inputs. Expectations to demonstrate the impact of interventions related to promoting protective factors was a key concern voiced by PHUs: *"everyone wants the quick fix and upstream interventions take time, sometimes there's an unrealistic expectation for immediate results." (PHU 20)*. Obstacles to evaluating primordial interventions were also frequently described, including the complexities of measuring reductions in health inequities. Some participants

suggested that having to "prove" outcomes may even direct program delivery and activities:

> *The ultimate end goal which I know will be challenging to measure, is a reduction in health inequities over time. Whether it's income, food, security, education attainment amongst parents, but the goal is to reduce inequity within the particular neighbourhood or population. (PHU 07)*

Generating interest and investment from funders to support less "urgent" upstream initiatives, as well as the need to demonstrate the immediate impact of long-term substance use prevention strategies illustrated a critical tension between public health and funder mandates and objectives:

> *I think the biggest challenge is we know that our strategy is a long-term prevention strategy, potentially intergenerational. And so, it's very difficult to show outcomes with that kind of long-term strategy and often, say funders or policymakers or leadership, want to see the downstream [strategies], because it's easier to measure the impact. But we know that the impact can be big with a long-term strategy. It's just harder to show along the way. (PHU 07)*

However, participants underscored the importance of moving beyond measurable traditional outcomes or impacts and that interventions that are community-driven and build the assets to create protective factors and promote resiliency are vital. Advocating and promoting a primordial prevention approach was acknowledged as an important role of public health staff in substance use prevention efforts more broadly. It is evident that there is no "one-size-fits-all" approach to primordial interventions, and that although evidence is an important piece of the puzzle, implementing interventions that are community-driven and that address local needs is especially important to address substance use amongst young people.

Substance use prevention is a complex, multi-dimensional challenge

Interviews with public health staff demonstrated that the prevention of youth substance use is a complex and multi-dimensional challenge, deeply connected to and impacted by individual, community, and structural risk and protective factors. Multiple participants emphasized that interventions to effectively address substance use among young people extend well beyond the scope of public health and require sustained collaboration with diverse stakeholders in other sectors to address intersecting and underlying causes of health (in) equities:

> *When it comes to substance use, it's just so big. There's so much about the supply coming into the community. There's so much about decriminalization access. It's so complex, that's where I think that the biggest bang that we can really have is getting to kids really early, developing other interests so that they have other things in life that interest them and fill their time, to help them. We are trying to move upstream. We know that's the way we need to go, we are faced with so many other environmental challenges that are making it difficult to demonstrate impact. Because again, poverty, and the cost of education is increasing so much. We know that lack of affordable housing and all of these things are working against us. It is tough. (PHU P09)*

> *Thinking about priorities, but also challenges, there are issues that are not just public health issues, and that are not just health issues. They require many different stakeholders and divisions. So even just thinking about city planning, and parks, and stuff like that actually really impacts mental health and the mental health of youth. So, at the [PHU] level, obviously, we could talk a lot about the health aspects, but it's a lot broader. (PHU 13)*

These sentiments were echoed in consideration of implementing the Icelandic Prevention Model, given the complexity of tackling upstream risk and protective factors. However, limited, and delayed engagement of youth in the Icelandic model process was identified as current limitation of the approach that may need to be adapted moving forward.

V. Examples of approaches to prevent substance use among youth[80-86]

Diverse novel and promising upstream primordial and primary prevention strategies to prevent and delay youth substance use are being implemented by PHUs in Ontario. Interventions were identified in both the quantitative survey and qualitative interviews and select examples of primordial initiatives are described (**Table 9**)

Table 9: Examples of primordial approaches to preventing substance use among youth in Ontario

Community Pathways Partnership program

The Community Pathways Partnership Program coordinates health and social services for at-risk secondary school students, particularly Indigenous youth. This initiative targets students in Northern Ontario, many of whom live on-reserve and must leave their communities to attend school. The intervention is "youth-led" as students identify pressing needs related to their health and other social determinants; it connects students with "Student Support Navigators" to facilitate access to vital supports and services, both within and beyond the school setting, to support academic achievement and improve graduation success.

By addressing social determinants of health, the initiative aims to reduce key systemic barriers to graduation and health outcomes, while enhancing community health and connecting youth with social and health services. Examples of support provided include identifying a student that may need glasses and organizing eye appointments and supporting them in getting the services needed or helping youth to get a birth certificate and SIN number to be able to seek employment. Feedback surveys are conducted annually with youth to evaluate their experiences and interactions working with the navigators.

Strengthening Families for Parents and Youth Program

The Strengthening Families for Parents and Youth program aims to increase family functioning, parenting skills, and youth social competencies, thereby strengthening youth resiliency factors. This program has a focus on the individual and family levels and seeks to increase youth resiliency and capacity to prevent, avoid, or minimize the use of alcohol and other drugs. It targets young people between ages 12-16 years, who are supported by hospitals, agencies, or child protection services. Although the program does not include gender-specific considerations, it is inclusive of ethnic minorities, with a particular focus on newcomers to Canada. The program was initially developed by Dr. K. Kumpfer using an evidence-based life-skills program developed in the 1980s.

The Strengthening Families intervention is a nine-week program for families; it involves parents and youth enjoying a communal meal together to increase social and community connectedness, followed by one-hour sessions for parents and a concurrent session for youth. Both sessions are delivered by trained facilitators and follow a curriculum to increase protective factors (e.g., communication, empathy, positive discipline, and family organization), parents and youth return and can apply and demonstrate learnings. The program is supported by staff and resources at the local Youth Wellness Hub.

Youth Wellness Hubs Ontario

The Youth Wellness Hubs Ontario is an initiative that aims to bring services to youth and families at the right time and place. It is a network of 22 sites/hubs across Ontario, serving 30 communities, that integrate youth services, provide a safe space, and gender-affirming care. The YWHO (Youth Wellness Hubs Ontario) aims to improve mental health and addiction services for youth and young adults by providing rapid access to adequate services with walk-in and low barriers services, providing evidence-based interventions, integrating different support services into a one-stop-shop model of care that reduces transitions between services and that establishes a common evaluation across sites. This initiative wants to increase youth self-esteem, a sense of belonging, and feelings of safety and closeness with a unique innovative model.

Youth Coalitions & Youth-Friendly Communities

The **Youth Coalitions** initiative aims to engage young people in local organizations to work alongside adults towards common goals. Youth civic engagement is facilitated through adult-youth partnerships where adults act as resources and coaches for youth, encouraging them to take increasingly active roles in local initiatives. This model allows youth to feel like partners, rather than clients, and to share their collective voice in the community. This program employs the evidence-based "Stepping Up" framework[71] and targets young people 12-25 years, to build resiliency, develop protective factors, and support successful transitions to adulthood. Meaningful youth participation in decisions that affect their health and well-being is central to promoting positive youth development, with long-term potential benefits including decreased substance use, improved educational attainment, decreased sexual activity or unplanned pregnancies, and improved mental health.

Youth engagement was identified as a local priority in the early 2000s, in response to high rates of substance use among young people. Youth coalitions have offered spaces to frame youth as local champions, generate opportunities for leadership and civic engagement, and support positive role modeling and relationships between adults and youth. Other examples identified to recognize youth as vital community members include the participation of municipalities in achieving designations as "Youth Friendly Communities"[67], as well as recognizing the contributions of young people through "Youth Citizen of the Year" awards in their local areas.

CASTLE Healthy Communities[70-72]

The **CASTLE Healthy Communities** program aims to increase social connectedness, resilience and promote protective factors for youth, parents, and communities. Embedded alongside other social services and structures, community health brokers support youth and communities to increase their skills, confidence, and coping mechanisms, as well as help to navigate health and social structures. The CASTLE program is informed by a community development model to ensure that activities and programs are offered "with" and "by" youth and community members, as opposed to just traditional approaches to designing and implementing interventions "to" and "for" communities.

Originally CASTLE was introduced to improve cancer screening rates but has since expanded to focus on the social determinants of health, including housing and food security. Priority populations and neighbourhoods are identified using measures of residential instability, material deprivation, as well as levels of food security and access to food. Longstanding partnerships and collaboration with organizations beyond the health sector (e.g., community housing, non-governmental organizations, neighbourhood organizations) are central to the program's success.

Icelandic Prevention Model – Planet Youth[82-85]

The **Icelandic model for primary prevention of substance use** (also called the Planet Youth model) is a collaborative upstream approach to addressing risk and protective factors for substance use among youth in community, school, peer, and family settings. Employed in Iceland since the 1990s, this community-based participatory model aims to reduce substance use behavior by ensuring engagement and collaboration across sectors, to foster an environment that identifies risk factors and promotes protective factors for youth.

The Icelandic model is being implemented across multiple PHUs, including Lanark County, to reduce substance use and promote mental health and well-being among youth in Ontario. Although this strategy has yielded impressive declines in substance use among youth in Iceland and is being considered a global best practice, it has only just recently been implemented in Canada.[66] Further research on its application in Canadian contexts is needed.

PreVenture program for youth mental health[84]

The **PreVenture program** is an evidence-based prevention program that uses personality-targeted workshops to promote mental health and prevent, delay, or reduce substance use among youth (67). By focusing on four key personality traits (hopelessness, anxiety sensitivity, impulsivity, and sensation seeking), the program aims to influence young people's decision-making, stress responses, risk-taking behaviours, and mental health to adapt and support young people to achieve their goals (28).

The PreVenture model is integrated within communities and provides school-based interventions to high-risk adolescents.

A review of findings from global PreVenture program trials found substantial improvements in substance use among youth - participation is associated with a 50% reduction in rates of alcohol and unregulated drug use and substance-related harms, and a 25% decrease in the likelihood of mental health challenges (e.g., anxiety, depression, suicidal ideation, and conduct problems) (68). Several PHUs have started to implement the PreVenture model across Ontario and sharing lessons learned is vital to better understanding and prioritizing interventions that impact risk and protective factors among youth.

Summary of participant recommendations

Participants emphasized numerous recommendations for improving efforts to prevent and delay youth substance use, particularly opioid and unregulated drugs, amongst youth. Suggestions included:

- Implement upstream interventions that address risk and protective factors across individual, interpersonal, and structural levels to increase resilience and create supportive communities for long-term changes in youth mental health, well-being, and substance use behaviours.
- Advocate and support capacity building for the public and community partners to increase awareness of the connection between risk and protective factors and lifelong health and health behaviours, including substance use. This was deemed essential to moving beyond a focus on treatment and response, to one of health promotion and prevention.
- Formalize partnerships and establish reciprocal relationships with key stakeholders, particularly educational partners, to improve collaboration and the availability of data to support program implementation processes.
- Disseminate lessons learned between PHUs to better share resources and tools related to substance use prevention interventions. Establishing standardized approaches that could be locally tailored also represented an area of future exploration that may also offer some consistency in terms of interventions implemented across the province; and
- Increased efforts to engage and partner with youth and target populations is paramount to ensure that interventions are uniquely tailored to meet the unique needs of diverse social, cultural, and economic contexts.

Discussion and Recommendations

The literature review underscores the presence of a wide spectrum of evidence-based programs and strategies within the socio-ecological model (SEM) that aim to promote youth health by preventing substance use and mitigating associated harms. It is important to acknowledge the role of social determinants of health and positive and adverse childhood experiences (PACEs) in shaping the effectiveness of these interventions. Initiating these intervention approaches early in life is crucial to maximize their impact.

The most effective preventive intervention programs summarized within the literature review are those that prioritize various key risk and protective factors across the SEM. Firstly, an emphasis should be placed on enhancing parent skills to provide a supportive and nurturing environment. Secondly, utilizing school-based and multiple prevention strategies in combination can yield positive outcomes. Thirdly, the implementation of booster sessions ensures sustained intervention effects. Fourthly, developing healthy peer-refusing skills at an early stage in adolescence is important. Additionally, targeting common risk and protective factors for multiple problem behaviors enhances program effectiveness.

Based on the literature review, studies have consistently highlighted the need for holistic interventions that address multiple levels (individual, microsystem, and macrosystem) of interaction, as well as strong multisectoral integration within health, school, and community organizations - at provincial, regional, and local levels. The most relevant social and development theories (e.g., social learning theory, empowerment theories, and social development theory) build upon existing models while integrating new periodic evaluations for quality improvement. The inclusion and engagement of young people, through a youth participatory approach has also been found to be extremely valuable. Consideration and reporting on equity can also play a pivotal role in obtaining a comprehensive understanding of the strategy's effectiveness.

Measuring the long-term impact of these programs in practice requires assessing various quality dimensions and specific program outcomes. This includes

evaluating behavioral problems related to self-control, resistance to peer group pressure, as well as improvements in parental skills and family relations. Equity reporting during the program's initial phases is crucial to obtain a comprehensive understanding of its effectiveness. Furthermore, sustained monitoring of programs using indicators that encompass risk and protective factors across the socio-ecological model is important. The literature offers crucial outcome evaluation indicators that can bolster parent and caregiver-focused preventive interventions.

Given the comprehensive and holistic nature of these programs and strategies, adopting a multisectoral framework such as trans-sectoral approaches effectively integrate and address the multifactorial aspects involved. An integrated approach is especially crucial in the program's initial phases. To accurately gauge the impact of programs and strategies, consistent evaluation using approaches like the RE-AIM approach ensures a thorough assessment of various dimensions, including reach, effectiveness, adoption, implementation, and maintenance. However, challenges may arise when attempting to persist with an ineffective program, often influenced by factors such as sunk costs and emotional investment. Despite the inefficient resource allocation and missed preventive opportunities, it is essential to recognize the need for objective evaluation and make informed decisions for the betterment of an overall initiative.

The degree to which evidence-based prevention strategies for opioid and substance use (as determined based on the current literature review) are implemented among public health units across Ontario, including their adaptation to diverse settings/contexts and culturally appropriate engagement of diverse populations, can vary greatly.

In Ontario, as learned from the survey and the qualitative study, there has been an increasing recognition of the importance of evidence-based prevention strategies for opioid and substance use. Public health units play a vital role in implementing these strategies and tailoring them to diverse settings and contexts. However, the level of implementation can vary due to several factors.

One factor is the availability of resources and funding dedicated to prevention efforts. Adequate resources are necessary to support the implementation of evidence-based strategies, including staff training, community outreach, and program evaluation. Public health units with sufficient resources are more likely to implement these strategies effectively.

Additional factors are the level of understanding among public health professionals regarding the prioritization of the burden of the problem as a key concern for children and youth, what evidence-based prevention strategies should be adopted, and how to collaborate and work with partners in a meaningful way. Continuous education, communities of practice, and professional development programs can enhance knowledge and skills in planning and implementing these strategies. Public health units that prioritize training and capacity-building are more likely to effectively implement evidence-based prevention approaches.

The adaptation of prevention strategies to diverse settings and contexts is essential to ensure their relevance and effectiveness. Ontario is a diverse province home to hundreds of unique communities, each with its own cultures, characteristics, and needs. Public health units that proactively engage with diverse populations and consider their cultural and contextual factors are better equipped to implement culturally appropriate prevention strategies. This may involve collaborating with community leaders, cultural organizations, and stakeholders to tailor interventions to specific populations and address their unique challenges and barriers.

However, despite efforts to implement evidence-based prevention strategies and adapt them to diverse settings/contexts, challenges and gaps persist. Limited resources, competing priorities, reduced focus on primordial/primary prevention, and systemic barriers can hinder the comprehensive implementation of these strategies across all public health units in Ontario. Achieving consistent and equitable implementation of evidence-based prevention strategies with a focus on protective and risk factors, requires ongoing commitment, collaboration, and support at various levels, including government funding, policy development, and knowledge exchange among public health units.

Taken together, the literature review, survey, and qualitative synthesis results point to some common findings and potential ways forward. Program integration and cross-sectional program management and implementation in health units can provide an integrative approach for preventive interventions of opioid use. This approach involves coordinating and aligning various programs and services within the health unit to work together towards a common goal of preventing opioid use and related harms. It aims to address the complex and multifaceted nature of the opioid crisis by considering the intersecting factors that contribute to substance use and promoting comprehensive, coordinated, and holistic interventions.

Some ways in which program integration and cross-sectional program management and implementation

can enhance preventive interventions for opioid use include:

1. Coordinated Planning: Siloed program planning has been observed in health units and communities. By integrating different programs and services, health units can develop a comprehensive and coordinated approach to prevent opioid use based on risk and protective factors across SEM. This also involves bringing together stakeholders from various sectors, such as public health, mental health, addiction services, law enforcement, and community organizations, to collaboratively plan and implement strategies. Coordinated planning ensures that interventions are aligned, resources are utilized efficiently, and interventions are tailored to the specific needs of the community.
2. Comprehensive Assessment: Integrative approaches allow for a comprehensive assessment of the community's needs, assets, and gaps related to opioid use prevention. Health units can gather data from multiple sources, conduct needs assessments, and engage with community members to gain a holistic understanding of the factors contributing to opioid use. This comprehensive assessment informs the development of targeted interventions that address the underlying determinants of substance use, such as social determinants of health, mental health, and trauma.
3. Multifaceted Interventions: Program integration enables the implementation of multifaceted interventions that address various aspects of opioid use prevention. It allows for a combination of upstream, midstream, and downstream strategies. Upstream strategies focus on addressing social determinants of health, promoting mental health, and building resilience in young children and communities. Midstream strategies target at-risk populations, such as youth, through school-based prevention programs, community outreach, and peer support initiatives. Downstream strategies involve harm reduction, treatment, and recovery support services. By integrating these different components, health units can provide a comprehensive approach that addresses prevention, early intervention, and harm reduction simultaneously.
4. Shared Resources and Expertise: Program integration facilitates the sharing of resources and expertise among different programs and services. This can lead to increased efficiency, reduced duplication of efforts, and improved coordination. Health units can pool together resources, such as funding, staff, training materials, and data, to support the implementation of evidence-based interventions. Cross-training and knowledge exchange among staff members from different programs enable the integration of best practices and ensure a unified and cohesive approach.
5. Continuous Evaluation and Improvement: Integrative approaches allow for ongoing evaluation and improvement of preventive interventions for opioid use. By collecting and analyzing data across programs, health units can assess the impact of interventions, identify gaps, and make informed decisions about program modifications and resource allocation. This continuous evaluation and improvement cycle enhances the effectiveness and sustainability of interventions over time.

Public health units and key stakeholders employ a diverse range of indicators to systematically monitor and evaluate existing practices, with a particular emphasis on inclusivity to represent diverse perspectives and identify gaps in implementation. These evidence-based indicators serve as valuable tools to assess the effectiveness, reach, and equity of interventions, thereby guiding informed decision-making for continuous improvement. Commonly used evidence-based indicator themes summarized from the systematic reviews that can lend crucial support to intervention implementation include:

- **Reach and Accessibility:** Indicators related to reach and accessibility assess the extent to which interventions are reaching the target population, including diverse populations. This can include tracking the number of individuals or communities reached, demographic information of participants, and geographic distribution of services. Monitoring the accessibility of interventions helps identify potential gaps in reaching specific populations and guides efforts to address equity.
- **Implementation Fidelity:** Evaluating implementation fidelity involves assessing the extent to which interventions are delivered as intended. This includes monitoring adherence to intervention protocols, the quality of program delivery, and the consistency of implementation across different sites or providers. Examining fidelity helps identify variations in implementation and potential gaps in delivering interventions effectively.
- **Participant Engagement and Satisfaction:** Indicators related to participant engagement and satisfaction capture the perspectives

and experiences of individuals involved in the interventions. Surveys, focus groups, or feedback mechanisms can assess participant satisfaction, perceived relevance, cultural appropriateness, and perceived impact of the interventions. These indicators provide insights into the acceptability and appropriateness of interventions for diverse populations.

- **Health Outcomes:** Monitoring health outcomes is crucial to evaluate the impact of interventions. Indicators related to health outcomes can include changes in substance use behaviors, overdose rates, emergency department visits, hospitalizations, mortality rates, or improvements in mental health and quality of life. Analyzing health outcomes helps determine the effectiveness of interventions and identify gaps in achieving desired outcomes. However, these indicators must be monitored over the long term, and are influenced by many factors beyond specific public health interventions.
- **Equity and Disparities:** Indicators focusing on equity and disparities assess whether interventions are reaching and benefiting diverse populations equitably. This includes evaluating the distribution of services and outcomes across different demographic groups, socioeconomic strata, and geographic areas. Monitoring disparities helps identify gaps in implementation and guides efforts to promote health equity.
- **Stakeholder Engagement and Collaboration:** Assessing stakeholder engagement and collaboration involves evaluating the extent to which diverse perspectives and stakeholders are involved in the planning, implementation, and evaluation of interventions. This can include monitoring the representation of diverse stakeholders in decision-making processes, partnerships with community organizations, and engagement of individuals with lived experience. Evaluating stakeholder engagement helps ensure that interventions are responsive to community needs and promote inclusivity.

By monitoring these indicators over a short- and long-term basis, public health units and key stakeholders can gain a comprehensive understanding of the effectiveness, equity, and implementation gaps of existing practices. This information guides decision-making, informs program modifications, and facilitates the continuous improvement of interventions to better serve diverse populations and address identified gaps.

Study Considerations

Literature focus:

- The literature review depends on SRs. However, they may not be the most appropriate methods for measuring the impact of complex public health interventions particularly if multiple components are involved. Small universal intervention trials may have high public health benefits.
- Cross-sectional studies were not included because they have not been able to measure the desired outcome over time.
- Studies included are limited to studies in the English language.
- The heterogeneity within some subgroups of studies suggests future work with more consistent reporting within individual studies that could explore combinations of interventions and components that may be more effective than others.

Health units survey and qualitative study focus:

- Key considerations for data generation and analysis of the qualitative study care are also outlined. Firstly, interventions reported by PHUs varied from 1-15 initiatives submitted for the survey in phase IIA. Many PHUs discussed other programs during interviews, beyond some of the primary prevention efforts identified in the survey portion of the study, which may be linked to more primordial or upstream interventions. For example, the Healthy Babies, Healthy Children program is a program implemented across the province, yet only a subset of PHUs submitted this as an intervention related to the study. Similarly, one PHU emphasized that interventions, such as the Community Safety Wellbeing Plan or local mental health strategy were not submitted indicating:

The outcomes for those particular strategies are not specifically related to substance use. So, they don't quite meet the inclusion criteria for the survey, but we wanted to mention those because they are complimentary […] They're not both run by public health or they're not both overseen by public health, but they do seek to impact those risk and protective factors that could influence substance use." (PHU 08) This shows that the concept of substance use protective factors is interpreted differently by some PHUs. In addition, the Youth Wellness Hub was not submitted as a standalone primordial intervention, despite its promising potential to offer supportive environments for youth to prevent substance use. However, gaps or "silences" for "what is not said or done at all" (69) illustrate the range of understanding and capacity for public health involvement, in the complex connection between substance use among youth and other interventions that are focused on upstream (e.g., SDOH) or risk/ protective factors, even amongst PHUs.

- Public health practitioners and health unit staff were interviewed, however, as underscored by study participants many upstream initiatives or interventions targeting risk and protective factors are cross-cutting for multiple sectors (e.g., housing, public health, social services, parks and recreation, education, etc.). Interviewing with stakeholders beyond the health sector may be needed to adequately capture the diverse and collaborative efforts and roles to implement primordial interventions targeting the social determinants of health.
- Interviews conducted with public health units were also impacted by social desirability effects, as participants may have attempted to emphasize their organizations' successes, and robust use of evidence to inform interventions while downplaying limitations or shortfalls of interventions or PHUs. Although the qualitative interviews were conducted independently from the study leads based in other public health units and Public Health Ontario, as well as reassurance that data would be de-identified, an element of impression management was observed in the narratives.
- Lastly, the timing of the study post-pandemic and amid many PHUs focusing on recovery efforts represents an important study consideration. Although several participants viewed the post-pandemic period as a unique opportunity to re-evaluate and re-consider public health approaches and priorities, implementation, and evaluation of interventions reflective of the emerging focus on risk and protective factors, social determinants of health, and primordial interventions, in practice, was limited.

Conclusion

The prevention of youth substance use is a complex and multi-dimensional challenge deeply connected to and impacted by individual, community, structural, risk, and protective factors. Nearly all public health staff underscored the prioritization of preventive strategies and interventions as essential, yet the implementation of primary and primordial prevention strategies in practice was shaped by the complexities of partnerships with different stakeholders for:

- program planning
- delivery and evaluation
- the flexibility needed to have different roles
- systemic factors such as public health and funding priorities
- the different contexts
- the relatively recent emphasis on risk and protective factors

Key study takeaways include:

- Addressing risk and protective factors, including ACEs, SDOHs, and a range of other risk and protective factors, is increasingly acknowledged as an essential strategy to effectively prevent substance use amongst youth. In practice, many primordial interventions are in nascent stages of implementation, and documenting and sharing lessons learned and best practices will be important to ensure future funding and support, and to catalyze sustained changes in youth mental health, wellbeing, and substance use behaviours.
- An emphasis should be placed on key protective factors such as enhancing parent skills to provide a supportive and

nurturing environment, utilizing school-based and multiple prevention strategies in combination, implementing booster sessions to ensure sustained intervention effects, and developing healthy peer refusing skills at an early stage in adolescence to support resilience. Additionally, targeting common risk and protective factors for multiple problem behaviors through integrating mental health/wellness enhances program effectiveness.

- Efforts to address underlying influences of substance use prevention demand a systems-level and community-wide approach. Integrating programs and prioritizing intersectoral collaboration, implementation, and management can substantially enhance future preventive interventions for youth substance use.
- Opportunities to overcome limited local, recent, and disaggregated data to inform program planning, delivery, and evaluation should be considered. Increased and formalized partnerships with non-health stakeholders may represent an avenue for future exploration and investment.
- Leveraging further opportunities to align public health efforts with existing community-based initiatives and partnerships is needed. Strategic opportunities for inter-sectoral collaboration should be explored, such as Community Safety Wellbeing Plans, to promote community and structural factors, including safe and enabling environments for youth.
- Interventions should prioritize the active and meaningful engagement of youth in all stages of design, implementation, and evaluation, including those at higher risk for substance use or youth with lived experiences of using substances. Involving diverse youth in decisions that affect them is essential to improving their health and well-being.
- Multiple novel and promising examples of primordial approaches to preventing youth substance use were described. These programs offer tangible strategies to address the social determinants of health, foster protective factors of youth/families/communities, as well as target youth at the highest risk for substance use and mental health challenges. In particular, the Icelandic Prevention Model is being considered or implemented across many public health regions, however, further research on its application in Canadian contexts is needed. Documenting and sharing lessons learned implementing these upstream interventions may require the use of novel research methods or approaches to overcome the constraints of conventional evaluation strategies.
- Moving beyond measurable outcomes to recognize other achievements, such as social connectedness, community partnerships, supportive community and school environments for youth, youth leadership, and individual and community resilience, is critical to assessing the impact and implementing primordial and primary substance use interventions for youth.

Ethics and Confidentiality Consideration

The project team obtained ethics approval from the Ethics Research Board of Public Health Ontario, as it is the default ethics board for public health units. We subsequently obtained approval from the Unity Health Toronto Research Ethics Board. Interview participants were assigned an ID number, and a linking log was kept separately with restricted access. Results are summarized in aggregate data without information that could identify participants directly.

Knowledge Dissemination Plan

The knowledge dissemination plan will involve the following components:

- An interim report of the updated literature review will be presented to the COMOH DOPC Prevention subgroup committee.
- A final report of the project will be presented at the COMOH DOPC work group and to key stakeholders.
- A knowledge translation summary will be disseminated to the COMOH executive and a planned online seminar through PHO.
- A slide deck and summary materials will be presented at a public health or substance use conference.
- A peer reviewed article will be developed with the participation of the applicants and knowledge users/advisors; and
- An appraisal online seminar session will be organized with key stakeholders at the provincial level to discuss findings and evidence-informed recommendations.

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APPENDICES

Appendix 1: Inclusion and Exclusion Criteria for Literature Search

Search

Concept Map:
Opioids/Illicit Drugs
AND **Primary/Primordial Prevention Strategies**:
AND Youth [16-24]
AND Synthesized literature [systematic review/rapid review/scoping review/ Meta-analyses//Health technology assessments/Indirect treatment comparisons

Definitions:

Opioids/Illicit Drugs:
Primary/Primordial Prevention Strategies:
Definitions of importance from email:
Key primordial prevention strategies include addressing social determinants of health and reducing adverse childhood events.
Key primary prevention strategies include supporting the implementation of evidence-based prescribing guidelines, expanding school-based prevention programs, and improving access to behavioral health supports.
Key secondary prevention strategies include expanding access to evidence-based medications for opioid use disorder, especially for high-risk populations, including pregnant women, hospitalized patients, and people transitioning out of carceral settings.
Key tertiary prevention strategies include the expansion of harm reduction services, including expanding naloxone availability and syringe exchange programs.

Search Inclusion/Exclusion Criteria:

Include:

- English language
- 2018 – present
- Systematic Reviews/Rapid/Scoping reviews
- Youth [16-24]
- Decision to limit keyword terms in the abstract field to non-indexed records due to appropriate coverage by MeSH terminology.

Exclude:

- Languages other than English
- Pre-2018 publications

SCREENING INCLUSION/EXCLUSION CRITERIA: The search strategy was not limited by these concepts:

Risk factors and protective factors of drug use among youth (exclusively for opioid and illicit drugs and inclusively shared with others like tobacco, marijuana, and alcohol)

Limitations:

- Limiting to Systematic Reviews/Rapid/Scoping reviews
- Limiting to English language studies may result in missed pertinent literature.
- Limiting to youth may miss some articles.

Strategy/Intervention/Initiative Inclusion & Exclusion Criteria

Include	Exclude
1. **Primordial prevention** strategies that aim to prevent the development of risk factors and protective factors for substance use (e.g., activities/initiatives addressing the SDOH and ACEs) 2. **Primary prevention** strategies that aim to modify existing substance use risk factors to prevent or delay age of initiation, for general or selected youth populations (e.g., guidelines, setting-based programs like school-based initiatives, strategies including embedded preventive approaches carried out by key partners like school boards and mental health agencies) 3. **Community action/health promotion initiatives:** ▪ Implemented by community partners, with or without public health involvement. ▪ Currently underway or planned to begin within the next 6 months. 4. Health promotion (primordial or primary) initiatives that are specific to, or include, opioid and illicit drug use among youth. 5. **Strategies addressing risk and protective factors** that are shaped through the life course, from the prenatal environment to adulthood: ▪ **Societal/structural factors**: marketing practices and social norms, colonization and intergenerational trauma, stigma and discrimination, income, and housing policies ▪ **Community factors**: school connectedness, social and community connectedness, availability, and access to substance ▪ **Interpersonal factors**: early childhood development, physical and sexual abuse and other types of violence, family member with problematic substance use ▪ **Individual factors:** resilience, mental health status and genetics	1. **Secondary prevention** strategies aimed at controlling the degree or damage to the individual by preventing substance use harms amongst those already using substances (e.g., harm reduction) 2. **Tertiary prevention** strategies (e.g., rehabilitation and relapse prevention) 3. Initiatives that are no longer active 4. Initiatives that do not include opioid and illicit drugs as relevant outcomes

Appendix 2: Health Units' Survey Questionnaire

Ontario Public Health Units Environmental Scan of Primordial and Primary Prevention Strategies to Reduce Harms from Substance Use Among Youth

Strategy/Intervention/Initiative Section

This document can be used to support you in collecting and collating information for your survey submission, especially if you have multiple strategies/initiatives/interventions to report from multiple collaborators. It is not required to complete this in addition to the online survey. However, if you choose to use this document, you will need to enter the information collected here into the online survey tool.

1. Name of the strategy/intervention/initiative:

2. Brief description of the strategy/intervention/initiative:

3. Please indicate which planning and evaluation approaches or components this strategy/intervention/initiative includes to support best practices. (Select all that apply)

   - ☐ Goals/objectives
   - ☐ Outcomes
   - ☐ Service plan/work plan
   - ☐ Logic model
   - ☐ Process indicators
   - ☐ Outcome indicators
   - ☐ Health equity impact assessment
   - ☐ Community needs assessment
   - ☐ Health impact assessment
   - ☐ Environmental scan
   - ☐ Project charter
   - ☐ Other, please specify: _____

4. If you selected ***Outcome Indicators***, please list the indicators below:

5. What sources of evidence support this strategy/intervention/initiative? (Select all that apply)

- ☐ Primary interventional or quasi-interventional research (e.g., controlled trials or before-after study with control group)
- ☐ Systematic review or meta-analysis of various study types
- ☐ Narrative review
- ☐ Literature review
- ☐ Grey literature
- ☐ Environmental scan
- ☐ Critical ethnography
- ☐ Indigenous Oral history (Primary source)
- ☐ Theory-based (e.g., health belief model, transtheoretical model etc.)
- ☐ Primary qualitative data (e.g., feedback surveys, focus groups, interviews, observation)
- ☐ Other, please specify: _____
- ☐ None of the above

Target Group

6. Please choose the most applicable age range of children/youth that this strategy/intervention/initiative intends to benefit.(Select all that apply)

- ☐ 0 to 13 years
- ☐ 14 to 18 years
- ☐ 19 to 24 years
- ☐ Other, please specify: _____

7. What type of strategy/intervention /initiative is this?

- ◎ Universal (e.g., whole community)
- ○ Targeted (e.g., focus on selective population)
- ○ Mix of universal and targeted

Level of Intervention

The level of intervention may include both in-person and virtual delivery methods.

8. What is the level of intervention for this initiative? (Select all that apply.)

- ☐ Individual (e.g., skill training, behavioural counselling, psychosocial interventions, case management)
- ☐ Child-care based (e.g., skill development and training)
- ☐ School-based (e.g., school-based curriculum, health education and training, peer mentoring)
- ☐ Family-based (e.g., family therapy, family relationship building, parent training/engagement programs)
- ☐ Community-based (e.g., events, workshops, community coalitions, youth participatory action)
- ☐ Policy (e.g., tobacco, alcohol, cannabis, substance use policy)
- ☐ Other, please specify: _____

Risk and Protective Factors Addressed

Below you will find a list of substance-use risk and protective factors which are grouped into the following categories:

- Individual
- Adverse Childhood Experiences
- Family
- School/Community
- Social Determinants
- Other (including political participation)

Please read through each category and select the factors that this strategy/intervention/initiative intends to address.

9. Individual (Select all that apply)
   - ☐ Resilience
   - ☐ Coping/self-regulation
   - ☐ Mental health and wellbeing
   - ☐ Mental illness (e.g., anxiety, depression, mood disorder)
   - ☐ Internalizing and externalizing symptoms
   - ☐ Self esteem
   - ☐ Nurturing childhood environment
   - ☐ Self-control, impulsivity
   - ☐ Self-efficacy
   - ☐ Exposure to violence (community or domestic)
   - ☐ Physical activity
   - ☐ Spirituality
   - ☐ Previous medical prescription use
   - ☐ Substance use prevention education and training
   - ☐ Perceived risk of harm of substances
   - ☐ Academic performance
   - ☐ Other, please specify: _____
   - ☐ None of the above

10. Adverse Childhood Experiences (Select all that apply)
   - ☐ Domestic violence
   - ☐ Parent/family member substance use
   - ☐ Parent/family member mental illness
   - ☐ Parental separation/divorce
   - ☐ Incarcerated parent
   - ☐ Adverse life events (e.g., death of family member or close friend)
   - ☐ **Abuse:** Emotional

- ☐ **Abuse:** Physical
- ☐ **Abuse:** Mental
- ☐ **Abuse:** Sexual
- ☐ **Neglect:** Emotional
- ☐ **Neglect:** Physical
- ☐ Other, please specify:
- ☐ None of the above

11. Family (Select all that apply)

- ☐ Family Relations/connectedness
- ☐ Parenting experience
- ☐ Parental education
- ☐ Family socioeconomic status
- ☐ Family support
- ☐ Other, please specify:
- ☐ None of the above

Please select the factors that this strategy/intervention/initiative intends to address.

12. School/Community (Select all that apply)

- ☐ School connectedness
- ☐ Peer pressure/peer influence/peer delinquency
- ☐ Community support
- ☐ Social network
- ☐ Neighbourhood support
- ☐ Built environment
- ☐ Accessibility/availability of substances
- ☐ Other, please specify:
- ☐ None of the above

13. Social Determinants (Select all that apply)

- ☐ Housing
- ☐ Socioeconomic status
- ☐ Employment
- ☐ Access to health services
- ☐ Inequality
- ☐ Stigma and discrimination
- ☐ Diversity and inclusion
- ☐ None of the above

14. Other, please specify:

Partnerships

15. Are there partners involved in this strategy/intervention /initiative?

    O Yes
    O No

16. **If no,** please specify if this is another type of community action (a community-driven initiative that has not evolved into partnership):

17. **If yes**, please indicate which types of partners are involved and whether each is considered a formal or informal partnership.

	Formal Partnerships (i.e., a contract or MOU / agreement exists between partners)	Informal Partnerships (i.e., there is no contract or MOU / agreement between partners)
Another department/program within your PHU	☐	☐
Another PHU	☐	☐
Another municipal department (e.g., Community/Social Services, Parks & Recreation)	☐	☐
Government (federal or provincial)	☐	☐
School/school board	☐	☐
Mental health organization	☐	☐
Community addictions services/organization	☐	☐
Local social service agency	☐	☐
Health care agency	☐	☐
NGO	☐	☐
Community action	☐	☐
Business	☐	☐
Indigenous communities/organizations	☐	☐
Police services	☐	☐
College/university	☐	☐
Other, please specify: _____		

Barriers and Challenges

18. Please briefly describe the barriers and/or challenges to implementing this strategy/intervention/initiative:

Evaluation

19. Has this strategy/intervention/initiative been evaluated with current or past participants?
    - ○ Yes
    - ○ No, but we have plans to evaluate in the future
    - ○ No, we have not evaluated this initiative, nor do we have plans to
    - ○ Not applicable
    - ○ Don't know

20. **If *yes***, please briefly describe the evaluation method and indicators used to measure the success of this strategy/intervention/initiative, and the results of the evaluation:

21. **If *no, but we plan to,*** please describe the evaluation plan, including indicators that will be used to measure outcomes:

Other Comments

22. Please share any additional comments about this strategy/intervention/initiative.(Optional, if none please leave blank)

Appendix 3: Participation Invitation and FAQs

Ontario Public Health Units Environmental Scan of Primordial and Primary Prevention Strategies to Reduce Harms from Substance Use Among Youth

Letter of Information

Introduction

This environmental scan is being conducted as part of the Locally Driven Collaborative Project (LDCP): *Implementing an evidence-informed public health approach to health promotion around substance use and preventing substance-related harms among youth aged 15-24 in Ontario*. This provincial survey aims to measure the range and extent of evidence-based primordial and primary prevention strategies to reduce harms from opioid and illicit substance use among youth aged 15-24 years, currently occurring (or that are planned to occur within the next six months) across Ontario's 34 public health units (PHUs).

Primordial prevention strategies are defined as those which involve preventing the development of risk factors for opioid and illicit substance use. *Primary* prevention strategies are those which aim to modify existing risk factors to prevent opioid and illicit substance use.

The lead for this project is Grey Bruce Health Unit, in partnership with Simcoe-Muskoka District Health Unit, KFLA Public Health and the Applied Health Research Center (AHRC) at Unity Health Toronto affiliated with University of Toronto as co-applicants. Funding has been provided by Public Health Ontario.

Purpose

The purpose of this environmental scan is to identify primordial and primary prevention strategies that are currently in use or are planned to be used within the next six months in your public health unit region. These strategies could be led by the health unit, or led by a community partner, or both in a collaborative partnership. We are also interested to know about initiatives or community action in your community that may have not evolved to a partnership but which are implementing relevant primordial/primary prevention strategies to promote the health of youth. The strategies should aim at influencing opioid and illicit substance use patterns or outcomes for youth aged 15-24 years through prevention or delaying use; this may be one of many potential objectives for the strategies (i.e., they may also aim to influence other aspects of mental and physical health). The results from this environmental scan will be used to develop an inventory of prevention strategies used within Ontario public health units and compile a summary of indicators used for monitoring or evaluating current prevention strategies.

Design and Methods

This design of this environmental scan is two phased, it consists of one online survey and one individual semi-structured phone or zoom interview to gather information related to the primordial and primary prevention strategies.

This study aims to include a maximum of 34 health units for both phases, survey and semi-structured interview, between December 2022 and May 2023.

Online Survey

For the online survey, you will be asked to appoint one person to submit a survey response on behalf of your health unit. This response can include anywhere from 1-8 different primordial/primary prevention strategies. To

help facilitate gathering the details of each strategy for inclusion in your survey response, a printable version of the strategy section of survey is attached. You can circulate this to others in your organization who are best able to report on each strategy and then collate the information into one electronic survey response using the link provided. The electronic survey is accessed through an online survey platform (*SurveyMonkey*) hosted by the Grey Bruce Health Unit. The length of time to complete the online survey is about 30 minutes, but will depend on the number of strategies you choose to submit.

Raw survey data will be shared with AHRC Unity Health through an encrypted share-file service and password protected files. This will give them the background needed to conduct the individual semi-structured interviews. In your survey response, you will be asked to provide contact information for one key person from your health unit who can be contacted by the AHRC staff to help coordinate your health unit's participation the individual semi-structured interview.

Semi-structured Interview

One interview would be conducted per health unit and would cover all the strategies submitted in the survey.

If your unit agrees to participate in the semi-structured interview, we will schedule a one-on-one interview that can take place over the phone or Zoom (using a Unity Health Health-Care Account). The interview is not a survey or a question and answer process, it is a conversation following a semi-structured guide, and you are in charge of what you want to share. We will audio-record the conversation with an external device so we do not miss any detail, we will transcribe it and delete or change any identifiable information we may mention to protect your identity. Interviews will be facilitated by an experienced qualitative researcher of the Applied Health Research Centre at St. Michael's Hospital. Interviews will last between 20 to 60 minutes, and these will be scheduled at a time that works best for the interviewees.

You may need approximately 4 hours to collect background information for both the survey and the interview.

Potential Risks to Participation

Potential risks are not expected. However, since the surveys will be distributed by a senior leadership representative at your place of employment, you may feel obligated to participate as part of your job. There is no obligation to participate and there will be no negative consequences if you choose to not participate or to stop part way through or withdraw from the survey or individual interview. The researchers will not use any data that can identify you or your health unit in any way (e.g., names, locations, or organizations will be changed or deleted for knowledge translation purposes to maintain the anonymity of the source). However, it is possible that you could be identified indirectly if your health unit, or the strategy you share, has unique characteristics or if you have limited staff capable of completing the survey.

Potential Benefits to Participation

This information will help public health units to understand and implement evidence-based strategies to reduce substance use and related harms amongst youth.

Compensation

As a token of appreciation for your time in completing the survey and the individual interview, you will be offered a $100 electronic gift card for your health unit. One gift card will be offered per health unit response. If multiple individuals participate in completion of the survey, it will be up to the health unit to determine how the gift card is shared amongst participants. You will be able to indicate at the outset of the survey if you would like to accept or decline the gift card. You are also welcome to accept the gift card and donate it to a community organization of your choosing.

Voluntary Participation

Your participation in the survey and interview is completely voluntary. You may stop or withdraw from the survey or interview at any time with any consequences for you or your health unit, and you may refuse to answer any question for any reason. Once you have completed the survey, you will no longer be able to request to have your responses removed from the survey.

Privacy and Confidentiality of Your Personally Identifying Information and Study Data

Survey data will be collected using SurveyMonkey. Once the survey has closed, responses will be downloaded and stored on an encrypted confidential password protected drive at the Grey Bruce Health Unit, and the data stored in SurveyMonkey will be permanently deleted.

You will be asked to enter contact information into the survey. The contact information will be used strictly for distribution of the gift cards and to schedule the individual interviews. The contact information will be shared by the Grey Bruce Health Unit through the secured Public Health file-share system and encrypted file with one member of the AHRC staff for the unique purpose of scheduling the semi-structured interviews. Once the interviews have been scheduled, the AHRC staff will destroy the file used to schedule the interviews.

Semi-structured Interviews. All AHRC staff involved in this study (only related to the semi-structured interviews) is committed to respecting your privacy. Other than the individuals or groups described in this section, no persons will have access to your personally identifying information without your consent, unless required by law. Personally identifying information is any information that could be used to identify you or your unit; this includes your name and address or location.

Study data is information that is generated by and/or collected for a study that has been stripped of personally identifying information. The study team will make every effort to keep your personally identifying information private and confidential in accordance with all applicable privacy legislation, including the Personal Health Information Protection Act (PHIPA) of Ontario. No personally identifying information will be allowed off-site the AHRC in any form, unless described in this consent form or required by law.

All data collected for research purposes (interviews) will be labelled with a unique study identification number instead of any of your personally identifying information. A document called a "master linking log" will be used to store your name, contact information, and interview date. This document will link your study identification number to your health unit and will be kept separate from the interview information and will be saved to the St. Michael's Hospital secure server, encrypted with a password, and only accessible by the study team.

Audio Recordings Storage and Retention

All audio recordings from the semi-structured interviews will be transcribed word for word (except for any personally identifying information, which will not be transcribed and will be changed or deleted). Audio recordings will be destroyed after analysis is completed. Direct quotes may be used in future publications; however, there will be no way to identify the original speaker or unit unless the program you describe is explicitly unique to your unit. Transcription will be completed by the AHRC staff with the support of NVivo automated transcription service or Zoom caption system.

Personally Identifying Information Storage and Retention of Interviews' Data

All personally identifying data used in the interview portion of this environmental scan will be securely stored. A document called a "master linking log" will be used to store the unit name, the contact information, and interview date. This document will link your study identification number to your unit and will be password-protected and kept separate from the interview information and will be saved to the St. Michael's Hospital secure server only accessible by the AHRC study team.

Personally identifying information collected for research purposes will be kept by the AHRC Investigator and Unity Health Toronto for as long as required by Unity Health Toronto policy (currently 5 years after this study ends), at which point any documents with personally identifying information will be destroyed.

Study Data Storage and Retention of the Interviews' Data

Study data from the interviews will be securely stored on the St. Michael's Hospital server. Study data will be destroyed after 5 years of study completion (data analysis and dissemination of results).

Your individual privacy will be maintained in all publications or presentations resulting from this study. While individual and health unit names will not be published, it is possible that the unique characteristics of certain activities/initiatives that are reported may result in a PHU's identity being inferred by readers.

Feedback of the Results of this Study to Participants

Research findings will be made available to all interested parties upon completion. Results and recommendations will be summarized in a report to public health units and stakeholders. Stakeholders include community partners who are implementing preventative strategies related to youth health promotion (e.g., mental health agencies, school boards, police, Ministry of Health, Ministry of Children, Community and Social Services, Non-Governmental Organizations, etc.). Knowledge exchange materials, such as an infographic summary of results, will be made public.

Subsequent Use of Data

Aggregate research findings may be used for further grant applications, peer reviewed papers and other academic opportunities.

Contact and Ethics Information

If you have any questions about this research study, please contact the Lead Researcher: Dr. Rim Zayed, Physician Consultant at Grey Bruce Health Unit: r.zayed@publichealthgreybruce.on.ca

This project has received ethics clearance from Public Health Ontario's ethics review board and Unity Research's Ethics Review Office. If you have any questions about ethical issues related to the project, you may contact the Research Ethics Coordinator, by email at ethics@oahpp.ca, or by phone at 647-260-7206.

impact the local community (e.g., mental health agencies, school boards, police, Ministry of Health, Ministry of Children Community and Social Services, Non-Governmental Organizations, etc.)

A fillable PDF version of the survey is included in case it is helpful for you to collect responses from multiple contributors. This information must then be collated and entered into the online survey.

How many strategies/interventions/initiatives can I submit?

You can submit as many as you'd like. The electronic survey will allow you to enter up to 8 different strategies/interventions/initiatives at a time. If you have more than 8, please use the survey link a second time to complete your next set of entries.

What are the inclusion and exclusion criteria for strategies to be included in the survey?

Table 1: Strategy/Intervention/Initiative Inclusion & Exclusion Criteria

Include	Exclude
1. ***Primordial prevention*** strategies that aim to prevent the development of risk factors and protective factors for substance use (e.g., activities/initiatives addressing the SDOH and early childhood development) 2. ***Primary prevention*** strategies that aim to modify existing substance use risk factors to prevent or delay age of initiation, for general or selected youth populations (e.g., guidelines, setting-based programs like school-based initiatives, strategies including embedded preventive approaches carried out by key partners like school boards and mental health agencies) 3. ***Community action/health promotion initiatives:*** ▪ Implemented by community partners, with or without public health involvement ▪ Currently underway or planned to begin within the next 6 months 4. Health promotion (primordial or primary) initiatives that are specific to, or include, opioid and illicit drug use among youth 5. **Strategies addressing risk and protective factors** that are shaped through the life course, from the prenatal environment to adulthood: ▪ **Societal/structural factors**: marketing practices and social norms, colonization and intergenerational trauma, stigma and discrimination, income, and housing policies ▪ **Community factors**: school connectedness, social and community connectedness, availability, and access to substance	1. ***Secondary prevention*** strategies aimed at controlling the degree or damage to the individual by preventing substance use harms amongst those already using substances (e.g., harm reduction) 2. ***Tertiary prevention*** strategies (e.g., rehabilitation and relapse prevention) 3. Initiatives that are no longer active 4. Initiatives that do not include opioid and illicit drugs as relevant outcomes

Include	Exclude
▪ **Interpersonal factors**: early childhood development, physical and sexual abuse and other types of violence, family member with problematic substance use ▪ **Individual factors:** resilience, mental health status and genetics	

What is the individual structured interview?

For the interview, the research team will connect with the contact person in each health unit after submitting the survey to set up a time for the individual interview. Each health unit can invite staff who completed the questionnaire including community partners. The interview duration is between 20 minutes to 60 minutes.

Ontario Public Health Units Environmental Scan of Primordial and Primary Prevention Strategies to Reduce Harms from Substance Use Among Youth

Frequently Asked Questions

What is the scope of the survey?

Although the scope of the research involves outcomes in the youth period from ages 15-24 years, there are relevant risk factors related to social determinants of health (SDOH) and experiences of trauma during childhood and adolescence, along with a range of protective factors, which influence the life course. Please identify strategies/interventions/initiatives that are focused on:

- **Primordial prevention**: building resilience, SDOH and Adverse Childhood Experiences (ACEs) across the socio ecological model (individual, family, community, and society).
- **Primary prevention**: initiative or preventive programs at various settings (e.g., youth-focused school health setting aimed at preventing or delaying opioid or illicit drug use).
- **Risk and protective factors throughout the life course** (as outlined in Table 1).

This research includes opioids and illicit drugs. However, strategies addressing other substances like tobacco, cannabis and alcohol can be included if the initiative includes empiric coverage for all substances and not specifically for opioids and illicit drugs. Some strategies or initiatives may be focussed on secondary prevention such as harm reduction – please do not include these in the survey. Only report primordial and primary prevention strategies/initiatives/interventions.

Who would be the relevant person(s) to contribute to the survey?

Please select one contact person to coordinate the information across the health unit (and with any relevant community partners) to complete the survey and submit the response on behalf of your PHU region. If you have multiple strategies/interventions/initiatives to report, the survey will allow you to enter each one individually. We understand that the preventive programs are sometimes embedded in multiple public health programs. Therefore, you may wish to involve the following people in coordinating your response:

- A/MOHs
- Directors/program managers/specialists/subject matter experts with work relevant to preventive strategies involving adolescents and youth, including but not limited to those leading work in:
    - School health
    - Healthy Babies Healthy Children (working with vulnerable families)
    - Healthy Growth and Development
    - Healthy equity leads; Foundational Standards managers
    - Chronic diseases and injuries prevention (mental health, substance use prevention)
    - Harm reduction
- Community partners who are implementing preventive strategies/interventions/initiatives related to youth health promotion either in partnership with, or separate from public health, but which

Appendix 4: Qualitative Interview Guide

PHU Key Informant Interview Guide

LDCP: Implementing an evidence-informed public health approach to health promotion around substance use and preventing substance-related harms among youth aged 15-24 years.

The interviewer will introduce themselves and ask the participant if they are OK to start and if they have any further question.

Overview Question:

1. Tell me about your professional role and how do you relate to the topic of this interview.
2. In your own words, can you describe the [name of activity/initiative], including the intended outcomes/impact? Tell the story of the initiative.
    a. What is its setting? I mean, where does it take place and who implements it?

Questions:

3. [Name of strategy/intervention/initiative] was described as a [universal/targeted] initiative. Can you tell me more about the target population?

4. How have priority population groups been involved in developing, implementing, or evaluating [activity/initiative]?
   What can you tell me about them?

   Tell me more about the youth that the intervention is aiming to impact.

    a. Do you see other youth attending the intervention?
    b. What are your thoughts on the population? I mean, do you think this population is benefitting from the intervention? Are there any community/group/individuals we are not reaching to? Why? What are your thoughts about how we could reach them?

5. In the survey, you indicated that [strategy/intervention//initiative] had the following [list] formal and informal partnerships. What role has each of these partnerships played in the initiative? If you don't mind, please tell me about how the partnerships have developed and unfold.
    a. How have partnerships <u>helped</u> the achievement of outcomes/impacts?
    b. Have partnerships <u>hindered</u> achievement/measurement of outcomes/impact?

6. Can you describe the barriers and challenges to implementing this program in the real world? Tell me about the main difficulties you have encountered, I mean during the implementation or at any moment in the process of developing, implementing, or evaluating.
    a. Have you heard from members of the community, or from the youth? What are their thoughts? Any needs we are not listening to?

7. In the survey, you indicated that [activity/initiative] [has been/has not been/has plans to be] evaluated.
    a. Based on your experience, what is the impact on the youth and the community?

b. How do the youth and the community see this initiative? Have they expressed any needs that this is not addressing? Why?
c. [If has been] Can you tell me more about the evaluation approach and the results?
d. [If has not been] Can you tell me more about why it has not been evaluated?
e. [If plans to be] Can you tell me more about the planned approach for evaluation (e.g., evaluation type, methods, etc.)

8. Can you share a bit more about how you measure success in these programs? What about failures? How do you know if you reach your objectives or if you have not been as successful?
   a. What outcome/impact indicators, if any, have been identified for this activity/initiative?
   b. Is data currently (or planned to be) collected about these indicators?
   c. What are the barriers and challenges to collecting data on these indicators?
   d. What are the facilitators?

9. My next question is around the sources or evidence supporting this initiative. There is no judgement in this question and no expectation of you providing a list of EBPs, so please feel free to share what you think or know that is supporting this initiative.

Summary Questions:

10. Tell me about the activities/interventions that you think your organization (solely or with community partners) has been most successful at with respect to preventing, delaying, and reducing opioid and illicit drug related harms in youth aged 15-24 years?
11. What do you see as important next steps for implementing evidence-informed public health strategies that will prevent, delay, and reduce opioid and illicit drug related harms in youth aged 15-24 years?
12. Thank the participant and ask for any further comments or anything they would like to share.

Appendix 5: Comprehensive Qualitative Interview Quotes – Themes and Sample Quotes

*The quotes have been edited for ease of reading eliminating pause fillers (e.g., um, hmmm, well, so, you know, and similar) and repetitions (e.g., "but, but"), no words have been altered or changed.

Theme	Sample Quotes
1. Experiences of program planning, delivery, and evaluation	
Sub-theme 1: Understanding local burden of substance use among youth	*In our area… we tend to have higher than provincial average substance use, especially in terms of alcohol and vaping. So those are the two problematic areas in terms of youth. (PHU 01)* *For us - obviously, alcohol use within secondary students is a concern… Alcohol, cannabis, vaping is a concern that gets brought up quite a bit from our local schools just because kids are vaping within the school setting, within classes, within bathrooms, and all that kind of stuff. That's probably what comes up the most. There is some level of concern about opioid use, but not as great as I would say the others. (PHU 03)* *We do rely a lot on the Ontario Drug Youth and Health Survey data, the challenge being we don't always get local data. So, we're sometimes making assumptions that we're similar to the provincial trends. (PHU 04)* *The bigger picture challenge is that we actually don't have data like, we don't have really, actually any data…after 2018…. We don't have any data to say - what age group is most using this? [Are] there hospitalizations related to this? Where do we need to focus our efforts on this topic? So, we're kind of shooting in the dark here…we're doing, you know, we're focusing with health communication on that topic, for sure, for the whole, just a broad…so not targeted to youth or adult, just kind of broadly. But …that's another one of those things. So, I think everybody is sort of plagued by this lack of data. And what we're doing, we're just yeah trying our…we're all trying our best. (PHU 02)* *Anecdotally speaking, one of the biggest things that we're seeing in terms of substances on the school team is vaping in schools. So, vaping amongst students in high schools is something that is a major problem or major challenge that staff at schools are having to deal with, both because it's happening a lot inside of schools, but also there are a significant amount of anecdotal reports that the percentage of students at schools that do vape has increased significantly post-pandemic. (PHU 15)*
Sub-theme 2: Availability & sources of data for program planning, delivery, and measuring success	*"…the "Stepping Up" document, which we followed, there's I think seven themes and objectives in that document that we tried to follow and support us in the process as we developed our youth coalitions." (PHU 04)* *"It's a 15-step. That's it's a long process we start with, as what [Name] is saying that you know it starts off with a literature review, and then we have to do [acronym?], we have to do an environmental scan and then, you know, and then narrow it down to what are the best interventions." (P05)* *"The developmental assets research, and it's really the Search Institute who is producing more and more around developmental relationships. That's where our team is starting to look at. The research from the search institute is based in 50 plus years of research and lots of evaluation outcomes that are available to look at when you build assets, what are those health and educational outcomes that are seen in the community with youth in particular." (P06)* *I think one of the things around the Planet Youth or the Icelandic model, one of the reasons that we're considering it is because it really does look at the whole process from beginning to end and makes those pieces and parts easier. The design is already set up, the framework is there, it's evidence-based, the evaluation pieces are already outlined, you have experts that can help you, you know, implement with success. So, although we haven't had any challenges really yet because we're so early in the process, I feel like we can maybe avoid some of them by using a framework that's already been tried and tested. (PHU 14)*

	"I've just recently joined the Icelandic [Prevention] Model community of practice, and it's comprised of members from various health units across Ontario, as well New Brunswick and Manitoba, staff from school health programs, substance use programs, are on this community of practice. There's also a member from the Public Health Agency of Canada in this group, and the purpose of this group is to share knowledge and support each other in advancing the Planet Youth work further, and the meetings are 3 to 4 times per year." (P06)
Sub-theme 3: Measuring success: Metrics & challenges	*We make sure everything is tracked. So, every workshop, every school, every student, staff members, tracked. For example, they went to 7 classes and 200 students were reached through programming. We have like 150 students reached through the tobacco and vaping presentations completed as well, and up to 638 students reached through the nicotine and tobacco programming for high schools. (PHU 15)* *It's challenging with a lot of these types of interventions to pinpoint any one particular intervention that led to the outcome. (PHU 06)* *It's always a challenge for public health to prove outcomes when it's multiple organizations, and initiatives, and society in general who contribute to health issues or social determinants of health. So, it's very difficult for us often to isolate our particular program or intervention as being the 'be all, end all' right, of impacting a specific outcome. So that's always a challenge for us. We actually try often to focus more on capacity building or actual physical or social changes which we can actually quantify, or tell a story about, or something versus the actual increases in income in the neighborhood. It's very challenging always to measure outcomes at a particular level. (PHU 07)* *The challenge right now is because things went on hiatus for three years because of COVID. So, we are going back to doing program planning. We know that there's some programs, the need is still there, so we are re-looking at our target, our strategies and evaluation. We are just picking up where we left off because of COVID. That's why when you mentioned some of the evaluations are not done is because we're just like restarting. (PHU 05)*
2. Roles of partner, public health, and youth	
Sub-theme 1: Partners & collaboration	*"…although we have a mandate to work with schools, schools, they don't have a mandate to work with us." (PHU 14)* *There is a divide between us, our partners, and social services; although we are all working towards the same end goal, it seems as though we are in opposite ends of the spectrum. This has been proven to be a challenge given we are all seeking for the same funding while there exists a scarcity of resources. When our partners have specific mandates that impact x, y, and z. We don't. The division between us, community partners and social providers has not always been clear cut so we should make sure we are not intruding on their space as our partners and providers may be on the defensive side to make sure that they keep within their objective*. (PHU 14) [Quote was edited for clarity]

Sub-theme 2: Role of public health	*"I think to try and do one specific program on its own could be challenging without all the other community supports in place." (PHU 09)* *This is an aspect of the strategy that is going to happen in partnership. So, some of those risk and protective factors, some of the kind of levers, or the influence over some of those factors sits outside of public health. [We are] working closely with our housing partners, working closely with our school partners in terms of [interventions in] that particular setting. (PHU 08) [*This quote was edited for clarity] *In public health we have a unique role looking at addressing root causes. And I think, having a collaborative approach to addressing those root causes is where we can see where we're going. Collaborating with the community, collaborating within divisions or within the department, I think looking at it from a similar lens, but also our different unique roles. I don't know that other health organizations are doing that - I think the term is primordial prevention. I think that's where we have a unique role. (PHU 07)* *For teachers taking this [training], then they have an understanding, and perhaps to come from a trauma-informed perspective and provide support to students that way from a trauma-informed lens. Another thing that these modules do […]is decrease the stigma associated with substance use and mental health issues. So, the purpose of getting that knowledge out there is to help people to have an understanding, and if they have that understanding, they may gain that compassion, that knowledge, and help these people, and then these people in turn, can […] seek the help and treatment that they need because they don't have that fear and feel more comfortable accessing that. (PHU 06)* *There's a lot of misinformation, a lot of stigma, and a lot of discrimination. And so, in part […] you want to create initiatives that target that and deal with that. But those are also the barriers toward some of the work, if that makes sense, why you might get some push back, or people might not understand certain approaches. (PHU 13)* *We are kind of the experts in prevention, and in those upstream approaches, and we try to bring that leadership to the community. That is sort of what we often call backbone support to try to support our partners to move in that direction as well, versus moving away - as [Name] was alluding to - from the deliverer of education, the deliverer of programs and all of that, to much more of that strategic thinking and strategic planning. I think that is the future. (PHU 18)*
Sub-theme 3: Engaging youth & priority populations	*So, it's very student-led, it's a student-led process. They focus on developing relationships with the students and the students come forward with requests for support. So, it could be anything from a student who identifies that they need glasses, they'll organize an eye appointment and then they would facilitate the student getting glasses. (PHU 10)* *From my perspective, there has been very little, no involvement [of youth] in terms of development of the programming. We have done evaluation. We have student feedback from both boards. We have that data. But in terms of the creation and development of the program, it is very structured. And we haven't had our target population involved in providing feedback there. (PHU 12)* *It was like the youth were the stars…at these meetings they were always wanting to hear from them, and kind of learn from them, and if the youth requested certain things. (PHU 04)* *I would say the youth strategy…had significant youth engagement and participation. I would say, for our initiatives, since we are very much in the infancy, we are not at that stage yet. We know that that's crucial and critical. But just again as this post-COVID renewal and direction that we would like to go, we're not there yet. That's part of our plan. (PHU 11)* *Generally, the people that are on those committees are not the people that you're trying to reach, right? They're the non-users, [laughs] right? So, they're the health promoters, and it's great with them. But you don't know necessarily if it's hitting the people that you want to target. (PHU 02)*

	I would say, off-hand, we probably did a better job of reaching our already successful youth. I think when we do that general outreach, we often see the Athletic Council kids, or the student council kids, or the kids who are connected to the music program or other programs within a school. I think it would be some of the priority populations or higher risk students that we maybe failed to connect with. (PHU 04)
3. Contextual factors shaping substance use intervention planning, implementation, and evaluation	
Sub-theme 1: Impact of public health measures during COVID-19 pandemic & recovery on programs, partners & structures	*Yeah, [the intervention] was put on hold...I think schools, everybody was just trying to get by. And then, because you weren't really doing this whole thing, because it was student-led and there's a lot of things that are done at the school level when you're not in school...you lose what you're trying to do with the initiative itself. So, yeah, no, it wasn't able to be run at all. (PHU 02)* *There's not a lot of active programming happening right now. So, a lot of what's happening now is really kind of taking stock of where things were pre-pandemic, what has changed in terms of our population level health assessment, you know, what are the settings of partners that we can work with to deliver interventions. (PHU 08)* *Yeah, [COVID] completely disrupted. And not only from the staffing perspective, but all of our staff were also redeployed to support the COVID response within the ... I shouldn't say all, the majority of our staff were [redeployed]. All our neighborhood groups were not running...for health and safety reasons, but also from the staff perspective of having to support the response. Our health and prenatal nutrition program did go to a virtual format. (PHU 12)* *...the pandemic [made] it is challenging for many of our community partnerships to focus on substance use... they were really focused on helping the students with the online learning needs and with all the COVID protocols. That was the focus. And substance use prevention wasn't necessarily a priority during the height of the pandemic school. (PHU 06)* *Pre-pandemic, we had established the partnerships, and now that we are in program recovery and repatriated back to our program, it has been a bit of a challenge to reconnect and establish these partnerships again. So that is something that we're definitely working on but that was one of the challenges, for sure. Because it was a long time to be redeployed. (PHU 06)* *We have been limited, obviously, during COVID. There is a lot of the initiatives I had mentioned that are EDI scores, which is the early development instrument scores, that are completed in school by kindergarten teachers, and that was paused over COVID for obvious reasons. So, we have not had access to that data since 2018. (PHU 12)* *We have to appreciate that our schools have acute needs. They're still in crisis mode, just because we've gone through the pandemic and are on the other side. They're still really struggling - the needs are really elevated, they're tired, their resources are really tapped out.... we hear from our schools "we're 'June tired' in November." Dealing with difficult behaviours, the children are behind socially, the children's mental health is a challenge, the teachers' mental health is a challenge - it's just the perfect storm. (PHU 20)*
Sub-theme 2: Vertical structures & programs	*We have pretty robust planning processes at the organization, but I still find them 'siloed,' right.... we have plans designed for each team, and the teams are based on the Ontario Public Health Standards... some of these issues that we're tackling are relevant to more than one team. They're relevant to like - ACEs, for example, it's something that's relevant to healthy growth and development, but also chronic disease and schools, and even sexual health. So, how do we start to look at some of these issues as not being 'owned,' for lack of better words, by one team? But you know, being owned by the organization, we must start thinking about these as part of our strategic plans, for the organization to make sure that you know they belong to more than one team. (PHU 15)* *It's the Ministry of Health that mandates that each jurisdiction must develop an action plan for opioid or an opioid response plan. And we use the Health Canada framework of the Four Pillar*

	Approach Framework, which is the prevention, treatment, harm reduction and enforcement. (PHU 05) *So certainly, from my portfolio, which focuses more on sort of the 18 [years] plus side of things it's just how we've cut the work in our agency. You know, illicit substance use is challenging…I mean the opioid crisis, and we certainly know the mortality rates are really focused around the mid-twenties to the forties in men who are dying from the toxic drug supply. So definitely, it is a concern. the opioid crisis is across the province and my work really focuses on the harm reduction activities – naloxone distribution, needle exchange, overdose action plan, things like that. (PHU 03)*
Sub-theme 3: Public health priorities	*I think it's just a balancing of priorities right now. We are really being pulled with some of the harm reduction policy work in the opioid emergency. And where we can continue to wrap in…. that looking forward piece as we continue to get movement, and community collaboration, and commitment on moving some of these little opioid strategic initiatives where we continue to weave and look at opportunities for prevention moving forward. I think we're just really at the cusp of moving some of our work for both definitely with the environmental protective factors, but some of the larger citywide opioid response pieces. (PHU 11)* *About our prevention work, a lot of it was paused during the pandemic. So, that's not ideal, but in terms of resourcing, that pillar is less advanced than the harm reduction pillar at this point. (PHU 08)* *I would say the other thing is competing priorities with[in] the prevention portfolio. I'm speaking about this prevention lens largely from an opioid perspective, which is the focus. But you know, if I look broader on our prevention portfolio, we have a significant work happening with alcohol...From a balancing of perspectives, we are a very small team, and so that honestly, has been the reality right now, continuing to prioritize amongst many other significant substance use priorities in our community. (PHU 11)*
Sub-theme 4: Policy and funding context	*I think so much of it is being able to identify risk as early as possible and have the supports in place, and the programs in place, to support children as they're developing, and families, to prevent going down that path of substance use. And I think that the challenge with that is having the funding to be able to offer comprehensive children and youth programming in neighborhoods in our community, which would be wonderful, which we see in other countries. But that's not really something that we're able to offer here, and that is one of our biggest challenges, how are we going to be able to do that? (PHU 09)* *We've also had a significant turnover in council here...[who] I would say, have a keen interest in the harms associated with opioids and harm reduction. So, we have received some direction around updating the opioid response plan […]. There has been a lot of focus in harm reduction and how we can continue to address the harms associated with substances in our communities to increase the tragic outcomes we are seeing, but that's also part of our work as public health, to continue to bring the prevention aspects, as we know it is. (PHU 08)* *I think that when we look at those models, we also have to be somewhat realistic in what can we learn that might be able to be applied into our community, recognizing we're not going to have the same outcomes that they would have had in Iceland, because that was adopted right across the country. And that took significant investments for them to be able to apply that model. (PHU 09)* *And part of the Icelandic model is trying to influence those policies. Part of the reason why the model was so successful in Iceland was because the Government was actually on board with it, and they created those policies to help curb the youths' substance use in Iceland. Unfortunately, our landscape in Ontario right now isn't so conducive… our alcohol policies are becoming more lax, and our cannabis stores are becoming more popular, and often the youth start off using the legal substances, but a handful of them will graduate to illegal stuff or substances. (PHU 01)*
4. Importance of risk and protective factors to youth substance use	
Sub-theme 1: A paradigmatic shift:	*We know that when we talk about risk and protective factors. We know that there is poverty, housing access [issues], we know that we have a housing crisis across the country. Certainly [This*

Momentum towards risk and protective factors	*region] has also been significantly impacted by that. So, it seems as you're trying to take one step forward, we're taking five giant steps back in terms of all of the other challenges that people are being faced with in our community. I would say that is our biggest challenge. (PHU 09)* *I think by the time that somebody has already been exposed or is already having stress in their life […], I think it's a bit late. (PHU 06)* *COVID offered the opportunity to…pause and really look at the work that we were doing, and really dig into the literature and the evidence to see where we should start moving. For our team, we've really kind of looked at how can we really start looking at how the risk and protective factors influence our substance prevention work. So, we are really trying to take that lens moving forward, moving past that - if we just tell them not to do it, then they won't do it - and how can we really build that community around the young people in [Region] to help them reduce their risky behaviour. So that's really kind of a shift. (PHU 18)* *We talk within public health, or people who do similar kinds of work to us, and we speak the same language. But when you move outside of people who do health related or social service-related work, there's a real lack of understanding in the general population about lifelong health and the ways in which it can be influenced. So, there's a lot of work to be done in that particular area. (PHU 07)* *I think ACEs work, PACEs [positive and adverse childhood events] work across the province is gaining some momentum, particularly within public health. There's the community of practice through Public Health Ontario, which is also very much at beginning stages. And if you ask any health unit, they at beginning stages as well about moving this forward. But people understand the importance of it. We did a baseline survey. People appear to know about ACEs, they may not know then how to apply it to their work, and that's part of what we'll look at for moving the initiative forward. So, this is a long-term strategy. (PHU 07)* *It's a lens of practice from which we develop and deliver all of our programming and services in schools […] our approach is upstream and at the heart is the goal to bolster protective factors and ameliorate those risk factors associated with substance use amongst students. The strategy is threefold - the ultimate goal is enhancing students' strength and their resiliency, helping students to thrive and flourish. In addition to delivering programming targeting students, there's also an element where we're working directly with adult influencers - bolstering their capabilities to support student outcomes, and also working with our school communities to create supportive school and community environments so that students can flourish and thrive. (PHU 20)*
Sub-theme 2: Scope and impact of primordial interventions	*I think scope is one of our biggest challenges, because everything is a social determinant of health. (PHU 14)* *So, we haven't been working on [the ACEs strategy] all that long, and it's got many components to it. And it's complicated, and big, and huge, and challenging. (PHU 07)* *One of the things that's a bit tricky about evaluating success is that when it comes to substance use and mental health… some things in this area aren't actually specific towards substance use education. So obviously, there are specific programs. But things that build resilience, things that build community relationships, things that build coping strategies, things that build healthier family dynamics or community dynamics, sports […] making art and creative outlets are all things that help substance use related issues and health issues down the line but aren't actually specific about substance use. So, it's hard to evaluate it or that direct link, but those are key. (PHU 13)* *The best prevention measures often have nothing to do with substance use at all, while the ultimate goal is to reduce substance use and prevent youth from using substances...upstream efforts often seem unrelated to substance use, as opposed to like specific substance use policies or education. We're addressing substance use, without talking about substances at all. (PHU 20)*

	The ultimate end goal, which I know will be challenging to measure, is a reduction in health inequities over time. Whether it's income, food, security, education attainment amongst parents, but the goal is to reduce inequity within the particular neighbourhood or population. (PHU 07) *Everyone wants the quick fix and upstream interventions take time, sometimes there's an unrealistic expectation for immediate results. (PHU 20)* *We really want to do a lot of focus work within that 'Prevention Pillar.' But we recognize that the hardest thing with doing the more 'upstream' interventions, which are so important, is that there isn't the urgency, the need for the funders to invest. They're going to want to invest far more under that harm reduction pillar. Whereas we, we know we need to pull back some resources to really make sure that there's a lot of supportive programming to prevent the uptake of substance use in the first place. We know that if we can prevent the uptake, it'll be far more beneficial. (P09)* *I think the biggest challenge is we know that our strategy is a long-term prevention strategy, potentially intergenerational. And so, it's very difficult to show outcomes with that kind of long-term strategy and often, say funders or policymakers or leadership, want to see the downstream [strategies], because it's easier to measure the impact. But we know that the impact can be big with a long-term strategy. It's just harder to show along the way. (PHU 07)* *We know that if it is driven by the needs and the wants, and building on the assets of the community, you will create those protective factors and resiliency. But it's not necessarily about what's the evidence of the right intervention to do in one area. It might be the cooking club in another area. It's we're supporting a neighbourhood association. So, for us it's a bit of a shift in mindset. We know that we're doing it right if we're following the process with fidelity. We're less worried about, do we have evidence to show that a cooking club impacts student drug use? Because it's more about the program and the intervention. (PHU 14)*
Sub-theme 3: Substance use prevention is a complex, multi-dimensional challenge	*When it comes to substance use, it's just so big. There's so much about the supply coming into the community. There's so much about decriminalization access. It's so complex, that's where I think that the biggest bang that we can really have is getting to kids really early, developing other interests so that they have other things in life that interest them and fill their time, to help them. We are trying to move upstream. We know that's the way we need to go, we are faced with so many other environmental challenges that are making it difficult to demonstrate impact. Because again, poverty, and the cost of education is increasing so much. We know that lack of affordable housing and all of these things are working against us. It is tough. (PHU P09)* *Thinking about priorities, but also challenges, there are issues that are not just public health issues, and that are not just health issues. They require many different stakeholders and divisions. So even just thinking about city planning, and parks, and stuff like that actually really impacts mental health and the mental health of youth. So, at the [PHU] level, obviously, we could talk a lot about the health aspects, but it's a lot broader. (PHU 13)*