Behavioural Science-Informed Strategies for Increasing COVID-19 Vaccine Uptake in Children and Youth


Key Message

Using evidence from other successful childhood vaccination programs and from behavioural science, we identify four broad evidence-based strategies for increasing COVID-19 vaccination uptake in children and youth: 1) School-based vaccination, 2) Healthcare provider recommendation, 3) Reminders and recall systems, and 4) Public health communication campaigns.

Across each intervention, behavioural science principles can be used to optimize COVID-19 vaccination uptake amongst children and youth including leveraging recommendations from trusted sources; tailoring messaging and experience to children, youth, and their parents/caregivers through individual and population-based approaches; and ensuring special considerations for reaching at-risk and racialized communities.

Summary

Background

Recognition of effective strategies and early collaborative planning is essential to ensure optimal uptake and engagement of all children and youth eligible for COVID-19 vaccination. At the time of writing, Health Canada has authorized two mRNA vaccines for use in youth born in 2009 or earlier (i.e., Pfizer-BioNTech Comirnaty and Moderna Spikevax), receiving a strong recommendation from the National Advisory Committee on Immunization (NACI).

Questions

What influences vaccination behaviour in children and youth?
What strategies are effective for increasing vaccination in children and youth?
What behavioural science principles can be used to support vaccination in children and youth?

Findings

By leveraging behavioural sciences to promote vaccine uptake in children and youth we can understand key influences on vaccination such as threat perception, leadership, individual and collective interests, science communication, social context, and stress and coping.

School-based vaccination programs are a high-impact and effective approach for increasing uptake that address many practical issues (e.g., reach, convenience, feasibility, accessibility, equity). Healthcare provider recommendation is a well-researched strategy for increasing vaccine uptake in children. Reminder systems are
among the most effective strategies to improve vaccine coverage in the Canadian context, including reminders for the next vaccine dose and recall for missed vaccination.

Healthcare providers are trusted sources for assessing and addressing the informational, logistical, and practical barriers to vaccination. School-based and community health communication campaigns are effective if delivered by authoritative sources and included parents. Efforts should be made to address misinformation, reduce risk perception, promote positive attitudes towards vaccines (e.g., including in needle phobia campaigns), and stimulate action (i.e., vaccination).

There are four behavioural science-informed principles to support COVID-19 vaccination: build and leverage trust; avoid one-size-fits-all approaches; ensure special considerations for reaching at-risk populations; and ensure special considerations for reaching black, indigenous and all racialized communities.

Interpretation

Given ongoing implementation of the youth COVID-19 vaccination program in Ontario and pending Health Canada approval of COVID-19 vaccines for children aged 5-11, increasing COVID-19 vaccine acceptance and uptake in children and youth will help allow them to continue safely returning to pre-pandemic activities by reducing transmission, hospitalizations, and severe outcomes.

Background

The Rationale for Vaccinating Children and Youth with COVID-19 Vaccines

There is much to draw from behavioural science to continue to optimize the ongoing youth (12-17 years) vaccination program. Recognition of effective strategies and early collaborative planning is essential to ensure optimal uptake and engagement of all children and youth eligible for COVID-19 vaccination. At the time of writing, Health Canada has authorized two mRNA vaccines for use in youth born in 2009 or earlier (i.e., Pfizer-BioNTech Comirnaty and Moderna Spikevax), receiving a strong recommendation from NACI: “NACI recommends that a complete series with an mRNA COVID-19 vaccine should be offered to adolescents 12 to 17 years of age who do not have contraindications to the vaccine.”

The Canadian Paediatric Society has advocated for vaccination of individuals aged 12 years or over. As of October 20, 2021, 83% of youth aged 12-17 in Ontario received at least one dose of a COVID-19 vaccine, and 76% are fully vaccinated (e.g., received two doses). Evidence on COVID-19 vaccination in children 11 years and younger is now emerging from clinical trials and being shared with regulators in Canada and the United States. Pfizer-BioNTech has submitted initial trial data for its COVID-19 vaccine in 5–11-year-olds to Health Canada and the U.S. Food and Drug Administration. Clinical trials for Moderna’s vaccine are ongoing in 6-11 year-olds.

COVID-19 vaccination in children and youth is important for multiple reasons. First and foremost: to prevent SARS-CoV-2 infection and the risk of rare complications of SARS-CoV-2 (e.g., multisystem inflammatory syndrome), hospitalization, post-COVID condition, and also to prevent community spread as children have been shown to transmit SARS-CoV-2 to other children or adults. Vaccination against COVID-19 has been shown to reduce SARS-CoV-2 viral shedding and the likelihood of SARS-CoV-2 transmission within household thus vaccinating children and youth will decrease their likelihood of transmitting SARS-CoV-2, leading to reduced overall transmission within school settings and in the community. Limiting the spread and number of outbreaks within schools will be a crucial part of a full- and long-term normalization of children’s education by avoiding school closures and cohort dismissal.

Vaccination against COVID-19 presents benefits to individual Ontarians and the province...
overall. Vaccination reduces the risk of infection associated with close interactions and supports a safer return to socialization including with friends and family, participating in athletic or arts-based extracurricular activities, attending camps, recreational centres, and other community events. This enables children to have important educational and social experiences. In addition, a return to participation in these activities would accrue benefit for the mental health and psychosocial wellbeing of children, youth, and parents/caregivers (hereafter parents). Herein, we focus primarily on behavioural science consideration for children and youth vaccination, while recognizing that parents are centrally important to fostering vaccination acceptance and uptake and should be equally supported alongside children and youth.

Questions

What influences vaccination behaviour in children and youth?

What strategies are effective for increasing vaccination in children and youth?

What behavioural science principles can be used to support vaccination in children and youth?

Findings

Leveraging Behavioural Sciences to Promote Vaccine Uptake in Children and Youth

To increase vaccine acceptance and uptake, we must consider a wide range of factors linked to under-vaccination and their relative contributions to suboptimal coverage. Behavioural science combines methods and approaches from psychology, economics, and other social science disciplines that can help to identify and reduce barriers to vaccine acceptance and uptake. By leveraging behavioural science, we can understand key influences on vaccination such as threat perception, leadership, individual and collective interests, science communication, social context, and stress and coping (see Figure 1). These insights can guide vaccination programs in developing strategies to improve uptake and prioritize interventions.

Figure 1. Social and Behavioural Science Factors That Impact Vaccination in Children and Youth

The World Health Organization’s behavioural and social drivers (BeSD) is a useful framework for ensuring that strategies for increasing vaccination reflect four domains that drive vaccine acceptance and uptake: 1) Thinking and feeling (including individual cognitive and emotional responses), 2) Social processes (including people’s
experiences related to vaccination when interacting with family, friends, and their broader social network), 3) Motivation (including people's willingness or hesitancy to get a vaccine), and 4) Practical issues (including the experiences people have when trying to get vaccinated such as accessing vaccination services) (see Figure 2).

The BeSD model was developed through a comprehensive process to ensure measurability in individuals, specificity to the drivers of vaccination, and modifiability by vaccination programs. It was developed for childhood vaccination,13,14 and has already been adapted for COVID-19 vaccination in adults.15 The BeSD domains should be thoughtfully targeted, if they are creating barriers for vaccination, using evidence-based strategies tailored to children and youth. Research has shown that multi-component interventions are more effective than single-component interventions.16–18 Therefore, strategies that target multiple domains concurrently is likely to be most successful.19,20

Evidence-Based Strategies to Increase Vaccine Uptake in Children and Youth

In the last two decades, there has been an increase in the development of strategies aiming to promote vaccine uptake in children and youth. We highlight four key strategies below; however, there are also necessary but insufficient conditions that are pivotal to all of the following strategies such as the availability of free vaccination,21 the promotion of trust in vaccines and health services,22 tailoring clear messaging regarding risks and benefits to developmental ages, and surveillance systems to monitor vaccine safety and uptake.23 It is also important for any strategy to acknowledge and prepare for scenarios in which youth want to get vaccinated, but parents do not (or vice versa). For each of the outlined strategies, it is also crucial to consider different developmental stages within children and youth, and tailor the strategy accordingly (e.g., ability to consent). A one-size-fits-all approach risks leaving some behind.

School-Based Vaccination

School-based vaccination programs are a high-impact and effective approach for increasing uptake that address many practical issues (e.g., reach, convenience, feasibility, accessibility, equity)21,24 and social processes (e.g., promoting of social norms in favour of vaccination). Canadian schools are familiar locations for rolling out a number of youth vaccines (e.g., Hepatitis B, human papillomavirus (HPV) and meningococcal vaccines).25 In-school vaccination programs in Ontario have traditionally not been used for younger age groups, however, it may be possible in some cases to work with local public health units to deliver rollout in schools.

When school-based vaccination is not available, children and youth must receive vaccines at other locations in the community (e.g., primary care, walk-in clinics).
This may lead to reduced access and uptake in individuals from lower social and economic groups. Although school-based programs may not be appropriate for all ages, schools can function as trusted and central locations for vaccination clinics after-school hours or on weekends to leverage the reach, equity, and safe space of schools while enabling parental presence if desired. This builds on the success of school-based vaccination programs.

**Healthcare Provider Recommendation**

Healthcare provider recommendation is a well-researched strategy for increasing vaccine uptake in children. In order for healthcare providers to make an effective vaccine recommendation, it is necessary to inform, prompt and provide educational training and resources to providers about evolving COVID-19 vaccine recommendations and the rationale for vaccinating children and youth. It may be helpful to partner with primary care providers to administer vaccines in their offices, and ensure parents are supported to have adequate paid time off for their children’s appointments.

Healthcare providers are trusted sources for assessing and addressing the informational, logistical, and practical barriers to vaccination. This may include addressing concerns about vaccination in children, youth, and parents, as well as providing practical support (e.g., understanding where to get vaccinated). To maximize impactful communication with parents, the use of shared decision-making and motivational interviewing techniques have been identified as useful strategies.

**Reminders for the Next Vaccine Dose and Recall for Missed Vaccination**

Reminders for the next vaccine dose and recall for missed vaccination have also demonstrated impact. Personalized reminders focused on children, youth, parents, or providers have been shown to be effective. In a vaccine registry, reminders can be sent directly to individuals who have received one COVID-19 vaccine dose to prompt individuals when they are due for their second dose. There are many modalities of reminders such as mail, letter, telephone, email, or text; yet, different modalities have shown efficacy.

A recent systematic review of multiple strategies to increase acceptability of vaccines in the Canadian setting found that reminder systems are among the most effective strategies to improve vaccine coverage in the Canadian context. Reminders and recall may be particularly important for the second dose when other barriers besides motivation to get vaccinated are at play. Reminders and recall strategies are acceptable and financially feasible solutions, and should work within available systems.

**School-Based and Community Health Communication Campaigns**

School-based and community health communication campaigns are effective if delivered by authoritative sources and included parents. Communication campaigns should consider children, youth, and parents as key audiences. Authoritative sources could include recognized institutions, organizations (e.g., the Canadian Paediatric Society), respected community leaders and local influencers. Community engagement is important to the success of such campaigns, especially in minority populations where trusted community leaders (e.g., clergy) and organizations (e.g., community centres) in diverse and racialized communities can help tailor the message appropriately. Delivering information in public health campaigns is not enough; efforts should be made to address misinformation, reduce risk perception, promote positive attitudes towards vaccines (e.g., including in needle phobia campaigns), and stimulate action (i.e., vaccination).

While there are increasing reports on the effectiveness of the four strategies listed above, some limitations to the existing literature should be acknowledged. First, it
is important to understand the context of the jurisdictions in which these strategies have been implemented, as they may not be as effective in different settings. Thus, the effectiveness of strategies to increase vaccine uptake should always be assessed locally, in rural and urban environments, and across a diversity of parents and children. Different forms of incentives and rewards (e.g., stickers) tailored to children and youth may also improve vaccine uptake, whereas financial incentives (e.g., gift cards or lotteries) may also be effective in youth; however, greater evidence is required.

Behavioural Science Principles to Support Vaccination in Children and Youth

To optimize the impact of the four strategies above, we identify four behavioural science-informed principles to support COVID-19 vaccination in children (5-11 years) and youth (12-17 years) (see Table 1 for differential considerations for each group):

Build and Leverage Trust

Trust (or lack thereof) factors into vaccine acceptance and uptake in general and in parents/caregivers. Involving trusted sources and familiar spaces for supporting vaccination in children and youth. As these may differ between each group, involve a diversity of children and youth as well as parents in program planning as early as possible. Trusted sources include not only those in leadership roles in the community (e.g., teachers, health professionals, religious leaders, coaches) but also informal social connections. These include neighbours and friends (in person and online) as similarity and relatedness are often key in influential social connections.

Avoid One-Size-Fits-All Approaches

The vaccination experience should be tailored to children, youth, and parents, and disseminated by trusted sources (see point 1). This can be done by highlighting the benefits of vaccines, ensuring a mechanism exists to address specific vaccine safety and efficacy concerns as they arise, reassuring the robustness of monitoring adverse events following immunization in Ontario, and tapping into motivation by tying vaccination to personal values and priorities. We recommend tailoring risk and benefit communication to children’s developmental stage and to varying health literacy and health numeracy by drawing on best practices in risk communication. We also recommend eliciting the involvement of children, youth, and parents (as appropriate) in designing and sustaining public campaign messages. Invest early in infrastructure, education, and resources to empower trusted sources (e.g., community leaders, teachers, health professionals) and settings (e.g., schools, clinics, community health centres) to have effective, empathetic conversations about vaccine questions that children, youth, or parents may have.

Ensure Special Considerations for Reaching At-Risk Populations

Children with behavioural and physical disabilities, youth experiencing homelessness, and other at-risk populations are deserving of additional consideration to optimize vaccination experience. This includes partnering with organizations such as shelters that support precariously housed and homeless children and youth in receiving vaccinations. It also includes ensuring accessible information, accessible physical locations for vaccinations, wheelchair access, offering free or accessible transportation to vaccination sites for those who need it, and providing information about vaccination in multiple formats and languages.

Ensure Special Considerations for Reaching Black, Indigenous and All Racialized Communities

Surveys data from Black, Indigenous and other racialized communities have shown lower vaccine confidence. Trust-building strategies with community leaders and trusted partners to tailor messaging and build trust have been demonstrated to be
To this end, special efforts should be made to engage religious and spiritual leaders and highly respected elders, given the important leadership roles that they have in these communities.68

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<tr>
<th>What Can Be Done</th>
<th>Considerations For CHILDREN under 12</th>
<th>Considerations For YOUTH Aged 12 to 17</th>
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| Leverage
recommendations from trusted sources | Once COVID-19 vaccines are approved for children under 12, recommendations from local health providers, trusted paediatricians, and associations (e.g., the Canadian Paediatric Society) will be helpful in increasing parental confidence, recognizing that trusted community members may also be influential. | Highlight credible providers as well as associations (e.g., the Canadian Paediatric Society) that advocate for COVID-19 vaccination in those aged 12 and older.2 Empower and resource trusted community members. |
| Seek to involve children and youth as well as parents | Engage children and parents in vaccine program planning. | Direct engagement with youth can increase vaccine acceptance in vaccine programs. Although youth can get vaccinated without parental consent, parents remain key influencers in many youths’ decisions and need to be engaged, addressing any of their concerns. |
| Provide dedicated vaccine clinics in familiar settings | If feasible, try to vaccinate children in the school they attend, including evening or weekend school-based vaccine clinics, to enable a familiar setting to be leveraged while allowing parents to be present if desired. | While pop-up clinics can be set up in other locations (e.g., hockey rinks, sports clubs, community centres), schools provide among the broadest and most equitable community reach. Partner with primary care providers to administer vaccination in physician offices, and ensure parents have adequate paid time off for their children’s appointments. |
| Principle 2 – Tailor Messaging and Experience to Children, Youth, and Parents through Individual-And Population-Based Approaches | Highlight the benefits of vaccines for children and youth | Highlight benefits to children/youth and those around them (e.g., seeing/protecting grandparents, keeping schools open, seeing friends, attending recreational activities) using a tailored approach. |
| Use effective risk communication tools tailored to developmental stage to address any specific concerns | Authentically and proactively work with children, youth, parents, and teachers to address any concerns that may arise. | Communicate the robustness and transparency of Ontario’s ongoing monitoring and surveillance of COVID-19 vaccine safety. Draw upon evidenced resources for supporting children and youth who may have concerns about needles (e.g., concerns about pain).59,70 |
| | Tailor risk communication to varying health literacy and health numeracy. |
### Amplify social examples and provide social proof

Provide social examples of a diversity of children and youth getting vaccinated. Avoid imagery focused on the needle itself and instead focus on imagery showing the action of getting vaccinated.

Public demonstration of vaccination through social proof (e.g., local data on how many children/youth already vaccinated, stickers or buttons with messages such as “I did my part for my school, I got vaccinated”).

#### Elicit children and youth’s involvement as early as possible

Engage children and parents in developing and sustaining public health campaign messages in anticipation of Health Canada approvals.

Direct engagement with youth to develop and strengthen the message of public health campaign messages.

#### Tap into motivation by tying vaccination to personal values and priorities

Work with children and youth, and their parents, to identify values and priorities.

Emphasize what getting vaccinated enables children and youth to do themselves and how it benefits others (e.g., reduce the likelihood of school outbreaks and disruptions, keeping social spaces open).

### Principle 3 – Special Considerations for Reaching At-Risk Populations (Children with Disabilities, Homeless Youth, Etc.)

**Provide vaccinations in partnership with organizations that serve homeless children, youth, and families**

Engage homeless shelters, transitional housing, and drop-in centres in conversations about what can be done to reduce barriers to vaccination (e.g., setting up pop-up clinics in familiar areas, mobile vaccine clinics, small teams to visit specific shelters and centres).

**Include considerations for people with disabilities**

Provide information about where, when, and how to get vaccinated in multiple formats from trusted sources. Ensure vaccination sites are easily accessible, including wheelchair access.

Offer free and accessible transportation to vaccination sites.

### Principle 4 – Special Considerations for Youth from Black, Indigenous and All Racialized Communities

**Work with leaders from all communities using interventions that have been demonstrated to be effective**

Community engagement and cultural understanding are needed to tailor strategies to these groups, including providing information in multiple languages.

Partner with communities to identify and resource trusted messengers and community leaders for Black, Indigenous, and all racialized communities.

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<tr>
<th><strong>Table 1. Four Key Behavioural Science Principles to Support Vaccination in Children and Youth</strong></th>
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<td><strong>Interpretation</strong></td>
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Given ongoing implementation of the youth COVID-19 vaccination program in Ontario and pending Health Canada approval of COVID-19 vaccines for children aged 5-11, increasing COVID-19 vaccine acceptance and uptake in children and youth will help allow them to continue safely returning to pre-pandemic activities by reducing transmission, hospitalizations, and severe outcomes. Evidence from other childhood and youth vaccination programs to increase COVID-19 vaccine uptake in children and youth suggests a combination of school-based vaccination programs and/or clinics, healthcare provider recommendations, reminders and recall strategies, and appropriately messaged school-based, community-specific, and public health campaigns. These strategies should be tailored to children’s age, feasibility, and acceptability in children, youth, and their parents. Prioritizing research and evaluation to determine which strategies for encouraging vaccine acceptance and uptake work,
for whom, and in what circumstances, will continue to be crucial to further develop evidence-based strategies that would in turn inform vaccination strategies. Based on existing evidence, the Behavioural Science Working Group developed key principles to support COVID-19 vaccination in children and youth that include leveraging recommendations from trusted and familiar sources tailored to the group; tailoring messaging and experience to children, youth, and parents through individual-and population-based approaches; and ensuring special consideration for reaching at-risk and racialized communities as well as those in under-vaccinated communities.

Author Contributions

GKS, LD, JP conceived the Science Brief. GKS, AW, JP wrote the first draft of the Science Brief. All authors revised the Science Brief critically for important intellectual content and approved the final version.

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References


Ontario COVID-19 Science Advisory Table

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