



COVID-19 VACCINATION DISTRIBUTION AND UPTAKE: ADDRESSING VACCINE HESITANCY IN CANADA

NANCY DU[1], SUKHAHIJ GILL[1], GILLIAN GRANT-ALLEN[2], ATIYA IQBAL[1], BETHEL SAMSON[2], NICOLE WU[2]

[1] BACHELOR OF HEALTH SCIENCES (HONOURS), CLASS OF 2021, MCMASTER UNIVERSITY
[2] BACHELOR OF HEALTH SCIENCES (HONOURS), CLASS OF 2022, MCMASTER UNIVERSITY

ABSTRACT

The COVID-19 pandemic has prompted the urgent development and distribution of novel vaccinations to reduce the global disease burden and establish herd immunity. Vaccination is a cost-effective public health measure that is critical for disease prevention; as of March 2022, Health Canada has authorized the distribution of the Pfizer-BioNTech and Moderna mRNA COVID-19 vaccines in pediatric populations. However, vaccine hesitancy among caregivers remains a significant barrier to vaccine uptake in the pediatric population. Increased research on the intentions, motivations, and perceptions of pediatric COVID-19 vaccine efficacy and safety may facilitate the development of public health strategies to address pediatric vaccine knowledge translation, accessibility, and administration barriers. This perspective paper aims to explore the major barrier of vaccine hesitancy and potential solutions to achieve effective vaccine uptake in the Canadian pediatric population.

INTRODUCTION

The World Health Organization (WHO) declared COVID-19 a global pandemic on March 11, 2020.¹ Since this declaration, governments across the globe have implemented infection control and prevention measures, including social distancing, stay-at-home orders, and school closures.^[1] While these measures have been critical in slowing the spread of COVID-19, they have resulted in considerable economic, social, and educational costs; children and youth may be an especially vulnerable group due to the unique and unknown developmental consequences of the long-term establishment of public health restrictions.^[2]

Although the majority of COVID-19 cases in children have been asymptomatic or mild, severe disease manifestations and complications such as multisystem inflammatory syndrome have also been reported.¹ Similar to the adult population, racial and ethnic minority groups are disproportionately affected by severe disease manifestations.^[1] Public health restrictions have created a prolonged state of social isolation from peers, teachers, extended family and community networks.^[2] Children and adolescents are therefore facing an increased risk for developing mental health-related challenges as they experience increased loneliness, anxiety, and uncertainty.^[2] School closures have also had negative impacts on the physical health and nutrition of youth, particularly for individuals reliant on school-provided meals as a key source of their daily nutrition.^[1] Moreover, elevated rates of domestic violence during COVID-19 lockdown measures have been reported across Europe and North America, which may lead to alarming mental and physical health concerns for children and adolescents.^[3-5] When compared to adults, the challenges presented by the COVID-19 pandemic may present increased long-term adverse consequences for children and adolescents.^[4]

In order to reduce COVID-19 morbidity and mortality, mitigate potential developmental consequences of long-term public health restrictions, and enable children to re-engage with their communities, effective COVID-19 vaccine uptake is needed.^[1] Vaccination programs aim to reduce disease transmission and provide community protection for those that cannot be vaccinated, such as immunocompromised individuals.^[7] Canada currently has invested over \$9 billion to procure access to vaccine candidates and support international vaccine distribution.^[8-9] However, the success of a COVID-19 vaccination program in Canada is not solely dependent on distribution and production of effective vaccinations. This perspective paper aims to explore one of the major barriers in achieving effective vaccine uptake and herd immunity in the Canadian population: vaccine hesitancy.



FACTORS INFLUENCING VACCINE HESITANCY

Vaccine hesitancy is a prevalent concern in numerous countries, including Canada.^[9-10] Broadly, vaccine hesitancy is characterized by uncertainty and hesitation towards specific vaccinations.^[10] Although individuals who are vaccine-hesitant may not entirely refuse vaccines, they may delay or refuse certain vaccines whilst accepting others.^[11] Throughout the last five years, vaccine hesitancy has been an increasingly widespread concern, as evidenced by the WHO's declaration prior to the onset of the COVID-19 pandemic that vaccine hesitancy was among the top ten threats to global health.^[12] Several theoretical models intended to assess the determinants of vaccine hesitancy have been developed. In 2018, for example, the "5C framework" (Figure 1) examining the psychological antecedents of vaccination was developed, which proposed that confidence, complacency, calculation, collective responsibility, and constraints are primary factors contributing to vaccine hesitancy.^[13]



Figure 1. Schematic illustration of the 5C framework of vaccine hesitancy.¹³

In the context of COVID-19, existing empirical literature and theoretical frameworks surrounding vaccine hesitancy have supported the inquiry into determinants of vaccine hesitancy specific to COVID-19. For example, a study published on July 7th, 2020 in Wyoming, US with a sample size of 3133 examined the reasons underlying vaccine hesitancy of the 626 participants who indicated that they would decline to vaccinate themselves or their children.^[14] The primary reasons identified in this study included that the COVID-19 vaccine was developed "too quickly", "would not be effective," "would produce undesirable side effects." or that an individual would decline the COVID-19 vaccination as they "avoid most vaccinations."^[14]

Statistics Canada conducted an online crowdsourcing questionnaire between May 26 and June 8, 2020 to

investigate hesitancy towards receiving the COVID-19 vaccination in Canada. The overall results of this study showed that 57.5% of the study population were very likely to receive the vaccine once made available.

Conversely, the remaining study population were unlikely or unsure whether to receive the vaccine.[15] The survey also investigated factors contributing to vaccine hesitancy to further understand this barrier. Statistically significant ($p < 0.05$) differences in sociodemographic characteristics between the very likely group and the remaining population suggested that age, level of education, immigrant status, and geographical region may influence COVID-19 vaccine hesitancy.[15] The study also found that individuals over the age of 65 were more likely to get vaccinated when compared to the population between 15-64 years of age.[15] Individuals with children over the age of 18 were also more likely to receive the vaccine when compared to individuals with children under the age of 18.[15] A cross-sectional study conducted in December 2020 found that among Canadian parents, 63% intended to vaccinate their children (aged 0–17 years) against COVID-19.[16] Primary factors influencing parental intentions to vaccinate their children in Canada were their perceptions of pediatric vaccine safety and beliefs regarding the necessity of COVID-19 vaccination. 16 Parents who reported concerns about the safety of pediatric COVID-19 vaccination or that pediatric COVID-19 vaccination was unnecessary were four and two times less likely, respectively, to intend on vaccinating their children.[16] Moreover, parental intention to vaccinate themselves against COVID-19 was an important predictive factor identified in this study.[16] The high prevalence of vaccine hesitancy among parents suggests that further research and governmental actions are required to address both vaccine distribution and administration barriers.

ADDRESSING VACCINE HESITANCY

As of January 2022, the federal government has invested \$78 million towards The Immunization Partnership Fund (IPF) to fight vaccine misinformation since 2020.[17] The primary objectives of this fund are to improve access to vaccines and to facilitate vaccine confidence among the public by developing initiatives to disseminate evidence-based information about vaccines.[17] The funding is divided between community-led projects aiming to develop targeted educational resources to support COVID-19 vaccine confidence, and upgrading provincial and territorial governmental vaccination registries to monitor vaccine uptake.[17]

Many projects funded by the IPF thus far involve improving the accessibility of reliable, evidence-based information pertaining to the safety and necessity of COVID-19 vaccination by utilizing focus groups, peer support, social media, pamphlets, radio commercials, and bus advertisements.[17] Healthcare providers, particularly pediatricians, also play a critical role in providing

reliable information about vaccination; for example, 86% of people in Ontario cite primary care physicians as their most trusted source for information on the COVID-19 vaccine.[18] Several IPF-funded initiatives therefore also aim to facilitate the participation of healthcare providers to foster trust in the safety and efficacy of COVID-19 vaccinations.[17]

Despite existing and ongoing research on reducing vaccine hesitancy in Canada, gaps in available evidence remain. Presently, only 48% of children aged 5-11 years in Canada have received one dose of the COVID-19 vaccine; thus, additional resources should be allocated to the development of targeted initiatives and resources for parents and guardians.[19] Additionally, the creation of guidelines for pediatricians and other healthcare professionals caring for pediatric populations should be prioritized to ensure that pediatric healthcare providers are equipped to address concerns expressed by parents and children regarding COVID-19 vaccination.[19-20]

CONCLUSION

Vaccine hesitancy remains a significant barrier to pediatric vaccine uptake in Canada, ultimately hindering children and youth's ability to re-engage with their communities. Examining conceptual frameworks and predictive factors of COVID-19 pediatric vaccine hesitancy may inform the development of targeted strategies to foster vaccine confidence and increase uptake. In this perspective paper, factors affecting pediatric COVID-19 vaccine hesitancy in Canada include parental trust in the safety of the vaccine, perception of its necessity, vaccine accessibility, and whether the parent intends to vaccinate themselves. Further research may elucidate additional factors to consider when establishing public health and knowledge dissemination strategies to reduce vaccine hesitancy. Although governmental funds have been allocated to projects that address vaccine hesitancy, initiatives targeted toward parents and guardians, as well as pediatric healthcare providers, are required to improve pediatric COVID-19 vaccine confidence and uptake in Canada.

1. Kamidani S, Rostad CA, Anderson EJ. COVID-19 vaccine development: a pediatric perspective. *Curr Opin Pediatr*. 2021;33(1). Available from: https://journals.lww.com/co-pediatrics/Fulltext/2021/02000/COVID_19_vaccine_development_a_pediatric_20.aspx
2. Ludes ME, Chabram E, Higson-Sweeney N, Reynolds S, Shafran R, Bigden A, Linney C, McManus MN, Bowrick C, Crowder E. Rapid Systematic Review: The Impact of Social Isolation and Loneliness on the Mental Health of Children and Adolescents in the Context of COVID-19. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2020;59(11):1218–1259.e3. <https://doi.org/10.1016/j.jaac.2020.05.009>
3. Chia SM, Chang SYS, Roy CS. Effects of nationwide lockdown and school closures during the COVID-19 pandemic on children's physical health and beyond [published online ahead of print, 2020 Dec 21]. *Singapore Med J*. 2020. <https://doi.org/10.1062/smedj.2020172>
4. Singh S, Roy D, Sinha K, Parveen S, Sharma G & Joshi G. Impact of COVID-19 and lockdown on mental health of children and adolescents: A narrative review with recommendations. *Psychiatry research*. 2020;293:113429. <https://doi.org/10.1016/j.psychres.2020.113429>
5. Boserup R, McKinney M, Elkhadi A. Alarming trends in US domestic violence during the COVID-19 pandemic. *The American Journal of Emergency Medicine*. 2020 Dec;38(12):2753–5.
6. Kolman YB, Garfin DR. Home is not always a haven: The domestic violence crisis amid the COVID-19 pandemic. *Psychological Trauma: Theory, Research, Practice, and Policy*. 2020 Aug;12(5):899–201.
7. Randolph HE, Barreira JB. Herd Immunity: Understanding COVID-19. *Immunity*. 2020;52(5):757–741. <https://doi.org/10.1016/j.immuni.2020.04.012>
8. Government of Canada. Procuring vaccines for COVID-19 [Internet]. Government of Canada; 2021. Available from: <https://www.canada.ca/en/public-services-procurement/services/procuring-vaccines-covid19.html>
9. Mullard A. How COVID vaccines are being divided up around the world [Internet]. *Nature News*. Nature Publishing Group; 2020. Available from: <https://www.nature.com/articles/d41586-020-03570-6>
10. McAtee J, Yildirim I, Chahroudi A. The VACCINES Act: Deciphering Vaccine Hesitancy in the Time of COVID-19. *Clinical Infectious Diseases*. 2020 Jul;28(7):703–5.
11. Dube E, LaBerge C, Guay M, Bramadat P, Roy R, Bettinger JA. Vaccine hesitancy: An overview. *Human Vaccines & Immunotherapeutics*. 2013 Aug 8;9(8):1703–73.
12. Albar R. Ten threats to global health in 2019 [Internet]. World Health Organization. Available from: <https://www.who.int/viem/news/feature-stories/detail/ten-threats-to-global-health-in-2019>
13. Betsch C, Schmid P, Heinemeier D, Korn L, Hoffmann C, Bohm R. Beyond confidence: development of a measure assessing the 3C psychological antecedents of vaccination. *PLoS One*. 2018;13(12)
14. Thunstrom L, Ashworth M, Finnoff DC, Newbold SC. Hesitancy Towards a COVID-19 Vaccine and Prospects for Herd Immunity. 2020. doi:10.2139/ssrn.3593998
15. Frank K, Arim R. Canadians' willingness to get a COVID-19 vaccine: Group differences and reasons for vaccine hesitancy. 2020. Available from: <https://www150.statcan.gc.ca/n1/pub/45-28-0001/2020001/article/00073-eng.htm>
16. Humble RM, Sell H, Dube E, MacDonald NE, Robinson J, Bridges SB, et al. Canadian parents' perceptions of COVID-19 vaccination and intention to vaccinate their children: Results from a cross-sectional national survey. *Vaccine*. 2021 Dec 20;39(52):7669–76.
17. Public Health Agency of Canada. Government of Canada invests in community-based projects to support COVID-19 vaccine uptake: Government of Canada [Internet]. 2022 Jan 21; Available from: <https://www.canada.ca/en/public-health/news/2022/01/government-of-canada-invests-in-community-based-projects-to-support-covid-19-vaccine-uptake.html>
18. Ontario Medical Association. News release: Ontario's doctors thank the premier, ready to expand vaccine role [Internet]. Toronto, ON: Ontario Medical Association; 2021. Available from: <https://www.oma.org/newsroom/news/2021/mar/ontarios-doctors-thank-the-premier-ready-to-expand-vaccine-role/>
19. Canadian Paediatric Society. COVID-19 vaccine for children and adolescents [Internet]. Available from: <https://cps.ca/en/documents/position/covid-19-vaccine-for-children-and-adolescents/>
20. Terretsen P, Kim J, Caravaggio F, Quilty L, Sanchez M, Wells S, Brown FE, Agre B, Pollack BG, Gaff-Guerrero A. Individual determinants of COVID-19 vaccine hesitancy. *PLoS one*. 2021 Nov 12;16(11):e0258402.

