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Factors affecting COVID-19 vaccination among people experiencing homelessness and precarious housing in Canada: a behavioural analysis (September 10, 2021, 2021)

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Research Questions:

1) From a behavioural science perspective, what are the barriers and enablers to COVID-19 vaccination confidence and uptake voiced and experienced by people experiencing homelessness and precarious housing in Canada?
2) What strategies can and have been used to address identified barriers to vaccine confidence and uptake among people experiencing homelessness and precarious housing in Canada?

Summary of barriers and enablers

- There is a significant gap in the literature in general – and in Canada – regarding the views and experiences of people facing homelessness and housing precarity as it relates to their confidence and uptake of COVID-19 vaccination.
- Research conducted by the National Collaborating Centre for the Determinants of Health (NCCDH) has begun to fill this gap by identifying barriers to vaccination among those experiencing homelessness and precarious housing in Canada as well as suggested strategies to overcome them[1].
- In the present report, we used the Behaviour Change Wheel (BCW) to categorize the barriers to vaccination identified in the NCCDH report according to the inner circles of the BCW, the Capability, Opportunity, and Motivation-Behaviour (COM-B) model and Theoretical Domains Framework[2–4]. This allowed us to compare the barriers identified in the NCCDH report to those identified through the Living Behavioural Science Evidence Synthesis (LBSES) general population review v4[5].
- The NCCDH report nuances our understanding of how knowledge, resource, and social barriers may be experienced differently by people living with housing precarity and homelessness:
    - *Knowledge:* people experiencing homelessness may have specific knowledge needs (e.g., vaccine interactions with methadone).
    - *Environmental context and resources:* lack of access to internet and phone lines creates barriers to booking vaccine appointments; not having a secure place to recover from vaccine side effects may prevent some from getting vaccinated; standardized vaccine protocols may prohibit some people facing housing precarity from accessing vaccines.

  - *Social influences:* mistrust in healthcare systems that stems from past experiences with stigma and discrimination by healthcare providers may deter some from getting vaccinated.
- The NCCDH report also describes two barriers that are unique to this population: many face competing demands between meeting basic needs and accessing vaccines (*Goals*) and some may experience difficulties processing information due to mental health and substance-use challenges (*Memory, attention, decision-making*).

Summary of strategies to support people experiencing homelessness and housing precarity

- The NCCDH report provides recommendations for supporting vaccine uptake among housing precarious and homeless populations in Canada. We mapped those strategies to the BCW intervention functions and found that 6 out of 9 intervention functions were relevant for describing the NCCDH recommendations:
  - leveraging trusted relationships with healthcare providers and community ambassadors (BCW intervention functions: *training, environmental restructuring, enablement*)
  - minimizing access and resource barriers by supporting community-led outreach-based clinics (e.g., within shelters, mobile-based, minimal registration requirements) (BCW intervention functions: *enablement, environmental restructuring, incentivisation*)
  - improving how information is delivered (e.g., through trusted peers vs written/online) (BCW intervention functions: *education, environmental restructuring, training*, *modelling*)
- The NCCDH recommendations have implications for possible BCW policy level interventions that may further support vaccine uptake among housing precarious and homeless populations in Canada. Relevant BCW policy level interventions:
  - *service provision* to better support health care staff and outreach workers in vaccination education and rollout efforts amongst this population, and to better support those interested in accessing vaccines through material (e.g., cash incentives) and social means (e.g., connecting people experiencing homelessness to social services in the community),
  - *environmental /social planning* to ensure vaccine clinics consider the needs of those experiencing homelessness (e.g., providing recovery space, minimal registration process),

  - *guidelines* to promote vaccine delivery using trauma informed approaches, and
  - *regulations* for prioritizing homeless and housing precarious populations during vaccine rollouts.

Implications

- More research is required to better understand the unique barriers to vaccine uptake faced by people experiencing homelessness and housing precarity in Canada.
- Future research must also consider the impact of intersecting identities and associated challenges to getting vaccinated given that young, racialized and 2SLGBTQIA people are overrepresented among Canada's homeless and housing precarious populations[6]. More work is also needed to understand the role of gender and the unique needs of women as some research suggests housing precarity is less visible among women, particularly among those facing intersecting sources of oppression[7].
- Ongoing vaccination efforts must work to collaborate with healthcare providers and community ambassadors who are already working in outreach capacities to ensure vaccines are accessible.

Introduction

People experiencing homelessness and housing precarity face a myriad of diverse and complex challenges that impact their well-being and safety and may exacerbate barriers to accessing and accepting COVID-19 vaccines[6]. In Canada, young, Black, Indigenous, and 2SLGBTQIA identified individuals are overrepresented among those facing homelessness and housing precarity as are those who are contending with mental health challenges and histories of trauma[6].

Despite an exponential increase in research on COVID-19 vaccine acceptance there is a significant gap in research concerning populations facing homelessness and housing precarity in Canada and worldwide. Since April 2021, we have been conducting a Living Behavioural Science Evidence Synthesis (LBSES) (updated monthly) of international studies that have identified barriers and enablers to COVID-19 vaccine acceptance in the general public. Using a behavioural science approach, we interpret the barriers, enablers and possible strategies to addressing vaccine acceptance and uptake[5]. Our most recent update (v4, July 2021) identified 143 studies on vaccine acceptance. Of those, only one study focused on people experiencing homelessness[8]. Similarly, a rapid review[9] on general vaccine and immunization acceptance among equity seeking groups found one study assessing COVID-19 acceptance among homeless populations[10] (note: this study did not meet the inclusion criteria for our living review).

Given the dearth of Canadian data on people experiencing homelessness as it relates to COVID-19 vaccination, the National Collaborating Centre for Determinants of Health (NCCDH) conducted five interviews with healthcare providers (e.g., registered nurses) who are aiming to provide vaccinations to people experiencing homelessness and housing precarity in Toronto, Belleville, Calgary and Vancouver[1]. The present report aims to consider the NCCDH findings in relation to international research literature by comparing the identified barriers and enablers to those reported in the LBSES v4[5].

Consistent with our broader international LBSES report[5], we used the Capability, Opportunity, and Motivation (COM-B) model[2] and Theoretical Domains Framework[3,4] components of the Behaviour Change Wheel (BCW) to identify and classify barriers and enablers to COVID-19 vaccination confidence and uptake (see Figure 1), and use the same approach to explore alignment and unique factors for people experiencing homelessness in Canada. We also use the Behavioural Change Wheel[2] (see Figure 2) intervention and policy functions to link identified barriers and enablers to the strategies put forward by the NCCDH report and link strategies to broader policies that may address the needs of people facing precarious housing and homelessness.

Behaviour change approaches focus on the factors that drive and promote change in a given behaviour; in this case, COVID-19 vaccination. While the focus is on behaviour, contemporary

behavioural approaches situate behaviour as being a function of both internal and external factors. That is, personal agency can be supported or thwarted by the social and structural settings in which people live and work, past and present. The BCW is a tool that facilitates situating behaviour within such a context, where the onus for change may lie with various entities (e.g., individuals, groups, communities, leaders, institutions). Barriers and enablers to a given behaviour are understood to have multilevel causes and warrant multilevel interventions including at the level of policy to ensure strategies are well-supported and can succeed.

Methods

We used the NCCDH report entitled: "Supporting Vaccine Uptake amongst People Experiencing Homelessness or Precarious Housing in Canada" as source material and categorized the barriers and enablers to receiving COVID-19 vaccines that were reported in the results section according to the COM-B model[2] and Theoretical Domains Framework (TDF)[3,4]. We then assessed how the barriers and enablers reported in the NCCDH report compare to those reported across all studies identified in our LBSES v4[5].

We also categorized the suggested strategies for supporting vaccination according to the Behaviour Change Wheel (BCW) intervention functions[2] and mapped the TDF based barriers and enablers to BCW interventions to generate insights into what policy functions might be appropriate for addressing the identified barriers. Definitions for BCW intervention and policy functions are provided in Appendix 1.

Figure 1. Potential drivers of vaccination acceptance and uptake based on the COM-B model[2] and Theoretical Domains Framework[3,4]

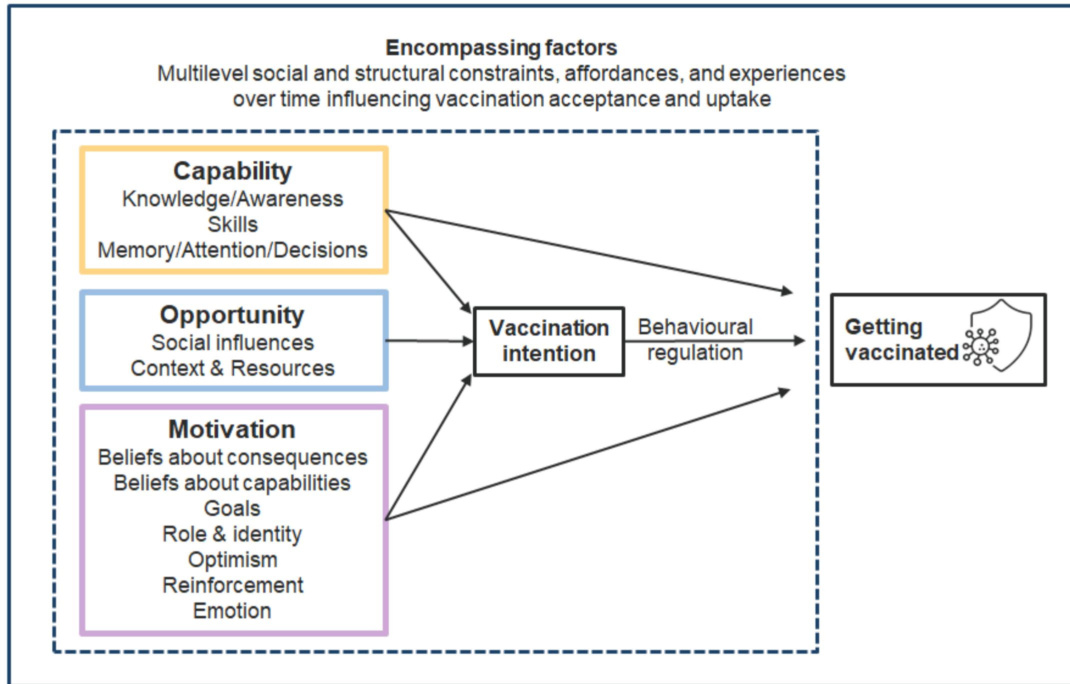
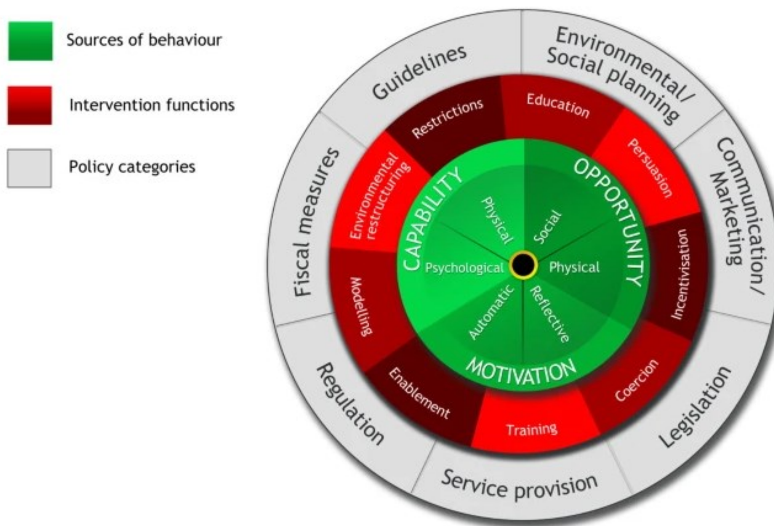


Figure 2. The Behaviour Change Wheel[2]



The Behaviour Change Wheel.

Results

Summary of findings from the NCCDH report on vaccine uptake among people experiencing homelessness and precarious housing

The NCCDH report describes findings from five key informant interviews with healthcare providers who work with people living with homelessness and precarious housing in mostly urban centres. The challenges faced by those experiencing homelessness and precarious housing identified by these healthcare workers included inaccessible clinics (e.g., distance, time, accessing booking system), the reality that many people living with housing precarity must choose between meeting basic needs (e.g., finding a space to sleep) and accessing health services, feelings of invincibility, inaccessible information, as well as distrust that stems from being stigmatized and discriminated against by healthcare providers and health systems. Key informants described how their clients feel judged and dismissed by the healthcare system which contributes to feelings of mistrust and apprehension over vaccines. Their role necessitates taking the time to understand the social context of people living with homelessness and housing precarity in order to build trusting relationships and cater their interactions and care to better meet the needs of their patients. For example, they described being mindful of how each interaction may be experienced by someone living with homelessness and how trauma-informed approaches may help guide effective interactions. The barriers and enablers identified in this report have been summarized and organized according to the COM-B model and TDF in Table 1.

Summary of findings from the LBSES v4 and US based research

The LBSES v4 identified 143 studies representing global data on factors affecting COVID-19 vaccine acceptance. Based on 104 studies from around the world that provided data on vaccine acceptance rates, 66% of respondents were willing to be vaccinated (median=63%, IQR=50-80%). Of the 143 studies that were identified, 115 provided evidence of the factors impacting vaccine acceptance. Nine of 14 domains from the TDF were identified as influencing willingness to get vaccinated. Capability-related factors included a desire for knowledge, particularly around disease-specific guidance. Opportunity-related factors included a mistrust in government and health agencies, the importance of social norms, and the influence of healthcare providers. Motivation-related factors included concerns over vaccine safety, efficacy, and necessity. Table 1 summarizes the barriers and enablers identified from this review.

Despite the preponderance of studies identified in the latest LBSES review, only 1/143 focused on people experiencing homelessness. Kuhn et al. surveyed 90 people experiencing

homelessness living in Los Angeles, California and found that 52% were willing to get a vaccine[8]. Another relevant study was identified from a rapid review conducted by the National Collaborating Centre for Methods and Tools[9]. Ninety-four participants living in Oakland and San Francisco, California were interviewed about their views on the acceptability of a COVID-19 vaccine before the vaccines were approved (note: this study did not feature in our LBSES as only studies with data collected after COVID-19 vaccines were approved for use were included). Based on these two studies, Capability-related factors included a desire for knowledge, particularly for safety and efficacy trial data. Opportunity-related factors included a mistrust in government and health agencies and concerns over racism in the healthcare system. Motivation-related factors included concerns over side effects and the rapid development of vaccines, perceived risk, and engaging in protective behaviours. The barriers and enablers identified in these studies are also summarized in Table 1 alongside those identified by the NCCDH report.

Table 1. Barriers and enablers to vaccine acceptance in global population, people facing homeless in the United States, and people facing homelessness in Canada

COM-B	TDF domains	Barriers/enablers in global population as identified in LBSES v4 (*k* = # of studies)	Barriers/enablers identified by studies exploring vaccine acceptance among people experiencing homelessness in the United States[8,10]	Barriers/enablers among people experiencing homelessness in Canada as identified in NCCDH report[1]
Capability	Knowledge	Barriers Gaps in knowledge about COVID-19 vaccines (*k*=19)	Barriers Gaps in knowledge about COVID-19 vaccines (*k*=2)	Barriers Gaps in knowledge about COVID-19 vaccines due to inaccessible or unreliable information (e.g. poor access to online information sources) Written and online resources not effective for this group Unavailable guidance and information on specific concerns (e.g., interaction between vaccines and methadone)
	Memory, attention, decision making	No barriers/enablers identified	No barriers/enablers identified	Barriers Difficulties processing information due to mental health and/or substance-use related challenges
	Skills	No barriers/enablers identified	No barriers/enablers identified	No barriers/enablers identified
	Behavioural regulation	No barriers/enablers identified	No barriers/enablers identified	No barriers/enablers identified
Opportunity	Environmental context and resources	Barriers Access issues in terms of time, convenience, and cost (*k*=6)	No barriers/enablers identified	Barriers Physical access issues in terms of long line-ups and geographical distance Access issues in terms of required resources to set up and attend

				vaccination appointments (e.g., internet, phone, transportation, day time shelters for recovery from side effects) Standardized vaccination protocols that are not adaptive to people living with homelessness/housing precarity Lack of resources to fund community ambassadors
		Enablers Having access to and trust in reputable information sources (*k*=12)	No enablers identified	No enablers identified
	Social influences	Barriers Mistrust in government/public health response to COVID-19 (*k*=26) Negative influence of close contacts and high-profile persons (*k*=8) Direct advice from medical professionals about vaccination (*k*=8)	Barriers Mistrust in government/public health response to COVID-19 (*k*=1) Negative influence of close contacts and high-profile persons (*k*=1)	Barriers Mistrust in government/public health response to COVID-19 due to previous experiences of discrimination and stigma from health care providers Negative influence of close contacts (word of mouth, social media)
		Enablers Advice from medical professionals encouraging vaccination (*k*=6)	No enablers identified	Enablers Involving peer and community ambassadors in delivering information and encouraging vaccination.
Motivation	Social and professional role and identity	Enablers Certain political preferences/identities (k=5)	No barriers/enablers identified	No barriers/enablers identified

		When getting vaccinated seen as a professional or collective/ prosocial responsibility (k=4)		
	Beliefs about capabilities	No barriers/enablers identified	No barriers/enablers identified	No barriers/enablers identified
	Optimism	Enablers Optimism was associated with greater vaccine acceptance (*k* = 1)	No barriers/enablers identified	No barriers/enablers identified
	Beliefs about consequences	Barriers Concerns about COVID-19 vaccine safety (*k*=41) Concerns about COVID-19 vaccine development (*k*=7) Concerns about COVID-19 vaccine efficacy (*k*=14) Concerns about COVID-19 vaccine necessity (*k*=12) Concerns about adverse reactions (specifically contraindications among specific patient groups) (*k*=3)	Barriers Concerns about COVID-19 vaccine safety (*k*=2) Concerns about COVID-19 vaccine development (*k*=1) Concerns about COVID-19 vaccine necessity (low perceived threat) (*k*=1)	Barriers Concerns about COVID-19 vaccine safety Concerns about COVID-19 vaccine necessity (low perceived threat)
		Enablers Concerns about becoming infected with COVID-19 (*k*=23) Positive attitudes/perceived benefit of COVID-19 vaccines (*k*=16)	No enablers identified	No enablers identified

		Belief that COVID-19 vaccines will help protect family (*k*=6)		
	Intention	66% willing to be vaccinated (*k*=104)	52% willing to be vaccinated (*k*=1)	N/A
	Goals	No barriers identified	No barriers identified	Barriers Meeting basic needs (e.g., food, sleep) conflict with accessing vaccines Waiting in line may be difficult due to mental health challenges and/or substance use-related needs Losing time in a line-up rather than earning money
		Enablers Matching vaccine preference	No enablers identified	No enablers identified
	Reinforcement	No barriers identified	Barriers Engaging with COVID-19 infection behaviours (i.e. personal protective behaviour) (*k*=1) Past experiences with race-based discrimination, particularly in health care (*k*=1)	Barriers Negative past experiences with health services and healthcare providers, including discrimination
		Enablers Historical seasonal influenza vaccination (*k*=21) Members of families/close social network having being infected with COVID-19 (*k*=3)	No enablers identified	No enablers identified
	Emotion	Enablers	No enablers identified	No enablers identified

		Fear about being infected with COVID-19 and its impact (k=3) Mental health challenges (stress, depression, anxiety) may contribute to protective behaviours, including greater COVID-19 vaccine acceptance (k=7)		

Convergences and complementarity in identified barriers

Based on the NCCDH report on barriers to vaccine uptake among people facing homelessness and housing precarity, 7 out of 14 TDF domains were identified as contributing to COVID-19 vaccine acceptance and uptake: Capability (*Knowledge, Memory, Attention and Decision-making*), Opportunity (*Environmental Context and Resources, Social Influence*), and Motivation (*Beliefs about Consequences, Goals, and Reinforcement*) (see Table 1).

The factors identified in the NCCDH report, the two US-based studies, and the LBSES v4 review indicate there are some shared barriers between people living with homelessness and the general public in countries around the world. For example, Capability-related factors like the need for more information on the vaccines and vaccine safety, Opportunity-related factors like mistrust in health institutions, and Motivation-related factors like concerns over vaccine safety and necessity were common barriers to getting vaccinated across all groups and respondents.

The NCCDH report provides further insights into how some of these common barriers may be uniquely experienced for this specific population. For example, while the general public may be interested in general vaccine safety and development data and some patient groups have indicated wanting to know more about specific guidance for some health conditions, some people who may be experiencing precarious housing and homelessness may be interested in other types of guidance and information that is not readily available (e.g., vaccine interactions with methadone)[1].

Likewise, while time, convenience and cost have been identified as access barriers in the international literature, the NCCDH report indicates that requiring resources like the internet and phone lines in order to book vaccine appointments pose significant barriers to getting vaccinated for people facing homelessness. Another resource related barrier that may prevent those experiencing homelessness and housing precarity from getting vaccinated is the limited access to day shelters where they may safely recover from any vaccine-related side effects. The report also suggests a key barrier to providing appropriate care to this population lies with standardized vaccine protocols that may prohibit some people facing housing precarity from accessing vaccines.

Finally, although mistrust in health and government institutions has been reported in the international literature, the NCCDH report provides insights into how experiencing stigma and discrimination from healthcare providers (*Reinforcement*) contributes to deteriorated trust in healthcare systems in general and specifically contributes to mistrust and hesitancy regarding COVID-19 vaccines (*Social influences*).

Two barriers were identified in the NCCDH report that have not been previously identified in the international literature. The report suggests that people who are facing homelessness and housing precarity are often also contending with longstanding challenges related to substance use and mental health that may affect their ability to absorb information (*Memory, attention, decision-making*), which has implications for how to appropriately provide useful and effective information to support vaccination decisions. The report also describes how the competing demands faced by people experiencing homelessness and precarious housing, who often have to choose between meeting basic needs and accessing health services (*Goals*), may prevent them from getting vaccinated.

Some barriers and enablers were identified only in the international literature and may or may not be as relevant to people experiencing homelessness and housing precarity in Canada. For example, political preferences, past experiences with influenza vaccination, the influence of family members and close friends being infected, were not specifically identified as barriers or enablers experienced by those living with precarious housing and homelessness in the NCCDH report. Though some of these factors may be relevant for some people in this population, it is likely that other identified barriers and enablers (e.g., meeting basic needs, stigma) take primacy over those that have been reported in the global literature but were not identified in the NCCDH report. Importantly, the role of mental health among the general population in the international literature suggests that those who experience some degree of anxiety or depression may actually engage in more protective COVID-19 behaviours and may be more accepting of a vaccine. However, according to the NCCDH report, the ways in which people facing homelessness experience mental health challenges poses significant barriers to accessing vaccines.

<u>Strategies and policies for supporting vaccine uptake among people experiencing homelessness and housing precarity</u>

The NCCDH report discusses important strategies for addressing identified barriers to vaccine uptake among people experiencing precarious housing or homelessness. We categorised these approaches according to the Behaviour Change Wheel (BCW) intervention functions and then mapped these strategies to the barriers and enablers identified in this report that were categorized according to the COM-B model and TDF (see Table 2). By doing so, we aimed to understand the potential linkages between identified barriers and enablers and suggested strategies to identify possible opportunities for drawing upon behaviour change research to complement the work of the NCCDH. We also generated possible additional strategies based on the mapping of COM-B/TDF barriers to BCW intervention functions and have presented these alongside the NCCDH recommendations in Table 2.

The strategies put forward in the NCCDH report include leveraging existing trusted relationships between healthcare providers (e.g., outreach workers) and people experiencing homelessness, working with community ambassadors and peer support workers, as well as engaging other service providers to deliver vaccine information and support vaccination roll-out. Importantly, ensuring healthcare providers use trauma-informed approaches is thought to further engender trust. The NCCDH also provides specific recommendations for improving access to vaccine information and vaccine clinics through logistical considerations (e.g., providing multiple opportunities to get vaccinated) and emphasizes the need for adaptive approaches. To these we add suggestions for addressing Capacity, Opportunity, Motivation-related barriers such as communicating risk information in a way that considers some of the unique challenges faced by this population as means to address low perceived threat and vaccine safety concerns (see Table 2).

Institutional policies are necessary to support the suggested strategies for improving vaccine uptake. We, therefore, build on the work of the NCCDH by identifying policy-level supports based on the BCW policy functions that may enable healthcare providers working with people experiencing homelessness and precarious housing to better meet the needs of the communities they serve (see Table 2). Relevant BCW policy functions include *service provision* to better support health care staff and outreach workers in vaccination education and rollout efforts and to better support those interested in accessing vaccines through material (e.g., cash incentives) and social means (e.g., connecting people experiencing homelessness to social services in the community), *environmental /social planning* to ensure vaccine clinics consider the needs of those experiencing homelessness, *guidelines* to ensure vaccines are delivered using trauma informed approaches, and *regulations* for including homeless and housing precarious populations as priority groups during vaccine rollouts.

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Table 2. COVID-19 vaccination strategies and policy interventions

COM-B (TDF domains)	Barriers/enablers in NCCDH report	BCW intervention functions	Strategies identified in NCCDH report	Possible additional strategies	BCW policy functions (definition)	Possible policy interventions
Capability (Knowledge)	Barriers Gaps in knowledge about COVID-19 vaccines Written and online resources not effective for this group Unavailable guidance and information on specific concerns (e.g., interaction between vaccines and methadone)	Education	Provide accurate information on vaccine development, safety, efficacy, and side effects. Communication and education must consider different levels of comfort and knowledge with COVID-19 vaccine information.	Equip community ambassadors and outreach workers (healthcare providers and other service providers) with accurate information they can deliver during in-person interactions. Provide healthcare staff who work in outreach capacity with information on specific topics of concern.	Service provision	Provide healthcare staff with multi-modal (e.g., other than written material) evidence-based educational resources and tools to facilitate vaccine-related education including special topics relevant to this population. Provide outreach workers and interested community ambassadors with training so they may use multi-modal evidence-based educational resources and tools to facilitate vaccine-related education. Provide outreach workers and community ambassadors with compensation for training and for outreach/education efforts.

Memory, attention, decision-making	Barriers Difficulties processing information due to mental health and substance-use related challenges	Environmental restructuring	Provide consistent messaging with repetition and reminders. Provide multiple opportunities to discuss vaccine information during clinic and outreach interactions. Allowing for adequate time with each person to communicate information and answer questions.		Environmental / social planning	Increase staff hours allotted to public health education during routine clinics and outreach efforts to allow for sufficient time with each person.
Opportunity (Environmental context and resources)	Barriers Standardized vaccination protocols that are not adaptive to people living with homelessness/housing precarity	Enablement	Vaccination teams who are partnered with community ambassadors must remain adaptive to community needs.		Regulation	Build-in flexibility and contingency measures that allow healthcare workers the necessary autonomy to address challenges and concerns to vaccine uptake as they arise. Audit, evaluate and revise existing healthcare protocols that may disadvantage people experiencing homelessness and housing precarity.

Opportunity (Environmental context and resources)	Barriers Access issues in terms of long line-ups and geographical distance Access issues in terms of required resources to set up and attend vaccination appointments (e.g., internet, phone, transportation, day time shelters for recovery, documentation)	Environmental restructuring	Important to customize the location, format, and timing to the community's needs and assets. Improve accessibility through community-based outreach services (i.e. van/mobile-based, 'pop-up' tents, within shelters or lunch programs, walking outreach)		Environmental / social planning	Engage with outreach workers and community ambassadors to plan and design vaccination spaces to minimize barriers (e.g., work with shelter staff to provide vaccination space + multiday recovery area). Provide mobile and flexible options. Work with public health to revise existing requirements for documentation. Establish rules and regulations to allow for walk-in processes with minimal registration. Work with municipality to identify other near-by spaces for post-vaccine recovery.
		Enablement	Provide support for transportation. Provide walk-in availability with minimal wait times. Provide ongoing and consistent opportunities for		Service provision	Provide community and outreach vaccination clinics sufficient financial and material resources to ensure vaccination incurs no costs to people experiencing homelessness (e.g., bus tickets).
					Regulation	Prioritize homeless and housing precarious

			vaccination (vs one-time mass vaccination clinics) Remove requirement for identification or health card.			populations in vaccination efforts moving forward to improve access and opportunities for vaccination.
	Barriers Lack of resources to fund community ambassadors	Enablement		Provide community ambassadors with compensation for their involvement in vaccine roll-out efforts.	Service provision	Provide community and outreach vaccination clinics sufficient financial and material resources including means to compensate community ambassadors.

Opportunity (Social influences)	Barriers Mistrust in government/public health response to COVID-19 Enablers Involving peer and community ambassadors in delivering information and encouraging vaccination	Environmental restructuring	Build on existing trusted relationships (e.g., street-based or outreach nurses) by partnering vaccine clinic staff with people in a community ambassador role, such as peer support workers or other service providers, to further builds trust with both the vaccine providers and the COVID-19 vaccine. Equip service providers already working with people living with homelessness to deliver vaccinations.		Environmental / social planning	Engage with outreach workers and community ambassadors to plan and determine roles and responsibilities of community ambassadors. Provide vaccine clinic staff time and opportunities to build relationships with outreach workers and community ambassadors (e.g., social events).
		Enablement	Enable the use of trauma-informed care and bring expertise/experience in addressing mental health and substance-use challenges to foster trust. In keeping with trauma informed		Guidelines	Develop guidelines detailing how to use trauma-informed care with housing precarious populations in the context of COVID-19 vaccination.
					Service provision	Provide financial, material, and training supports to encourage the uptake of trauma-informed

			approaches, offer people living with homelessness the choice to decline or defer the vaccine. Provide support for other health needs that may arise as part of trauma-informed approaches.			approaches by outreach workers and community ambassadors. Provide vaccine clinics and outreach workers with material, financial, and social supports to address mental and physical health needs as they arise (e.g., access to health clinics catered to this population; access to mental health services; financial/material means to meet immediate needs).
Opportunity (Social influences)	Barriers: Negative influence of close contacts (word of mouth, social media)	Modelling	Deliver accurate vaccine information through trusted sources like service providers, peers and family.		Service provision	Provide service providers, peers and family who support vaccination efforts with tools to facilitate conversations about vaccines that convey accurate information while respecting autonomous decision-making.
Motivation (Beliefs about consequences)	Barriers: Concerns about COVID-19 vaccine safety Concerns about COVID-19 vaccine necessity (low perceived threat)	Education		Provide transparent information on what is known and not known about vaccine safety, efficacy and side effects. Communicate risk information in a way	Service provision	Provide healthcare staff with multi-modal (e.g., other than written material) evidence-based educational resources and tools to facilitate vaccine-related education including special topics relevant to this population.

				that acknowledges unique challenges faced by this population.		
Motivation (Goals)	Barriers: Meeting basic needs (e.g., food, sleep) conflict with accessing vaccines	Enablement	Provide support for other health needs that may arise as part of trauma-informed approaches.		Environmental / social planning	Engage with outreach workers and community ambassadors to plan and design vaccination spaces to minimize barriers (e.g., work with shelter staff to provide vaccination space + multiday recovery area). Provide mobile and flexible options. Work with community organizations and outreach services to connect community members with various resources at the same time as they seek to get vaccinated.
	Waiting in line may be difficult due to mental health challenges and/or substance use-related needs		Provide walk-in availability with minimal wait times.			
	Losing time in a line-up rather than earning money	Incentivisation	Acknowledgment of time through incentives, preferably cash.		Service provision	Provide community and outreach vaccination clinics sufficient financial and material resources to ensure vaccination incurs no costs to people experiencing homelessness (e.g., bus tickets, cash incentives).

Motivation (Reinforcement)	Barriers Negative past experiences with health services and healthcare providers, including discrimination	Training	Provide vaccination staff who are new to working with housing precarious populations (and any community ambassadors/ outreach workers who seek additional training), with training in trauma-informed care to ensure all are treated with respect and dignity.		Service provision	Provide financial, material, and training supports to encourage participation in training. Create systems for ensuring accountability in healthcare providers who behave inappropriately.

Discussion

Behavioural science approaches like the BCW are important tools for synthesizing information because they facilitate the use of a common language with which to identify and summarize barriers, enablers, and possible strategies to promote COVID-19 vaccination. By categorizing research evidence according to the COM-B model, TDF, and BCW, we are able to draw upon decades of research to consider what strategies may be more appropriate for addressing specific barriers. In this report we were able to complement the laudable work conducted by the NCCDH by delineating the potential links between identified barriers and enablers, suggested strategies, and associated policy interventions.

Behavioural science approaches to developing targeted interventions are most effective when they are responsive to the specific contexts where they will be implemented and are, thus, improved upon when coupled with findings from in-depth engagement with community ambassadors who can speak to the nuances of community needs. However, given the paucity of Canadian data on the barriers to vaccine uptake among people experiencing homelessness and housing precarity, it is imperative that more research is conducted to better understand how intersecting identities and social positions do and do not compound barriers to getting vaccinated. As vaccine efforts continue, it will be ever more important to work *with* healthcare workers in outreach settings and with people experiencing homelessness and housing precarity to develop effective strategies and policies to support vaccine confidence and uptake.

Furthermore, while we use a behavioural science approach in this report to identify strategies and policy interventions to support vaccination efforts for homeless and housing precarious populations, we acknowledge that the barriers to vaccination experienced by this population reflect broader, longstanding, structural socioeconomic inequities that have produced the conditions within which people experiencing homelessness are subjected to including discrimination, stigmatization and various access barriers within the healthcare system. The application of a behavioural science approach in the present report focused on identifying concrete actions to enable change at multiple levels in the short and medium term as it relates to vaccination for COVID-19. However, more work that draws from other interdisciplinary approaches is required to develop a long-term equity-focused plan to support homeless and housing precarious populations that goes beyond meeting current vaccination targets to ensuring every resident in Canada has access to adequate and affordable housing and can have their basic needs met.

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Appendix 1

Behaviour Change Wheel Intervention and Policy Function Definitions

Intervention	**Definition**
Education	Increasing knowledge or understanding
Persuasion	Using communication to induce positive or negative feelings or stimulate action
Incentivisation	Creating expectation of reward
Coercion	Creating expectation of punishment or cost
Training	Imparting skills
Restriction	Using rules to reduce the opportunity to engage in the target behaviour (or to increase the target behaviour by reducing the opportunity to engage in competing behaviours)
Environmental restructuring	Changing the physical or social context
Modelling	Providing an example for people to aspire to or imitate
Enablement	Increasing means/reducing barriers to increase capability or opportunity[1]
Policies	
Communication/marketing	Using print, electronic, telephonic or broadcast media
Guidelines	Creating documents that recommend or mandate practice. This includes all changes to service provision
Fiscal	Using the tax system to reduce or increase the financial cost
Regulation	Establishing rules or principles of behaviour or practice
Legislation	Making or changing laws
Environmental/social planning	Designing and/or controlling the physical or social environment
Service provision	Delivering a service

[1]Capability beyond education and training; opportunity beyond environmental restructuring

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