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When good messages go wrong: Perspectives on COVID-19 vaccines and vaccine communication from generally vaccine accepting individuals in Canada

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ABSTRACT

Vaccines are one of the most important and successful public health interventions to reduce the spread of infectious diseases. However, unlike childhood diseases and routine vaccines, COVID-19 is a novel threat, and COVID-19 vaccines may elicit specific anxieties. Through focus groups, we examine the concerns and attitudes toward the COVID-19 vaccine expressed by individuals who accept routine vaccinations in Canada. We also conducted a pre-focus group survey to document participant attitudes towards vaccines in general. While most participants had received at least one dose of the COVID-19 vaccine or had the intention to get it, many had concerns. First, participants felt anxious about the quick development and approval of the vaccines, even if they recognized that the vaccines have undergone clinical trials. Second, participants felt confused about shifting public health guidelines regarding vaccine safety, changing the interval between doses, and mixing different vaccine brands. Finally, participants said they felt abandoned when deciding whether to get vaccinated or not. People who generally accept vaccines expressed concerns about COVID-19 vaccines, mostly related to the inevitable uncertainties of a new vaccine (i.e. novelty, safety, mandates, etc.). COVID-19 vaccine hesitancy, understood as concerns about the novelty of a vaccine and the rapid implementation of it, could be useful for understanding questioning attitudes towards COVID-19 vaccines from people who accept routine vaccinations. Understanding COVID-19 vaccine hesitancy can also provide valuable insights as booster doses are periodically needed and people may not be as accepting of these additional doses.

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Introduction

On February 14th, 2022, a month after being deported from Australia for refusing to get the COVID-19 vaccine to participate in a tournament, tennis player Novak Djokovic said in an interview "I was never against vaccination."[1] These comments sparked negative reactions in the media, with many labeling Djokovic an "antivaxxer."[2–4] This episode epitomized the hesitancy that many generally vaccine-accepting people were expressing about COVID-19 vaccines in Canada.[5] Vaccines are one of the most important and successful public health interventions to reduce the spread of infectious diseases, such as measles, rubella, and more recently, COVID-19.[6] Despite evidence of vaccine safety and efficacy, many people remain skeptical about vaccination, including acceptance of future booster shots, or oppose it completely. However, unlike childhood diseases and routine vaccinations (i.e. vaccines to protect against polio, measles, mumps, rubella, tetanus, pertussis, etc.), COVID-19 is a novel threat and the vaccine against it was developed in less than a year after the virus was first identified in December 2019, generating concerns about these vaccines' need and safety.[5]

The literature on public perceptions of COVID-19 vaccines is vast, with most studies examining quantitative data from surveys to determine general trends and public attitudes toward COVID-19 vaccines.[7–10] Qualitative studies, on the other hand, focus on why individuals feel the way they do about COVID-19 vaccines. These studies have shown that vaccine-hesitancy about COVID-19 vaccines are fueled by lack of accurate information, misinformation, and confusion (see refs.[11–14] thus highlighting the importance of communication strategies. Additionally, perceptions of COVID-19 vaccines as being developed too fast lead to people believing they are not safe[15] Frustration over confusing guidelines and misinformation lead to mistrust and negative feelings towards COVID-19 vaccines.[14,16] Furthermore, a study found that high risk perceptions of COVID-19 do not lead to higher vaccine uptake.[17] Many factors influence COVID-19 vaccine uptake, such as sociodemographic characteristics (i.e., age, gender, ethnicity, and language) (see refs.[18–20] political affiliation (see refs.[8,19,21] trust (see ref.[22] and affective reactions.[23] Misinformation and personal narratives against vaccines, which circulate liberally online, have also been found to be more persuasive than scientific evidence.[6,-24]

Despite the ample research into public perceptions of COVID-19 vaccines and intention to get vaccinated, the perceptions and concerns of those who generally accept vaccines remains understudied. Therefore, there is the assumption that those who generally accept routine vaccines, such as those to prevent polio, measles, mumps, tetanus, etc., will also accept COVID-19 vaccines. In this study, we examine perceptions and

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attitudes[25] toward COVID-19 vaccines and how they were communicated to the public among individuals who typically accept routine vaccines in Canada. Based on our findings, we also provide recommendations for future vaccine communication. This study provides valuable[26] insights into the specific concerns and anxieties that these novel vaccines elicit and how they may impact intention to vaccinate among those who generally do not oppose vaccines. These insights may also usefully inform how public health officials approach the communication and delivery of COVID-19 booster doses.

Vaccine hesitancy and "antivaxxers"

Vaccination is a key public health intervention for the benefit of the immunized individual and of society at large.[27] However, vaccination is not mandatory in Canada. Instead vaccination programs rely on individual actions, which are communicated in public discourse as a moral and collective responsibility.[28] Vaccination programs can therefore be viewed as rooted in the concept of governmentality, i.e. the extension of state power over the individual through the neoliberal imperative of self-governance.[29] In this context, individuals are expected to be responsible and vaccinate themselves and their children, whereas not vaccinating is considered morally reprehensible.[28,30] Outbreaks of vaccine-preventable diseases, such as the highly publicized 2015 Disneyland measles outbreak,[31] have led health experts to argue that community immunity is a collective endeavor and society should protect those who are most vulnerable (i.e., elderly, infants, immunocompromised, etc.).[28] This expert discourse aligns with the idea of governmentality and individual responsibility. Others, however, defend individual choice over collective well-being, reject state authority (e.g., vaccination programs/mandates) and choose some vaccines and reject others, or refuse vaccination altogether.[32,33]

Vaccine hesitancy is a spectrum of beliefs about vaccines and associated behaviors that reflects the complex and evolving attitudes individuals have toward vaccines.[34,35] Vaccine-hesitant individuals can choose to get some vaccines but not others, delay scheduled vaccinations, or even get immunized despite having concerns about the safety of vaccines and conspiratorial beliefs.[34–39] For example, individuals may express hesitancy about the COVID-19 vaccine and still get vaccinated.[39] Some vaccine-hesitant individuals may refuse vaccination altogether, i.e. vaccine refusal. However, not getting vaccinated does not necessarily mean that individuals are vaccine-hesitant, but can actually be related to barriers to vaccination individuals face, such as lack of access to vaccines due to other responsibilities (work, childcare, inconvenient hours of operation, etc.).[34] Therefore, we understand vaccine hesitancy as the "delay in acceptance or refusal of vaccination despite availability of vaccination services."[40] Additionally, VH is context specific, it varies in time and across vaccines, and it is "influenced by factors such as complacency, convenience and confidence."[40]

Despite this broad spectrum of attitudes toward vaccination, vaccine hesitant people are usually labeled as "antivaxxers." Antivaxxer is a pejorative term that conflates all forms of vaccine hesitancy, thus erasing the nuances described above. Public discourse about antivaxxers describes them as refusing all vaccines, as being ignorant, selfish, and anti-science.[28,35] Canada has high rates of childhood vaccination and vaccine refusal is less than 3% of the population.[41] Nevertheless, media coverage of outbreaks of vaccine-preventable diseases tends to vilify vaccine-hesitant people and represent them through stereotypes that reinforce the idea that vaccine hesitancy amounts to vaccine refusal.[28]

COVID-19 vaccines in Canada

Canada begun distribution of the COVID-19 vaccine in December 2020 and throughout 2021, many provinces implemented vaccine passports, allowing those vaccinated to access places and services that unvaccinated people could not. At the beginning of 2022, 79.3% of Canadians aged 18 and older have received two doses of the COVID-19 vaccine, 83.5% of those aged 12 to 17, and 22.7% of children between 5 and 11 years old.[42]

There are four types of COVID-19 vaccines approved in Canada: mRNA vaccines, viral vector-based vaccines, protein subunit vaccines, and plant-based vaccines.[43] The mRNA vaccines do not use live virus, but instead cause the body to produce a protein that in turn will trigger an immune response.[43] Although mRNA COVID-19 vaccines, such as Pfizer-BioNTech and Moderna, are the first ones to be widely used in humans, this technology has been researched for many years and tested to create vaccines for influenza, Zika virus, rabies, and some types of cancer.[43] Viral vector-based vaccines, such as AstraZeneca and Janssen (Johnson & Johnson) COVID-19 vaccines, use adenoviruses to produce the SARS-CoV-2 spike protein and trigger an immune response. Viral vector-based vaccines are a well-known technology that have been used for decades.[43] Protein subunit vaccines contain innocuous purified proteins of the SARS-CoV-2 virus, specifically selected for its ability to trigger immunity. Protein subunit vaccines have been widely used to prevent hepatitis B.[43] Finally, plant-based COVID-19 vaccines, such as Medicago Covidenz, use plants natural cell process to produce protein virus-like particles, which are then injected to the body triggering an immune response.[43]

In Canada, COVID-19 vaccines were initially authorized under an "interim order," the equivalent of the emergency use authorization that they received from the Food and Drug Administration (FDA) in the United States.[44] This emergency authorization allowed for the expedited review and authorization of the vaccines, but it also led to confusion and speculation that the COVID-19 vaccines remained experimental and had not been properly evaluated.[45–48] Both Pfizer and Moderna vaccines were granted full approval in Canada as of 16 September 2021, and the former also has full FDA approval in the U.S. However, the perception that the COVID-19 vaccines were rushed and are not safe remains.[45]

COVID-19 vaccines in Canada have been communicated by health authorities and healthcare providers as a collective responsibility, with public health authorities encouraging people to protect others, and as a sacrifice we must all do to end the pandemic and "be together again."[49,50] When Canada started distribution of COVID-19 vaccines, priority groups were

established to ensure that those at higher risk would have access to the vaccines first, such as the elderly and essential workers.[51] As the weeks went by, more age groups became eligible to receive a COVID-19 vaccine.

Guidance and eligibility, however, became confusing once reports of increased risk of blood clots for those receiving the AstraZeneca vaccine became public.[52] Originally, Canadians were instructed to receive the same brand of vaccine for the two required doses. However, once it was known that some people had developed the rare blood clot disorder and died after receiving the AstraZeneca vaccine, the head of the National Advisory Committee on Immunization (NACI) stated on a national news network that mRNA were the "preferred vaccines."[53] This statement left millions of Canadians who had received a first dose of AstraZeneca completely uncertain of what to do about their second dose.[53] Public health authorities then discontinued the AstraZeneca vaccine and advised Canadians to get any vaccine available to them for their second dose, stating that mixing different brands of vaccines was allowed.[51,54] This guidance change came after new evidence supporting that mixing different vaccines generated a stronger immune response.[55] However, these changes resulted in deepening anxiety about COVID-19 vaccines and leading many Canadians to delay their second doses until they could get a specific brand.[56,57]

Materials and methods

This study is part of a wider research project on COVID-19 management strategies across Canada that includes different populations.[58] Here we examine the concerns and arguments about the COVID-19 vaccine expressed by individuals who generally accept routine vaccinations across those populations, and their perceptions of how COVID-19 vaccines were communicated to the public. We conducted 26 age-stratified online focus groups with 157 Canadians living in Toronto, Ottawa, Vancouver, and Winnipeg, between December 2020 and July 2021. Of those, seven focus groups were conducted with Canadians with disabilities (n = 23) in Manitoba, and another seven focus groups were conducted with residents of Manitoba's Southern Health Region (n = 52), an area with traditionally low vaccination rates even for routine vaccines. This recruiting strategy allowed us to capture perspectives from individuals who face various specific challenges and risks when seeking vaccines due to the nature of their disabilities, as well as from individuals who live in communities that are mostly vaccine hesitant. These different perspectives and lived experiences complement those of the general population and allow for a more robust and comprehensive analysis.

Most participants were recruited through a market research firm using a variety of standard methods (e.g., e-mails to individuals signed up as part of existing panels, random digit dialing, ads posted on Facebook/Instagram). Participants with disabilities were recruited in consultation with four local and national cross-disability organizations[a] run by people living with disabilities using various strategies (e.g., ads posted on social media, Kijiji, and email distribution lists of consulted organizations). Participants were age-segregated into one of three mix-gender groups (18–34 years, 35–54 years, 55+ years), and received an honorarium of $70 for their time. Table 1 shows the demographic characteristics of our participants.

Table 1. Socio-economic and demographic characteristics of focus group participants with up-to-date or mostly up-to date routine immunizations, N = 139.

Characteristic	Count	%
Gender		
Female	73	52.52%
Male	66	47.48%
Total	**139**	**100.00%**
Age Group		
18 to 24	17	12.23%
25 to 30	24	17.27%
31 to 34	13	9.35%
35 to 40	14	10.07%
41 to 48	18	12.95%
49 to 54	10	7.19%
49 to 55	1	0.72%
55 to 60	11	7.91%
56 to 60	1	0.72%
61 to 68	21	15.11%
69 or older	9	6.47%
Total	**139**	**100.00%**
Marital Status		
Divorced, separated or widowed	16	11.51%
Married or common law	85	61.15%
Single (never married)	38	27.34%
Total	**139**	**100.00%**
Number of Children under 18 years of age		
1	18	12.95%
2	19	13.67%
3	8	5.76%
More than 3	1	0.72%
None	93	66.91%
Total	**139**	**100.00%**
Education		
College/university degree	91	65.47%
Some college/university	38	27.34%
High school	10	7.19%
Total	**139**	**100.00%**
Income		
Under $50,000	44	31.65%
$50,000–$74,999	30	21.58%
$75,000–$99,999	23	16.55%
$100,000–$149,999	30	21.58%
$150,000 or more	10	7.19%
Prefer not to answer	1	0.72%
Don't know	1	0.72%
Total	**139**	**100.00%**
Race (self-identified)		
White	94	67.63%
People of Colour	36	25.90%
Indigenous	7	5.04%
Black	2	1.44%
Total	**139**	**100.00%**

We administered a pre-focus group survey with all participants within one to five days (mode of 5 days) before the participant's focus group. The survey included questions on the participant's socio-economic and demographic characteristics, status of routine vaccinations[b] (up-to-date/mostly up-to-date/no/not sure), typical uptake of the annual influenza vaccine (yes/no/sometimes), intent to vaccinate and/or receive second dose (yes/no/not sure), and attitudes toward COVID-19 vaccines according to the 5Cs. The 5Cs are reliable and valid indicators related to psychological concepts on vaccine confidence (attitude), complacency (perceived personal health status and invulnerability), collective responsibility (communal orientation), calculation (preference for

Table 2. Status of uptake of annual influenza vaccine, intent to vaccinate against COVID-19, of focus group participants with up-to date or mostly up-to date routine immunizations, N = 139.

	Count	%
Uptake of Annual Influenza Vaccine		
Yes	81	58.27%
Sometimes	11	7.91%
No	47	33.81%
Total	**139**	**100.00%**
Intent to Vaccinate Against COVID-19		
Yes	116	83.45%
No	23	16.55%
Total	**139**	**100.00%**

deliberation) and constraints (self-control).[59] We used a 6-point Likert response scale to the 5Cs: Completely agree, somewhat agree, neither agree nor disagree, disagree, somewhat disagree, and not sure. In our results, we collapsed categories into agree (agree and somewhat agree), disagree (disagree and somewhat disagree), neutral (neither agree nor disagree), and not sure. The pre-focus group survey allowed us to systematically capture our participants' views and establish a good record of which participants were generally vaccine acceptant (routine vaccines up-to-date or mostly up-to-date). This systematic documentation of participants' attitudes toward vaccines through survey responses helps to strengthen our interpretation of the focus group data regarding why they feel about the COVID-19 vaccines the way they do because survey responses will not be moderated through a social interaction of a discussion.

Focus groups were moderated by either the lead researcher or a professional research firm experienced in qualitative methods. The lead researcher also attended the sessions moderated by the firm, although they remained off camera, and occasionally suggested follow up prompts to the moderator. We developed a focus group thematic guide with the main questions, including participants' opinions on the implementation of public health guidelines, compliance with infection prevention measures, information seeking behavior and trust, and attitudes toward vaccination in general and specifically the COVID-19 vaccines. The discussions lasted two hours. To identify participants in the transcripts, we used the name they requested.

All focus groups were audio-recorded, transcribed verbatim, and audio-verified for accuracy. Transcripts were uploaded for analysis using NVivo12. We developed initial codes corresponding to the scripted questions posed to participants. We followed an open coding process, which allowed for new codes to emerge during the coding process.[60] Two team members coded the transcripts, and two coding tests were performed with a third member of the research team to ensure inter-coder reliability. Our Kappa coefficient score was 0.85. Ethics approval was obtained from (blinded) and (blinded).

Findings

We recruited 157 focus group participants, who shared their opinions and experiences with COVID-19 vaccines and discussed how the vaccines had been communicated by public health authorities. Of those, 139 participants reported in the pre-focus group survey that their routine vaccines were up-to-date or mostly up-to-date. These vaccine accepting participants are the focus of what we report in this article (see Table 1). Despite accepting most vaccines, 34% of participants do not get the annual influenza vaccine, and 17% did not intend to get a COVID-19 vaccine (see Table 2). Furthermore, of those participants who had a COVID-19 vaccine available to them, 69% had already gotten at least one dose (see Table 3). Below we report on concerns about COVID-19 vaccines expressed by participants who generally accept routine vaccines (n = 139). We have grouped these concerns into four topics: (1) novelty of the vaccine; (2) preference for some vaccine brands; (3) confusion about changing guidelines; and (4) vilification of vaccine hesitant views.

New isn't always better

The novelty of the COVID-19 vaccine was one of the main reasons why participants were reluctant. Many participants expressed anxiety about the novelty of the vaccine regarding three different aspects. First, participants felt anxious about the recent development of the vaccine; second, some expressed concerns about the novel mRNA technology used for this vaccine; and third, some participants related these concerns to the novelty of the disease itself. One participant, who said she had received all her routine vaccinations as well as her children, described the COVID-19 vaccines as "trickier" than others "because this vaccine is so new [. . .] and we know less about [it] than COVID itself. It's a little bit more scary" (Laura, 18–3 4 December 2020). Another participant also expressed fear about COVID-19 vaccines, which she perceived as still being experimental, saying "I am not going to sign up to be one of the first guinea pigs to get a COVID vaccine" (Rebecca, 35–5 4 December 2020).

The mRNA technology used in the COVID-19 vaccination was cited by some as the reason why they had doubts about the vaccine. One participant, for example, refused to get

Table 3. COVID-10 vaccination status at time of survey of focus group participants with up-to-date or mostly up-to-date routine immunizations, N = 61*.

COVID-19 Vaccination Status at Time of Survey		
	Count	%
I've already had at least one dose of the vaccine	42	68.85%
I haven't had the vaccine yet, and I'm in no rush	8	13.11%
I haven't had the vaccine yet, but I have an appointment booked	4	6.56%
I'm not likely to get the vaccine	5	8.20%
I haven't had the vaccine yet, but I'm going to get it as soon as possible	2	3.28%
Total	**61**	**100.00%**

Note: * 78 (56.12%) of participants were excluded as the vaccine was not yet available at the time of the survey.

Table 4. Participants' attitudes toward COVID-19 vaccination (5cs) of focus group participants with up-to date or mostly up-to date routine immunizations, N = 139.

Attitude (5Cs)	Agree		Disagree		Neutral		Not Sure		Total	
	Count	%	Count	%	Count	%	Count	%	Count	%
5C Confidence: I am completely confident that the COVID-19 vaccines currently available in Canada are safe	98	70.50%	26	18.71%	12	8.63%	3	2.16%	**139**	**100.00%**
5C Complacency: Vaccination against COVID-19 is unnecessary because the risk of getting the COVID-19 virus in Canada is small	10	7.19%	120	86.33%	8	5.76%	1	0.72%	**139**	**100.00%**
5C Collective Responsibility: If everyone gets vaccinated with a COVID-19 vaccine, I won't have to get vaccinated against COVID-19 too	12	8.63%	108	77.70%	19	13.67%	0	0.00%	**139**	**100.00%**
5C Calculation: When I think about getting the COVID-19 vaccine, I will weigh the benefits and risks to make the best decision possible	124	89.21%	8	5.76%	7	5.04%	0	0.00%	**139**	**100.00%**
5C Constraints: Everyday stress (such as competing priorities or many demands on my time) will prevent me from getting the COVID-19 vaccine	11	7.91%	117	84.17%	10	7.19%	1	0.72%	**139**	**100.00%**

a mRNA vaccine, saying "You'd have to come out with new vaccines that definitely aren't MRNA vaccines to start off with and you'd have to have long-term data for me and that's not going to be available for the long term [. . .] all the other vaccines were made in a way where they didn't use that" (Christa, 41–4 8 December 2020). Another participant recalled her local government promoting the vaccine as a "brand-new type of vaccine that had never been used before in humans," but instead of perceiving this as something positive she felt anxious and thought "that's not a good way to say this." She explained her concerns were reduced once "I did my own research [and found that] it's not the first time this type of vaccine has been used in humans. It's been used in humans before but more in trials in the past" (Linda, 25-30 December 2020).

Some participants expressed reluctance to get a COVID-19 vaccine because they interpreted the initial emergency authorization as the vaccines being rushed and still largely experimental. A person worried that "when you fast track it that means your regular research isn't as complete as it could be" (Scott, 55–60, December 2020), and another participant believed the vaccines have not been "completely tested" or that scientists "took shortcuts" (Raj, 35–5 4 December 2020). One participant criticized the government for approving the use of COVID-19 vaccines saying "it's too soon to have a vaccine and too soon to really know [if it's safe]. I think Canada made too quick of a decision to approve this vaccine" (Vipul, 18–3 4 December 2020).

Other participants said they understood that the vaccines had passed clinical trials and undergone extensive reviews in Canada and other countries, but they still perceived them as under-tested and risky. For example:

> The vaccine has been rushed too much. Yes, they have had into the 3rd clinical trials and FDA approval but I'm already hearing in the news that there are severe reactions (. . .) I won't be rushed. Let's make sure everything is done properly, cross out our t's and dot our i's *(Shehzad, 35–5 4 December 2020).*

> My concern is that it's not a well tested out vaccine. We didn't have COVID a year ago. They haven't even been able to test it out on any humans. I highly doubt that they've done the proper studies or testing even on chimps because there's no way it could be accurate in the timeline [of about a year] they've had to develop this *(Lucinda, 55+, December 2020).*

For many of these participants more research is necessary to ensure vaccine safety, and maybe then they would get vaccinated. One participant, for example, said that "often [vaccines] are not tested on diverse groups" (Raj, 35–5 4 December 2020), and this made him reluctant to get a COVID-19 vaccine. For another participant the problem was that "you need 1 year and a half to 2 years to see the results fully, the effects of the vaccine, and I will wait that time" (Roland, 55+, December 2020). Others referred to routine vaccines, such as the measles-mumps-rubella (MMR) vaccine, explaining that these routine vaccinations "are the regular, FDA-approved [vaccines], not just in emergency use" (Linda, 25–30 December 2020) like the COVID-19 vaccine.

The perception that there was not enough research done to ensure vaccine safety or that the COVID-19 vaccine is only meant for emergency use led many participants to adopt a 'wait-and-see' approach. These participants said they intended to get vaccinated but not just yet, instead, they wanted to wait some time and see the effects the COVID-19 vaccine had on those who got it first. For example, comparing the vaccine to a new car model, a participant said "you don't take the first car that comes off the line, you wait for a year and see how it behaves (Raymond, 55+, December 2020). Likewise, "I'm a little bit hesitant to be the first out the door" to get the COVID-19 vaccine. This sentiment was shared by many participants who said they would rather be "in the back of the line" (Raj, 35–5 4 December 2020) and "observe what kinds of reactions people have, then, if I think it's safe for me and my family, we will get it" (Vipul, 18–3 4 December 2020). Another participant reiterated her trust in science, but still wanted to wait to get the vaccine: "I am pro-vaccine and I do trust science. I trust science much more than skeptics around the internet. I will eventually get the vaccine, I just want a little more time to pass before I get it" (Ana-Laura, 18–3 4 December 2020).

Despite expressing concerns about the safety of COVID-19 vaccines, 70.5% of participants agreed in the survey that COVID-19 vaccines available in Canada are safe, and 19% disagreed (see Table 4).

Shopping for vaccines: which brand is better?

Concerns about the vaccine being "rushed" were coupled with worries about the risk and benefits of different vaccine brands, which was exacerbated by confusing public health communication. Several participants referred to AstraZeneca vaccine as riskier than others. One person mentioned the case of

a Canadian woman who "went to the hospital after a bad reaction to AstraZeneca [COVID-19 vaccine] and they just sloughed her off. And then she died" (Faye, 61–6 8 July 2021). Based on this case, the participant expressed hesitance to getting a COVID-19 vaccine because "the vaccines were developed really fast, and I could wait a couple more months to see how it plays out." Yet another participant explained how official warnings against the AstraZeneca vaccine had made them reluctant to get a vaccine:

> I wasn't hesitant at all about vaccines and especially about the AstraZeneca because I was only hearing bad things about from people that I don't trust and sources that I don't trust, but now I'm concerned about it because the last time I went to the government website [it showed] all these warnings about it and saying that they prefer not to give it out. And so, I'm like oh great! Maybe there was some truth to it? But vaccines in general, I am more than happy to be getting the Pfizer *(April, 25–30, June/July 2021).*

Although the risk of developing a clot disorder after getting the AstraZeneca vaccine is very low, some participants who had already gotten a dose of it expressed anger and frustration about not having been able to choose a different vaccine. A participant who is a kindergarten teacher said "I took the AstraZeneca one first. That wasn't my preference but considering how sick the kids in my class were [. . .] I was just glad to have any type of vaccine" (Terry, 35–55, June/July 2021). Another participant, who is immunocompromised and who got one dose of the AstraZeneca vaccine, expressed uncertainty about how high the risk of the clot disorder actually is saying, "first they said [the blood clot disorder happened to] 1 in 100,000 and then it's gone to 1 in 60,000" (Catherine, 59–5 4 July 2021). She added, "I already have a compromised immune system, a compromised body [and] it upsets me very much that [the AstraZeneca vaccine] was even something that was offered to me. That shouldn't have even been on the plate." Yet, other participants expressed outrage that Canada had administered the AstraZeneca vaccine when other countries had deemed the risk of blood clots high enough to not use the vaccine, for example:

> Finding out that [AstraZeneca] was rejected from all these different countries, and then surprisingly Canada [kept using it]. That kind of put a little scare in my heart. If all these other countries aren't taking it, why are we taking it? So, I am very glad I got the Moderna [vaccine] (Oassis, 18–3 4 July 2021).

The risk posed by the AstraZeneca COVID-19 vaccine was perceived by participants as high because of the way in which public health authorities managed communication of the risk, saying that mRNA vaccines were preferred to others and discontinuing the AstraZeneca vaccine. These messages contradicted the initial recommendation to get the first vaccine Canadians were offered, and undermined trust in public health authorities. Like many others, Catherine struggled with uncertainty about what vaccine she should get for her second dose:

> I don't want my second one to be the AstraZeneca. So, I'm holding off and waiting so far you can't mix and match the vaccines. I want to get my second shot. So, I feel confused and mixed up and apprehensive, because I want to get [a vaccine] because I don't want anybody else to get COVID. But at the same time, I've got to worry about my health too *(Catherine, 59–5 4 July 2021).*

This sense of confusion was shared by other participants, who also felt that the government and public health authorities had abandoned millions of Canadians who got an AstraZeneca COVID-19 vaccine:

> My sister had the AstraZeneca shot and as soon as she heard that she couldn't get it again for her second dose and would have to be stuck getting one of the MRNA vaccines, she felt trapped. On top of that, from stuff that I've read, the efficacy of having an MRNA vaccine on top of your AstraZeneca, I believe Johnson and Johnson was the other one, is still more advantageous than having the two shots of AstraZeneca. So, here we go again with the who the hell knows what the right answer is *(Yves, 18–34, June/July 2021).*

In this context, participants expressed preference for the Pfizer vaccine over AstraZeneca, and even over the less known Moderna vaccine. Most participants (90%) reported in the survey that they will balance the risks and benefits of getting a COVID-19 vaccine before deciding (see Table 4), which combined with the confusion generated by the AstraZeneca episode, made some participants willing to delay their second dose if the vaccine brand they wanted was not offered to them. Others, however, were willing to get the first vaccine available to them despite their preferences

> My second dose is going to be Pfizer, that's my preference. I've seen research that the combination of AstraZeneca and Pfizer actually works well and gives you even better immunity than just having both of the same type of vaccine (Terry, 35–50, June/July 2021).

> I think, from a consistency perspective, I'd like to do the same [Pfizer vaccine]. Not to say that there wouldn't be probably any issues with mixing and matching. But just I think because of the fact that a lot of the trials that were done, you know, weren't mixing and matching and they've got data that was obviously supporting their approval within the process. That would be my, my choice (Joel, 35–50, June/July 2021).

Confusing guidelines: vaccine mixing and interval changes

Most participants said they trusted government websites and public health sources, such as provincial and federal officers of health, as well as mainstream news sources, such as the CBC[c]. Some participants also got information through friends and family. Most participants said they did not trust information published in social media. Despite actively looking for information, participants expressed frustration over unclear guidelines for COVID-19 vaccines. COVID-19 vaccination guidelines in Canadian provinces, regarding who can get vaccinated and when, which brand of vaccine to get, and even what freedoms vaccinated people could enjoy, have shifted several times during the pandemic [cf. 61–63]. Some participants referred, for example, to public health guidelines that changed to extend the recommended time between vaccine doses and to allow people to get a different COVID-19 vaccine for their second dose. A participant explained the confusion many people experienced saying that "there's a lot of inconsistency and there's a lot of muddled communications, and [when] you just figured out what's going on, all of a sudden, they pull the carpet out from under you, and you have to sort of start over again" (John, 35–50, July 2021). For this participant, unclear messages of shifting vaccination guidelines contributed to a loss of trust in public health authorities, leading many to

decide that "I won't get that vaccine because [public health officers] don't know what they're talking about." Another participant echoed this opinion saying that she found a discrepancy in the age group for the AstraZeneca vaccine, with the National Advisory Committee on Immunization (NACI) giving one recommendation and the government of Manitoba giving a different one. This led the participant to believe that "there's controversy here so [I'm] just not getting the vaccine because of that" (Kally, 18–35, June/July 2021).

The loss of trust described above was also expressed in relation to mixing different vaccine brands. Many participants perceived this recommendation as being another inconsistency in public health guidance and this perception made them feel uncertain. One participant explained that "one minute [they say] AstraZeneca is perfect. Next minute, oh no, don't do it. Then, it's good that you had the first one but now we're mixing [vaccine brands]. I feel that's just put a bit of doubt in some people's brains (George, 18–35, June/July 2021). This sentiment was confirmed by others who say they "don't feel comfortable at all with the idea of mixing" (Bryan, 18–35, June/July 2021) different COVID-19 vaccines.

One participant expressed concern about how the COVID-19 vaccines were being administered, particularly because public health authorities were not following the manufacturers' recommendations but adapting them to other priorities, which seemed unsafe.

> First, we were supposed to get our second dose 8–10 weeks after the first dose, but then they said no, everyone get your first dose and we don't care when you get the second dose. I don't get that. Why wouldn't you do what the medication says? That was very disturbing to me (. . .). Now they say you can mix them. I don't know. Did they do that in the research when they were doing the vaccine trials? (Christine, 55+, June/July 2021).

This participant, like others, said she understood that recommendations will change as new evidence emerges, but it felt insufficient for her to trust public health authorities: "I get it that the science is changing along the way, but it makes you lose a little bit of trust in them" (Christine, 55+, June/July 2021).

Vilification of vaccine-hesitant views

The various concerns and anxieties explained above led participants to feel reluctant to get the COVID-19 vaccine, however, these participants were still very much in favor of routine vaccination. Despite this, participants noted that there is a very polarized vaccination debate online in which any concern about COVID-19 vaccines tends to quickly be labeled "anti-vaxxer." A participant explained that "there are pro-vaxxers and anti-vaxxers. There are also people in the middle [but] if you don't get a shot, [they say] you don't believe in science [and] you're an anti vaxxer" (FK 35–40, July 2021). This opinion was shared by another participant who also referred to the vilification of vaccine hesitancy in public discourse saying that "there's this rhetoric out there that if you don't get [the COVID-19 vaccine] you don't care about other human beings, and that's simply not true" (Christine, 55+, June/July 2021). She went on to say that she was reluctant to get a COVID-19 vaccine because "I feel like [vaccine incentives are] a little bit of a manipulation again by our government. I think that kind of thing pushes the people who are on the fence further away instead of drawing them closer (Christine, 55+, June/July 2021).

Other participants were critical of the way in which the vaccination program had been rolled out and how public health officials had communicated with the public. These participants found it suspicious that the government kept "pushing and pushing" the vaccine: "first they're trying to bribe you and then they are taking away your freedoms" (Blake, 18–35, June/July 2021). This sentiment was echoed by another participant also referred to feeling pushed to get a COVID-19 vaccine and disagreed with the way in which the vaccines were publicized: "I feel the people who want it should be very much able to get it as soon and as fast as they can. I think that's great. It should be available to all but be required by none. The roll out and the marketing campaign and even the division we have within our family and at work, it's dividing workplaces and it's dividing families" (Lisa, 35–55, June/July 2021). This participant said that she felt "threatened and bribed" by public health authorities to get the COVID-19 vaccine, which "makes me all the more stubborn and mad (. . .) but I'm being stubborn because I'm so upset about the roll out."

Another person explained having "mixed feelings about this end-all and be-all cure. If it means I am restricted from flying, so be it. My health is important to me and my belief of what I put in my body" (Norm, 55+, December 2020). Yet, another participant was suspicious about the economic interests of pharmaceutical companies and how these may have influenced the rapid development and rollout of the vaccine:

> When you think about the pharmaceutical industry and you think about how much for profit it really is, [it] just seems to put humanity second to profit a lot of the time. You wonder, are these the people who are in charge of the cure for the whole world? I think it helps to be skeptical but not overboard.
> *(Calyx, 18–3 4 December 2020).*

For another participant, the problem with COVID-19 vaccines is "whether it is really effective" (Conrad, 55+, December 2020). These doubts about the vaccine's efficacy were noted by other participants who were ambivalent about getting vaccinated because of this uncertainty. For example:

> My big one is if I get the vaccine am I 100% guaranteed that I will not get COVID or am I just guaranteed that it's not going to be so bad? Also, I know it's a two-dose thing, but is it going to be in 10 years am I going to have to get it again? I don't have enough information that's why I was not able to make an educated decision on whether or not I want the vaccine
> *(Allison, 18–3 4 December 2020).*

Uncertainty about vaccine efficacy led another participant to ask what the point is of getting the COVID-19 vaccine at all: "I am not against the ideas of vaccine, but it is more like I will get it done at some point. I just need a logical reason to get it and I will get it done" (Renee, 55+, December 2020).

Some participants noted that labeling people who remain reluctant to getting a COVID-19 vaccine as "anti-vaxxer" is counterproductive. One participant explained that "we have people [saying], 'Hey, you're stupid. You have an obligation to the society and you're doing a disservice. You're an anti

vaxxer'" (Fk, 35–5 4 July 2021). This participant suggested addressing concerns about COVID-19 vaccines using a "milder tone" that does not vilify vaccine-questioning people but can lead to a respectful conversation. Other participants echoed this idea, saying that, to regain public trust, the government should "humanize its position [. . .] be more personal and realistic with how they've handled [the COVID-19 vaccination program] and that they have made mistakes" (Bryan, 18–35, June/July 2021).

Discussion and conclusion

Vaccination in Canada has been traditionally communicated as a personal choice, based on the neoliberal imperative of self-regulation.[27,28] COVID-19 vaccines, however, have been communicated not only as a moral imperative but they soon became mandated in places of employment and to access many spaces and services (see ref.[50] We examined the concerns about COVID-19 vaccines expressed by individuals who accept routine vaccinations in Canada. While most participants who had COVID-19 vaccines available to them had received at least one dose (69%) or had the intention to get it (7%) (see Table 3), many remained hesitant and had concerns specific to this vaccine, i.e., novelty of the mRNA technology, rapid development and approval of the vaccine, and lack of long-term data regarding side-effects. These results confirm that many people remain vaccine-hesitant even after getting a COVID-19 vaccine.[39] While many factors affect COVID-19 vaccine uptake (see ref.[18,19,22,64] we found that for those who generally accept vaccines, vaccine safety, risk perception related to novelty of the vaccine, and lack of information were crucial in shaping perceptions and intent to get a COVID-19 vaccine.

First, participants felt anxious about how quickly the vaccines were developed and approved, even if they recognized that the COVID-19 vaccines have undergone clinical trials and their safety has been confirmed. This anxiety about the novelty of these vaccines was predictable as there is ample evidence that new medical technologies, particularly new vaccines, are initially perceived as riskier.[65–67] Other studies conducted with general population in the United States (see ref.[8,14,17] Europe (see ref.[12–14] and Asia (see ref.[14] found that a people who perceive the risk of COVID-19 as low tend to reject COVID-19 vaccines. However, we found that our participants perceived the risk of COVID-19 as high but consider COVID-19 vaccines as being riskier.

Second, participants felt confused about shifting public health guidelines, particularly regarding the safety of the AstraZeneca vaccine, changing the interval between doses, and the recommendation to mix different vaccine brands. While most participants understood that guidelines need to change in light of new evidence, they explained that the vaccine guidelines seemed to change arbitrarily and not based on evidence. Scientific uncertainty is inevitable with new risks, such as COVID-19, and as new evidence emerges, recommendations will shift accordingly.[68] However, when recommendations change without adequate communication and are perceived as arbitrary, it can lead to a loss of trust in public health authorities and increase public uncertainty.[22,69] While some studies have shown that that lack of information and misinformation about COVID-19 vaccines lead to vaccine refusal (see ref.[12,14] our generally vaccine-accepting participants were distrustful of shifts in messages and guidelines about the vaccines even when delivered by trustworthy sources (e.g., public health officials and official agencies). Given the frequency in which earlier messages (e.g., get the first vaccine offered, keep the same brand of vaccine for both doses) were communicated, the changes to guidance were not explained with the same level of frequency to override people's original understanding.

Finally, the speed at which information changed, without the same level of explanation behind the changes, made some participants feel abandoned when deciding whether to get vaccinated or not. However, they also felt pressured to get vaccinated but without adequate risk communication, participants did not feel empowered in that decision. In this context, participants were discouraged by the extreme polarization of the public discourse about COVID-19 vaccines, in which those who harbor doubts and concerns about this vaccine are immediately labeled antivaxxers, i.e., anti-science, selfish, ignorant, and stereotyped.

While many of the behaviors and attitudes expressed by participants could have been predicted based on evidence of vaccine hesitancy about routine vaccinations, the COVID-19 pandemic created particular noteworthy challenges: the scale and magnitude of the risk of COVID-19, the speed at which new information was circulated, and the heightened level of public attention to these messages made public reactions less predictable and risk communication about COVID-19 vaccines more challenging. Addressing vaccine hesitancy about COVID-19 vaccines in the same way as hesitancy about routine vaccinations, i.e., reiterating the need for vaccination and vaccine safety without further contextualizing these messages or emphasizing and explaining guideline shifts, contributed to deepening uncertainty and risk repeating these failures in the future.

Our results provide valuable insights into the specific concerns and anxieties that COVID-19 vaccines elicit and how they may impact intention to vaccinate among those who generally accept vaccines. While vaccine hesitancy about routine vaccines, such as polio and measles vaccines, is usually based on claims of negative effects (e.g., autism, ADHD, allergic reactions, overwhelming children's immune system, etc.) (see ref.[34] COVID-19 vaccines elicited different and specific concerns, mostly related to the inevitable uncertainties of a new vaccine (i.e., novelty, safety, mandates, etc.). COVID-19 vaccine-hesitancy, understood as concerns about the novelty of a vaccine and the rapid implementation of it, could be useful for understanding questioning attitudes toward COVID-19 vaccines from people who accept routine vaccination. Furthermore, our results stress the need to address COVID-specific vaccine hesitancy as routine booster doses have become necessary to maintain immunity and people who got their first two-doses may remain hesitant and not get their booster doses.

This has practical implications for public health communication. First, increased training in risk communication, or the advice of risk communication experts, is necessary to develop effective, evidence-based communication strategies that foster public trust. Second, public health messages should emphasize guideline changes by providing context and explaining why the changes happened, and new recommendation should be communicated repeatedly to reduce doubts. Finally, vaccine hesitancy about novel vaccines, such as COVID-19 vaccines, should not be treated as vaccine hesitancy about routine vaccines; instead, there should be an active effort to acknowledge and address vaccine-specific concerns. This is crucial as new bivalent vaccines, which target two strains of the virus, have become recently available and individuals may be concerned about the safety of these new vaccines or may question the benefit of booster doses if vaccinated people can still contract the virus or transmit it to others.[70] Furthermore, understanding COVID-specific vaccine hesitancy can inform new vaccine communication efforts as many pandemic restrictions have been lifted in Canada (see ref.[71,72] such as vaccine requirements for travel and employment, potentially leading people to question the need for booster doses.

This study has three main limitations. First, our focus groups were conducted either before the COVID-19 vaccine was widely available or in the earlier stages of the vaccine rollout in Canada. While our data provides us with valuable insights, this study could be expanded with more focus groups once the vaccine was available to all Canadians. A second limitation is the size of our sample. While our study provides rich qualitative data, further research could be done with a bigger sample. Finally, despite the diversity of our focus group participants, all of them were Anglophones, thus the Franco-Canadian population remains underrepresented. Future studies could include Franco-Canadians to obtain a more robust understanding of Canadian attitudes toward the COVID-19 vaccine.

Notes

[a] We consulted with The Independent Living Resource Centre (Winnipeg), Manitoba Accessibility Office, Manitoba League of Persons with Disabilities, and the Council of Canadians with Disabilities (Manitoba chapter).

[b] We define "routine vaccinations" as those given to infants and children (e.g., polio, measles, mumps, rubella, pertussis, etc.), those that require routine boosters and adult routine vaccines (such those to prevent tetanus). Influenza vaccines were considered a separate category, which we report in Table 2.

[c] The Canadian Broadcasting Corporation, branded as CBC/Radio-Canada, is a Canadian public broadcaster for both radio and television. It is a federal Crown corporation funded by the Government of Canada.

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Ethics approval

Approval for this research was granted by the University of Manitoba Research Ethics Board (Reference number: H2020:510, Linked with H2020:164) and through Ryerson University Research Ethics Board (REB 2020-445).

Consent to participate

All participants gave informed consent to participate in this study, where publication was identified as one form of dissemination. Information and Study Consent Forms available upon request.

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